

INDEX

A

- American Oil Chemists Society (AOCS), 220, 221
 Amylopectin, 12–13
 Amylose, 12
 Anaerobic co-digestion, FVW, 104–106
 Anaerobic digestion, FVW
 biodegradation waste management, 103–104
 choice of temperature, 101
 potential for material recovery, 102
 reaction scheme, 101
 Apogossypol, 225
 Apple pomace
 for fatty acid production, 78
 for heteropolysaccharide-7 production, 79
 for lactic acid production, 78–79
Aspergillus niger, 73–74

B

- Bacillus licheniformis*, 194
 Balsamic vinegar. *See* Traditional balsamic vinegar (TBV)
 Barrel cask, TBV production process
 aging
 definition, 163
 physical ripening time, 166–168
 residence time, 164–166
 configuration, 160
 process streams types, 159
 refilling procedure
 degree of freedom (DOF) analysis, 163
 Fickian model, 161–162
 mass transfer, 161
 vectorial concentration model, 162–163
 residence time (RT), 160–161
 yield, 161
 Beer brewery waste, 97
 Beetroot, coloring agents, 86
 Bioadsorbents for wastewater treatment
 dyes adsorption, 97–98
 metal ions biosorption, 94–97
 Biodiesel production, 107–108

- Biopolymeric nanostructured particles
 hydrolyzed protein, 194
 polysaccharides, 194
 protein–polysaccharide mixtures, 194–195
 whole proteins, 193
 Borohydride, 222–223
 Bound gossypol (BG), 220, 221, 229, 231, 232

C

- Candida utilis*, 71
 Carboxymethylchitin, 91, 92
 Carotenoids, seafood wastes, 91
 Cauliflower, FVW, 83–84
Ceratocystis fimbriata, 75
 Chemoinformatics
 chemical space exploration, 35–36
 computational methods, classification and definition, 35
 definitions, 34
 in food chemistry
 chemical space comparison, 41
 physicochemical properties
 distribution, comparison, 42
 toxicity, 40
 food-related components
 molecular docking, 49–52
 molecular similarity, 43–47
 pharmacophore model, 47–48
 QSAR and QSPR, 48–49
 molecular databases and chemical space
 Distributed Structure-Searchable Toxicity (DSSTox), 38
 DrugBank, 39
 generally recognized as safe (GRAS) compounds, 38
 MMsINC database, 39
 National Cancer Institute (NCI) database, 39
 Protein and Bioactive Peptide Sequences (BIOPEP), 39
 SuperScent, 39
 molecular descriptors and physicochemical properties, 36–37

- Chenopodium quinoa*, 19
 Cotton and cottonseed products, 216–218
 Cyanoborohydride, 223
- D**
- Dairy industry wastes, 65–66
 Dairy wastes
 aerobic treatment, 111–116
 anaerobic treatment, 108–111
 Differential scanning calorimetry (DSC), 14
 Docosahexaenoic acid (DHA), 15
- E**
- Eicosapentaenoic acid (EPA), 15
 European Landfill Directive, 60
- F**
- Fermentation industry wastes, 64–65
 Fermentation, TBV production process
 acetic acid bacteria
 ecological studies, 157–158
 oxidation products, 158–159
 scalar fermentation, 154–156
 yeast and alcoholic fermentation
 product, 157
 zygosaccharomyces, 156
 Food chain management (FCM)
 for sustainable food system development,
 116
 food market focus, 118–119
 integrated product development and
 sustainability, 118
 market-oriented research, 117–118
 user-oriented innovation in food
 sector, 117
- Food materials structuring process
 electrospraying, 190–191
 homogenization, 186–188
 microfluidization, 188
 milling, 186
 rapid expansion of supercritical solution
 (RESS), 191–192
 ultrasound, 188–190
- Food-related components,
 chemoinformatics
 molecular docking
 Autodock, 49, 52
 improvement areas, 49
 Protein Data Bank, 49
 QSAR models, 50–51
 molecular similarity
- fusion methods, 43
 G-protein coupled receptor (GPCR), 44
 odor-structure relationships, 45–46
 OpenEye scientific software
 (OpenEye), 45
 stereochemical theory, 45
 pharmacophore model, 47–48
 QSAR and QSPR, 48–49
- Food waste processing
 FCM, sustainable food system
 development, 116
 food market focus, 118–119
 integrated product development and
 sustainability, 118
 market-oriented research, 117–118
 user-oriented innovation in food
 sector, 117
 fruit-and-vegetable wastes (FVWs),
 63–64
 multifunctional food ingredient
 production, 82–93
 recovering added-value products,
 69–82
 green production processes, development
 food production, holistic approach,
 61–62
 green production strategy, 62–63
 waste management hierarchy, 60–61
- problems and opportunities, 58–60
 anaerobic digestion (AD), 59
 CO₂ emissions, 59
 low levels of suspended solids and
 dissolved materials, 59
 restrictions on waste, 60
 sources and characterization
 dairy industry, 65–66
 fermentation industry, 64–65
 fruit-and-vegetable wastes (FVWs),
 63–64
 meat and poultry industry, 67–68
 olive oil industry, 64
 seafood by-products, 68–69
 using eggshell, 98
 vegetable residues for wastewater
 treatment
 dyes adsorption, 97–98
 metal ions biosorption, 94–97
 waste treatment
 aerobic treatment of dairy wastes,
 111–116
 anaerobic treatment of dairy wastes,
 108–111

- of aqueous food industry waste streams, 100
- biodiesel production, 107–108
- bioprocessing of FVWs, 100–107
- whey, added-value products, 98–100
- Free gossypol (FG)*, 221, 229, 231, 233
- Fruit-and-vegetable wastes (FVWs), 63–64
- bioprocessing, 100–107
- multifunctional food ingredient production, 82
- coloring agents and antioxidants, 84–86
- dietary fibers, 83–84
- food preservation, 88–89
- gelation properties, 87
- meat waste derivatives, 89–91
- oil and meal, 88
- production of biopolymers, films, food packaging, 89
- seafood waste derivatives, 91–93
- recovering added-value products
- SSF of fruit/vegetable by-products, 70–82
- vegetable industry challenges, 69–70
- Fusarium oxysporum*, 73, 74
- G**
- Gelatin, 92–93
- Glucosamine, 91–92
- Goldenberry pomace, 88
- Gongronella butleri*, 80
- Gossypol, cotton plant
- agricultural implication
 - antifeeding activity, 228–229
 - detoxification, 232–233
 - insecticidal activity, 228
 - toxicity, 229–232
- analyses, 225
- AOCS methods, 227
- enzyme-linked immunosorbent assays (ELISA), 227
- high-performance liquid chromatography (HPLC) method, 226–227
- near-infrared reflectance, 226
- biological properties
- anticancer activity, 237–242
 - antifertility activity, 235–237
 - antimicrobial activity, 247–248
 - antioxidant property, 234–235
 - antiparasitic protozoan activities, 244–247
 - antivirus activity, 242–243
- plasma cholesterol levels, 248–249
- clinical implication, 249–251
- cotton and cottonseed products, overview, 216–218
- occurrence, 218
- physiochemical properties, 218
- apogossypol, 225
 - chemical formula, 219
 - methylation, 224
 - naphthalene rings, 220
 - oxidation, 223
 - ozonolysis, 223–224
 - Schiff base reaction, 221, 222
 - structure, 219
 - tautomeric forms, 220
- G-protein coupled receptor (GPCR), 44
- Grape must production, TBV
- chemical changes, 153–154
 - cooking time effect, 155
 - physical changes, 154
 - solute concentration, 151–153
- Grape pomace, 75
- Grapes, 85–86
- H**
- Hydrogen–methane two-stage fermentation, 105
- 5-Hydroxymethyl furfural (HMF), 153
- Hydroxytyrosol, 84
- Hypokalemia, 249–250
- L**
- Lactic acid bacteria (LAB), 93
- Lipids and lipidic compound, Quinoa docosahexaenoic acid (DHA), 15 eicosapentaenoic acid (EPA), 15 fatty acid composition, 15, 17 polyunsaturated fatty acids (PUFA), 16 squalene and phytosterols, 17
- Liposomes, 203
- Lycopene, 81
- M**
- Meat and poultry industry wastes, 67–68
- Melanoidins, 153, 174
- Molecular databases and chemical space, chemoinformatics
- Distributed Structure-Searchable Toxicity (DSSTox), 38
- DrugBank, 39

Molecular databases and chemical space, chemoinformatics (*cont.*)
generally recognized as safe (GRAS) compounds, 38
MMsINC database, 39
National Cancer Institute (NCI) database, 39
protein and bioactive peptide sequences (BIOPEP), 39
SuperScent, 39
Molecular docking, 49–52
Molecularly imprinted polymer (MIP) techniques, 201
Molecular similarity fusion methods, 43
G-protein coupled receptor (GPCR), 44
odor-structure relationships, 45–46
OpenEye scientific software (OpenEye), 45
stereochemical theory, 45

N

Nanosensors and nanotracers *Escherichia coli*, 200
molecularly imprinted polymer (MIP) techniques, 201
molecular recognition, 199
Nanostructured materials aggregates disruption, 188–189
biopolymeric nanostructured particles hydrolyzed protein, 194
polysaccharides, 194
protein–polysaccharide mixtures, 194–195
whole proteins, 193
food materials structuring process electrospraying, 190–191
homogenization, 186–188
microfluidization, 188
milling, 186
rapid expansion of supercritical solution (RESS), 191–192
ultrasound, 188–190
functionality and applications encapsulated food components, 202–205
food packaging and edible coatings, 201–202
nanosensors and nanotracers, 199–201
future of, 206–207
high-pressure homogenization effects, 188–189

lipid nanoparticles, 195–196
microencapsulated food components, 204–205
microfluidization effects, 188–189
nanocomposites, 198–199
nanoscale manipulation, 185
nanostructured emulsions double emulsions, 197
microemulsions, 197
simple oil-in-water emulsions, 197
structuring emulsions, functionality, 198
nanotechnology and society, 206
Neurospora crassa, 73, 74

O

Oleuropein, 84
Onion wastes, 85
OpenEye scientific software (OpenEye), 45

P

Pectin, 87
Pectin methylesterase, 73
Penicillium decumbens, 73, 74
Pharmacophore model, 47–48
Phytosterols, 17
Polyunsaturated fatty acids (PUFA), 16

Q

QPs. *See Quinoa proteins*
Quantitative structure–activity relationships (QSARs) models, 35, 48–49
Quantitative structure–property relationships (QSPRs), 48–49
Quinoa antioxidant capacity, phenolic compounds, and flavonoids, 18 carbohydrates amylopectin, 12–13
amylose, 12
differential scanning calorimetry (DSC), 14
gelatinization properties, 14
glucose polymers, 11–12
granule size, 13
polysaccharides, 12
thermal properties, 14
chemical, nutritional, and physical properties, 4–6
chenopodium species, 2–3
functional properties

- quinoa flour, 21–23
 quinoa protein, 23
 quinoa starch, 24
 water-holding capacity (WHC), 21
 water imbibing capacity (WIC), 21
- lipids and lipidic compound**
 docosahexaenoic acid (DHA), 15
 eicosapentaenoic acid (EPA), 15
 fatty acid composition, 15, 17
 polyunsaturated fatty acids (PUFA), 16
 squalene and phytosterols, 17
- minerals and vitamins, 19–20
- proteins**
 active biopeptides, 9
 chemical and nutritional aspects, 6–9
 structural aspects, 9–10
- pseudocereal, 3
- saponins, 18–19
 uses of, 24–25
- Quinoa flour**
 emulsifying capacity and stability, 22–23
 functional properties, 22
 solubility, 21
- Quinoa proteins (QPs)**
 active biopeptides, 9
 chemical and nutritional aspects
 amino acids composition, 6–9
 protein efficiency ratio (PER), 7
 structural aspects, 9–10
- Quinoa starch**
 functional properties, 24
 structure, 11–15
- R**
- Rapid expansion of supercritical solution (RESS), 191–192
- Residence time (RT), 160–161, 164–166
- Rhizopus oligosporus*, 96
- Rhodopsin, 44
- S**
- Saponins, 18–19
- Seafood by-products wastes, 68–69
- Seafood wastes, derivatives
 carotenoids production, 91
 gelatin production, 92–93
 glucosamine and carboxymethylchitin production, 91–92
 marine peptone production, 93
- Solid-state fermentation (SSF),
 fruit/vegetable by-products
- antibiotics, 81–82
 apple pomace, 70–71
 aroma compounds production, 74–75
 baker's yeast production, 80
 enzymes production, 71–74
 ethanol production, 75–78
 feed protein, 81
 organic acids production, 78–79
 pigments production, 80–81
 polysaccharides production, 79–80
- Squalene, 17
- Supercritical fluid anti-solvent (SAS) process, 191
- T**
- Thermophilic bioremediation technology, 111–116
- Total gossypol (TG), 221, 233
- Traditional balsamic vinegar (TBV)
 chemical composition
 characteristics, 169
 composition, 174–175
 furanic compounds, 173–174
 melanoidins, 174
 minor compounds, 171–174
 organic acids, 170–171
 phenolic compounds, 172–173
 sugars, 169–170
 volatile compounds, 171
- condiments, 139, 141
- conservative mass balance equation, 151–153
- consortia, 138–139
- features, 142–143
- historical note
 comprehensive research, 140–141
 production aspects, 144–145
 testimonies, 141–144
- 5-hydroxymethyl furfural, 153
- legal aspects, 147–148
- physical properties
 color and spectrum absorbance, 176–177
 rheological properties, 176
- production process
 barrel set, 159–168
 cooking technology, 151–154
 cooking time effect, 155
 fermentation, 154–159
 raw material, 149–151
- semitic languages and italian legislation in European languages, 146

Traditional balsamic vinegar (TBV) (*cont.*)
 traditional vs. industrial, 146–147
 various forms, 145
sensorial aspects, 148
vinegars, 139–141

Tuna fin gelatin (TFG), 92–93

U

UK's Waste and Resources Action Program (WRAP), 59

User-oriented innovation in food sector, 117

V

Vegetable residues for wastewater treatment
dyes adsorption, 97–98

metal ions biosorption, 94–97
Vinegar. *See* Traditional balsamic vinegar (TBV)

W

Waste management strategies, 62–63

Waste recovery, 62

Whey utilization and disposal, 99–100

X

Xanthan gum, 79

Z

Zirconium, 96

Zygosaccharomyces, 156

A

- AAC. *See* Antioxidant activity coefficient
 Acid degree value (ADV) method, 178–179
Aeluropodeae, 217
 Alcoholic fermentation, 49, 54. *See also* Fermentation process
American trypanosomiasis
 diagnoses and treatment, 67–68
 discovery, 65–66
 with food
 Brazil, 72–77
 Chacao city, 77
 history, 64–65
 oral route transmission
 animals, 69–70
 humans, 70–71
 T. cruzi strain, 72
 phases and symptoms, 67
T. cruzi
 control (in food), 78–80
 life cycle, 66–67
 transmission routes, 68–69
 Antioxidant activity coefficient (AAC), 227
 Aroma extract concentration analysis (AECA), 196
 Aroma extract dilution analysis (AEDA), 196
 Artificial neural networks, 96

B

- Balsamic vinegars of Modena (BVM), 141–144
 Beer, 137–138
BHA. *See* Butylated hydroxy anisole
 Biomarkers. *See* Milk fat biomarkers
 Boehringer Mannheim kits, 174, 176
Botrytis cinerea, 47–48
 Bureau of Dairy Industry (BDI) method.
 See Acid degree value method
 Butylated hydroxy anisole (BHA), 230
BVM. *See* Balsamic vinegars of Modena

C

- Calcium flux mechanisms, 27–28
 Carbohydrate composition, ragi
 nonstarchy polysaccharide, 233–236
 starch, 231–233
 Cardiovascular diseases (CVDs), 6, 11–13
 Cereals, geographical origin
 discriminant analysis, 118
 ¹H NOESY spectrum, 116–117
Chagas disease transmission. *See also*
 American trypanosomiasis
 oral route transmission
 animals, 69–70
 humans, 70–71
 T. cruzi strain, 72
 outbreaks with food, Brazil
 Barcarena city, 76
 Belém city, 74
 Catolédo Rocha, 74–75
 Chacao city, 77
 Estrela, 73–74
 Macaúbas city, 76–77
 Pan American Health Organization (PAHO), 73
 routes, 68–69
Chamomile flowers (*Matricaria recutita* L.), 127–128
CHD. *See* Coronary heart disease (CHD)
 Cheese
 compositional analysis
 acidity and pH, 172–173
 ash, 172
 calcium and phosphorus, 173
 fat, 171
 moisture and total solids, 169, 171
 protein, 171–172
 salt and chloride content, 172
 standard methods, 169–170
 FTIR spectroscopy
 NIR and MIR, 197
 partial least-squares regression model, 199
 principle, 196–197

Cheese (*cont.*)

- sampling techniques, 197–198
- spectra of Cheddar cheese, 198–199
- TruDefender™ FT handheld, 199–200
- geographical origin
 - Emmental, canonical analysis of, 113–114
 - Italian Parmigiano Reggiano *vs.* east European Grana-type samples, 114, 116
 - mozzarella, 113
 - Parmigiano Reggiano, ^1H NMR spectrum of, 114–115
- quality and authenticity, 151–153
- ripening process
 - citrate metabolism assessment, 176
 - lactose and lactate
 - assessment, 174–178
 - lipolysis assessment, 178–180
 - proteolysis assessment, 180–194
 - smaller breakdown products
 - assessment, 194–196
 - sampling techniques, 168–169

Chemometrics. *See also* Geographical origin of foods; Quality and authenticity of foods

- artificial neural networks, 96
- multivariate statistical analysis, 92–93
- multivariate statistical analysis
 - applications, 93
 - compression technique, 93–94
- DA and independent component analysis (ICA), 94
- partial least squares
 - projections, 95–96

Chromatography, proteolysis assessment

- GC-FID chromatogram of cheddar, 192, 194
- IEC and SEC, 190–191
- RP-HPLC, 191–192
- water-soluble component extraction, 192–193

CLA. *See* Conjugated linoleic acid

Cocoa, 130–131

Cod liver oil, 128

Conjugated linoleic acid (CLA), 18

Copper soaps method, 178

Coronary heart disease (CHD), 24–26

CVDs. *See* Cardiovascular diseases

Cynodontae, 217

D

- Dairy food consumption. *See also* Obesity-related chronic disease
- CLA effects, 18
 - individual dairy foods effects, 21–23
 - micronutrients effects, 15–17
 - milk composition and percent contribution, 13–15
 - milk-derived peptides effects, 17
 - obesity-related chronic disease
 - and cardiovascular diseases, 11–13
 - and dietary fat, 6–7
 - metabolic syndrome and type 2 diabetes, 10–11
 - and weight management, 8–10
 - saturated fats, 18–20
 - total dairy fats, 20–21
 - trans-fatty acids effects, 17–18
- Dairy products
- cheese, 151–153
 - milk, 150–151
- Discriminant analysis (DA), 94, 96

E

- Electrophoresis, cheese ripening
- capillary, 190
 - isoelectric focusing (IF), 189
 - sample preparation and staining, 188–189
 - types and application, 188
- Eleusine coracana*
- composition
 - AAC, 227
 - α -amylase inhibitor, 242–243
 - benzoic acid, 228
 - BHA, 230
 - caffeic acid, 227
 - carbohydrate, 231–236
 - coumaric acid, 227
 - ferulic acid, 227
 - Folin–Ciocalteau method, 228
 - gallic acid, 228–231
 - mineral, 226
 - nitrogen and calcium, 225
 - nonstarchy polysaccharide, 233–236
 - phenolic acids, 227
 - polyphenol, 227–228, 230
 - protein, 225, 236–243
 - starch, 231–233
 - tannin, 227–228
 - testa, 228
 - total lipids, 225

trypsin/ α -amylase inhibitor, 242–243
 zinc, 226
 cultivation
 antiquity, 223
 expressed sequence tags, 225
 seed development, 223–224
 glycemic index, 251–252
 herbicides and genetic transformation, 253
 processing and utilization
 amino acid composition, 247
 amylase activity, 247
 flour, 243–244
 NPU, 246
 parboiling and decortication, 251
 PER, 246
 properties, 244–245
 sprouting, 249
 taxonomy
 Chloridoideae, 217–218
 chromosome number, 218
 distribution, Africa and India, 221
 fluorescent *in situ* hybridization, 219
 inflorescence morphology, 217–218
 landrace, 221–222
 linkage map, 222–223
 restriction pattern analysis, 219
 sequenced amplicons, 220
 tetraploid species, 219
Eleusine indica, 218–220, 235
 Eragrostideae, 217
 Extra virgin olive oil (EVOO). *See* Olive oil

F

Fat oxidation mechanisms, 27–29
 Fecal fat excretion mechanisms, 27–28
 Fermentation process
 alcoholic fermentation, 49, 54
 pesticides residues, 57–58
 yeasts, 54–57
 Finger millet. *See* *Eleusine coracana*
 Fish
 geographical origin, 121–122
 quality and authenticity, 149–150
 Folin–Ciocalteau method, 228
 Food characterization. *See also* Geographical origin of foods; Quality and authenticity of foods
 analytical online system, 89–90
 chromatographic techniques, 89
 omics techniques, 90
 Fourier-transform infrared (FTIR) spectroscopy

NIR and MIR, 197
 partial least-squares regression model, 199
 principle, 196–197
 sampling techniques, 197–198
 spectra of Cheddar cheese, 198–199
 TruDefenderTM FT handheld, 199–200

G

Geographical origin of foods
 cereals
 discriminant analysis, 118
 ¹H NOESY spectrum, 116–117
 chamomile flowers (*Matricaria recutita* L.), 127–128
 cheese
 Emmental, canonical analysis of, 113–114
 Italian Parmigiano Reggiano vs. east European Grana-type samples, 114, 116
 mozzarella, 113
 Parmigiano Reggiano, ¹H NMR spectrum of, 114–115
 cocoa, 130–131
 cod liver oil, 128
 EU regulation, 96–97
 fish, 121–122
 green tea, 126–127
 honey
 Corsican and non-Corsican, 120–121
 hierarchical PLS-DA, polyfloral, 119–120
 meat
 canonical analysis, 123, 125
 ¹H HRMAS and TOCSY spectrum, 123–124
 mustard oil, 125
 olive oil
 canonical LDA, 107–108
 classification, 106
 ¹³C NMR DEPT, 111–112
 ¹H and ¹³C NMR spectra, 108–109
 ¹H NMR spectroscopy and PCA, 106–107
 LDA, Lazio provinces, 108, 110
 PCA, Lombardia and Veneto bank of Garda lake, 111
 PDO, PGI, TSG status, 97
 product quality level, 97–98
 propolis, 128
 tomato paste
 ¹H NMR spectrum, Chinese and Italian triple, 128–129

Geographical origin of foods (*cont.*)
 unsupervised PCA protocol, 130
 traditional food products, 88
 wine
 Apulian and Slovenian, 103
 2D ^1H - ^{13}C GHSQC spectrum, Venosa, 98, 102
 metabolic content, 104
 physicochemical analysis, 103–104
 PLS-DA, 104–105
 red, 102–103
 trace element analysis and chemometrics, 105–106

Grapevine
 cultivation, 44–45
 pathogens
 citrus mealybugs (*P. citri*), 48–49
 downy mildew (*P. viticola*), 46–47
 grape moth (*L. botrana*), 48
 gray mold (*B. cinerea*), 47–48
 powdery mildew (*U. necator*), 47
 vine mealybug (*P. ficus*), 48–49

Green tea
 geographical origin, 126–127
 quality and authenticity, 141

H

Hemicellulose structure, ragi, 234
 Heptadecanoic acid, 3, 23–24
 High resolution-magic angle spinning (HR-MAS) spectroscopy, 91

Honey
 geographical origin
 Corsican and non-Corsican, 120–121
 hierarchical PLS-DA of polyfloral, 119–120
 quality and authenticity
 ^{13}C NMR study, 153
 ^1H NMR spectrum of polyfloral, 154–155
 TOCSY NMR experiment, 154

L

Lactic acid bacteria (LAB), 174
 Lipolysis, cheese ripening
 colorimetric methods, 178–179
 GC-MS detection, 180
 HPLC, 179
 sample preparation and GC analysis, 179–180
Lobesia botrana, 48

M

Malolactic fermentation (MLF)
 lactic bacteria, 59–60
 pesticide residues, 60

Meat
 geographical origin
 canonical analysis, 123, 125
 ^1H HRMAS and TOCSY spectrum of Swiss dried, 123–124
 quality and authenticity, 149–150

Metabolic syndrome and type 2 diabetes
 dairy food intake, 10–11
 obesity-related chronic disease, 5

Micronutrients effects, 15–17

Milk-derived peptides effects, 17

Milk fat biomarkers
 CHD, 24–26
 pentadecanoic acid and heptadecanoic acid, 23–24
 stroke, 26
 type 2 diabetes mellitus, 26

MLF. *See* Malolactic fermentation

Monovariate statistical analysis, 92–93

Multivariate statistical analysis
 applications, 93
 compression technique, 93–94
 discriminant analysis (DA) and
 independent component analysis (ICA), 94
 partial least squares projections, 95–96

Mustard oil, 125

N

Net protein utilization (NPU), 246

NMR. *See* Nuclear magnetic resonance (NMR)

Nonstarter lactic acid bacteria (NSLAB), 174, 176

NPU. *See* Net protein utilization

NSLAB. *See* Nonstarter lactic acid bacteria

Nuclear magnetic resonance (NMR). *See also*
 Geographical origin of foods; Quality and authenticity of foods

energy absorption, 90–91

HR-MAS spectroscopy, 91

MRI, 91–92

SNIF, 92

Nutrigenomic effects mechanism, 27, 29–30

O

- Obesity-related chronic disease
 calcium flux mechanisms, 27–28
cardiovascular diseases, 6
dairy food components
 CLA effects, 18
 micronutrients effects, 15–17
 milk composition and percent contribution, 13–15
 milk-derived peptides effects, 17
 saturated fats, 18–20
 total dairy fats, 20–21
 trans-fatty acids effects, 17–18
and dietary fat, 6–7
and dietary foods intake
 and cardiovascular diseases, 11–13
 metabolic syndrome and type 2 diabetes, 10–11
 obesity, and weight management, 8–10
fat oxidation mechanisms, 27–29
fecal fat excretion mechanisms, 27–28
individual dairy foods effects, 21–23
and insulin resistance, 4
metabolic syndrome and type 2 diabetes, 5
milk fat intake, biomarkers of CHD, 24–26
 pentadecanoic acid and heptadecanoic acid, 23–24
 stroke, 26
nutrigenomic effects mechanisms, 27, 29–30
satiation mechanisms, 27, 29
- Olive oil
geographical origin
 canonical LDA, 107–108
classification, 106
 ^{13}C NMR DEPT, 111–112
 ^1H and ^{13}C NMR spectra, 108–109
 ^1H NMR spectroscopy and PCA, 106–107
LDA, Lazio provinces, 108, 110
PCA, Lombardia and Veneto bank of Garda lake, 111
quality and authenticity
 ^{13}C NMR spectroscopy, 147
 ^1H and ^{13}C NMR, 148
LDA, Sicilian extra virgin, 147–148
 ^{31}P NMR spectra, 148–149

P

- Pappophoreae, 217
Partial least squares discriminant analysis (PLS-DA), 95–96, 104–105, 114, 116, 119–120
Pentadecanoic acid, 3, 23–24
PER. *See* Protein efficiency ratio
Pesticide effect. *See also* Wine fermentation, pesticide effect
 lactic bacteria, MLF, 60
 maximum residue limits, grape and wine, 53
 registered pesticides, 49–52
 yeasts, fermentation process, 54–57
Planococcus citri, 48–49
Planococcus ficus, 48–49
Plasmopara viticola, 46–47
Propolis, 128
Protected designation of origin (PDO), 88, 97
Protected geographical indication (PGI), 88, 97
Protein composition, ragi
 amino acid, 236–237
 α -amylases, 241
 carboxyesterase and ferulic acid esterase, 240
 prolamins, 238–239
 protease activity, 239
 pyrophosphatase activities and glycerolphosphatase, 240
Protein efficiency ratio (PER), 246
Proteolysis, cheese ripening
 analysis scheme for, 181–182
 chromatography, 190–194
 electrophoresis, 188–190
 fluorimetric and colorimetric methods, 187
 nitrogen analysis, extraction and fractionation methods, 182–184
reactive compounds and formol titration, 186
schematic diagram, 181
trichloroacetic acid (TCA), 185
ultrafiltration, 186
water-soluble extracts (WSE), 182, 185

Q

- Quality and authenticity of foods
 beer, 137–138
BVM and TBVM
 ^1H NMR spectrum, 143–144

Quality and authenticity of foods (*cont.*)
 PCA, 142
 coffee, 154
 dairy products
 cheese, 151–153
 milk, 150–151
 fish and meat, 149–150
 fruit juice, 143–145
 ¹H NMR spectra, 145–146
 PCA, 145
 SNIF-NMR, 144
 honey
 ¹³C NMR study, 153
 ¹H NMR spectrum, 154–155
 TOCSY NMR experiment, 154
 olive oil
 ¹³C NMR spectroscopy, 147
 ¹H and ¹³C NMR, 148
 LDA, Sicilian extra virgin, 147–148
 ³¹P NMR spectra, 148–149
 papers dealing NMR and chemometric characterization, 131–133
 vanilla, 154, 156
 vegetables
 green tea, 141
 potato, 138–139
 rice, 141
 watermelons, 139
 wheat, 139–141
 wine
 antioxidants, 137
 fermentative performance of yeast strains, 136–137
 ¹H NMR spectra of red wine, 134, 136
 metabolite content of grape berries, 134

R

Ragi. *See also* *Eleusine coracana*
 carbohydrate composition
 nonstarchy polysaccharide, 233–236
 starch, 231–233
 glycemic index, 251–252
 protein composition
 amino acid, 236–237
 α -amylases, 241
 carboxyesterase and ferulic acid esterase, 240
 prolamins, 238–239
 protease activity, 239
 pyrophosphatase activities and glycerolphosphatase, 240

Ripening, cheese monitoring
 lactose, lactate, and citrate metabolism assessment
 acetic acid measurement, 176
 analysis, 174–175
 Boehringer Mannheim kits, 174, 176
 citrate quantification, 176
 diacetyl and acetoin quantification, 176–177
 gas chromatographic methods, 177–178
 high-performance liquid chromatography (HPLC) method, 177
 lipolysis assessment
 colorimetric methods, 178–179
 GC-MS detection, 180
 HPLC, 179
 sample preparation and GC analysis, 179–180
 proteolysis assessment
 analysis scheme for, 181–182
 chromatography, 190–194
 electrophoresis, 188–190
 fluorimetric and colorimetric methods, 187
 nitrogen analysis, extraction and fractionation methods, 182–184
 reactive compounds and formol titration, 186
 schematic diagram, 181
 trichloroacetic acid (TCA), 185
 ultrafiltration, 186
 water-soluble extracts (WSE), 182, 185
 smaller breakdown products assessment
 biogenic amines, 196
 headspace analysis, 195
 lactones and methyl ketones, 195
 pathways, 194–195
 SPME, 195–196

S

Satiation mechanisms, 27, 29
 Saturated fats, 18–20
 Site specific natural isotope fractionating (SNIF)-NMR technique, 92
 authenticity of fruit juice, 144–145
 authenticity of mustard oil, 125
 geographical characterization of wines, 105–106
 Sporoboleae, 217

T

TBVM. *See* Traditional balsamic vinegars of Modena
 Tomato paste, concentrated
¹H NMR spectrum, Chinese and Italian triple, 128–129
 unsupervised PCA protocol, 130
 Total dairy fats, 20–21
 Traditional balsamic vinegars of Modena (TBVM), 141–144
 Traditional specialty guaranteed (TSG), 88, 97
 Trans-fatty acids effects, 17–18
Trypanosoma cruzi. *See also* American trypanosomiasis
 control (in food)
 food contamination, 78
 freezing and refrigeration, 79
 good manufacturing practices (GMP), 80
 integrated pest management (IPM), 80
 microwaves and ionizing radiation, 79
 sanitization and pasteurization, 79
 standardized operational procedures (SOPs), 80
 life cycle, 66–67
 strain influence, 72
 Trypsin/α-amylase inhibitor, 240–241
 Type 2 diabetes, 5, 10–11

U

Uncinula necator, 47

V

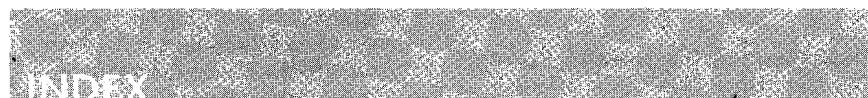
Vanilla, 154, 156
 Vinegar, BVM and TBVM, 141–144

W

Wine
 geographical origin
 Apulian and Slovenian, 103
 2D ¹H-¹³C GHSQC spectrum, 98, 102
 metabolite content, 104
 physicochemical analysis, 103–104
 PLS-DA, 104–105
 red, 102–103
 trace element analysis and chemometrics, 105–106
 quality and authenticity
 antioxidants, 137
 fermentative performance of yeast strains, 136–137
¹H NMR spectra of red wine, 134, 136
 metabolite content of grape berries, 134
 Wine fermentation, pesticide effect
 consumption, 45–46
 fermentation process
 alcoholic fermentation, 49, 54
 pesticides residues, 57–58
 yeasts, 54–57
 grapevine cultivation, 44–45
 grapevine pathogens
 citrus mealybugs (*P. citri*), 48–49
 downy mildew (*P. viticola*), 46–47
 grape moth (*L. botrana*), 48
 gray mold (*B. cinerea*), 47–48
 powdery mildew (*U. necator*), 47
 vine mealybug (*P. ficus*), 48–49
 malolactic fermentation
 lactic bacteria, 59–60
 pesticide residues, 60
 maximum residue limits, grape and wine, 53
 registered pesticides, 49–52

Z

Zoysieae, 217

**A**

- Acute toxoplasmosis, 6
 Alaska pink salmon, 139
 Alaska pollock gelatin, 138–139
 Animal feed
 C. difficile, 60
 E. coli O157:H7, pathogen transmission,
 72–73
 rat feeding experiments, 38
 Asthenia, 7
 Atlantic cod, 138
 Atlantic salmon, 138

B

- Bacteriophage
 high-level shedders, 81–82
 preharvest control, 92–93
 Bill and Melinda Gates Foundation (BMGF), 23
 Biofortification
 anthropometric measurements and
 blood tests, 43
 Burkina Faso, 44–45
 cereal, 42–43
 CMF, 44
 definition, 23
 lysine plus threonine, 42
 micronutrient deficiency, 46
 PDCAAS, 45–46
 QPM, 44
 transferrin and hemoglobin levels, 43
 wheat bread, 43
 Biosorghum project, 23–24
 Bradyzoites, 3–5

C

- Carcass contamination
 C. difficile, 60–61
 E. coli O157:H7
 fecal shedding and hide prevalence,
 70, 89
 probability, 81
 Carp skin gelatin, 139
C. difficile infection (CDI), 54

- Cerebral biopsy, 10
 Cerebral toxoplasmosis, 9–10
 Clostridial spores, 60
Clostridium difficile
 animal feed, 60
 detection, food
 bacteriologic culture, 55
 enrichment broths, 55–56
 recovery rates, 55, 57
 environmental strains/organisms, 57, 60
 food contamination, 60–61
 genotypes, 61–62
 human colonization, 62–63
 isolation, 54
 meat and meat products, 57–59
 Cold-water fishes, 129–130
 Collagen
 α -chains, 122–123
 amino acids, 123
 β -and γ -chain, 123
 fibrils, 121–122
 gelatin conversion
 alkali and acid process, 125
 drying and grinding process, 126
 extraction method, 125–126
 pretreatment process, 125
 removal of unwanted materials, 124
 hydroxyproline, 123
 isoelectric point, 137
 molecular structure, 122
 molecules arrangement, 121–122
 stabilization, hydrogen bonds, 123–124
 structural protein, 25
 triple helix structure, 122
 tropocollagen, 122
 types, 124
 Cow's milk formula (CMF), 44

D

- DDG. *See* Dried distillers grain
 with/without solubles
 Direct/indirect fecal–oral exposure, 75
 Dried distillers grain with/without solubles
 (DDGS), 84–85

E

- Electrolyzed oxidizing water, 74
Enterobacteriaceae, 93
Escherichia coli O157:H7
 animal stress
 catecholamine norepinephrine, 87
 heat stress, 88
 immune response, 87
 livestock response, 88
 microbial food safety risk, 86
 practical implications, 87
 weaning, 87
 antimicrobial carcass interventions, 97
 bacterial diarrhea, 68
 beta-agonists, 88–89
 diet effects, shedding and persistence
 barley grain, 84
 cattle fed barley *vs.* cattle fed cracked,
 84, 86
 distillers grains, 84
 energy-dense grain rations, 84
 gastrointestinal tract and fecal
 incidence, 86
 potential effects, 83–84
 ruminal fluid, 83
 ruminant animals, 82–83
 WDGS and DDGS, 84–85
 fecal shedding, 70
 feedlot cattle, 89
 high-level shedders
 bacteriophage, 81–82
 cattle hide contamination, 81
 chain of events, 81–82
 colonization, 81
 feedlot pens, 80
 mathematical modeling, 80–81
 super-shedders, 80, 82
 ionophores, 89
 modes of transmission, 69
 outbreak, water, 69
 preharvest control
 bacteriophage, 92–93
 brown seaweed product, 95
 chlorate, 93–94
 cottonseed, 94
 esculinin and esculin, 95
 manure and cattle pen surface
 treatments, 95–97
 neomycin sulfate, 94
 probiotics/direct-fed microbials, 91–92
 rumen modifiers, 94
 vaccines, 90–91

risk factors, 98**seasonality of shedding**

- cattle feeds, 77
 cooler temperatures, 77–78
 heat stress, cattle, 78
 human foodborne disease, 80
 melatonin, 78
 percentage of samples, 78–79
 physiological responses, animal, 78
 prevalence, 77

sorbitol fermentation, 70

- sources and transmission, cattle**
 animal feed, 72–73
 drinking water, 73–75
 feces, manures, and soils, 75–76
 flies, 71–72
 on-farm ecology, 70
 potential reservoirs/vehicles, 70–71
 prevalence, 71
transportation and lairage, 98–99

F**Fecal-oral transmission, 75****Feedlot calves, 61****Fish gelatin**

- chemical characteristics**
 amino acid composition, 134
 peptide size, quality, 134–135
common and potential sources, 129–130
effects of processing conditions
 alkali and acid treatments, 135–137
 extraction temperature and duration,
 137–138
 gelatin extraction flowchart, 135–136
 storage and transportation, 138

physical attributes

- gel strength, 130–132
 melting and gelling temperature,
 132–133
 viscosity, 131–132

quality *vs.* mammalian gelatins, 138–139**Freeze drying method, 140****Frequency sweep tests, 133****G****Gelatin**

- biopolymers, 120
 characteristics, 127
 chemical composition, 120
 collagen-gelatin conversion
 alkali and acid process, 125

drying and grinding process, 126
extraction method, 125–126
pretreatment process, 125
removal of unwanted materials, 124
gelatin market, 128
gelation mechanism, 126
industrial applications, 128–129
manufacturing, raw material, 127–128
parent molecule, collagen
 α -chains, 122–123
 amino acids, 123
 β -and γ -chain, 123
 fibrils, 121–122
 hydroxyproline, 123
 molecular structure, 122
 molecules arrangement, 121–122
 stabilization, hydrogen bonds, 123–124
 triple helix structure, 122
tropocollagen, 122
 types, 124
quality determination, 139–140
Gelatin hydrolysate, 134
Gelation mechanism, 126
Gel strength
 bloom jar, 130–131
 bloom strength, 130
 different instruments and probes,
 131–132
 measurement, standard method, 130
Glucocorticoid dexamethasone, 87
Grand Challenges in Global Health, 23

H

Headache, 7
Heat drying method, 140
High-level shredders
 bacteriophage, 81–82
 cattle hide contamination, 81
 chain of events, 81–82
 colonization, 81
 feedlot pens, 80
 mathematical modeling, 80–81
 super-shredders, 80, 82
Houseflies, 71–72
Hydroxyproline, 123–124, 134

I

Isoionic point, 137

K

Kafirin–tannin complexation, 42

L

Leishmania gondii, 3
Lymph node enlargement, 7

M

Mediterranean Intensive Oxidant Study
(MINOS), 27
Multivariate regression analysis approach, 7
Muscle mass
 amino acids, 26–27
 death, human starvation, 27
 maintenance, 28
 malnutrition, 26
 metabolism, genesis, 26
 MINOS (see Mediterranean Intensive
 Oxidant Study)
 obesity relationship, 27
 protein loss, 28
 rapid starvation/dietary protein
 depletion, 26

N

Neomycin sulfate, 94
N-(n-butyl) thiophosphoric triamide
(NBPT), 96

O

Ocular toxoplasmosis, 8, 10
Oocysts sporulation, 5
Osteopenia, 27

P

Parasitophorous vacuole, 4
Pharmaceutical gelatin, 129
Preharvest control
 bacteriophage, 92–93
 brown seaweed product, 95
 chlorate, 93–94
 cottonseed, 94
 esculin and esculin, 95
 manure and cattle pen surface treatments,
 95–97
 neomycin sulfate, 94
 probiotics/direct-fed microbials, 91–92
 rumen modifiers, 94
 vaccines, 90–91
Proline, 123–124, 134, 139
Protein content and composition
 PDCAAS calculation, sorghum, 33, 36
 sorghum vs. other cereals, 32, 34–35
 tryptophan, 36

- Protein digestibility
changes, protein body, 39
cross-linking, kafirin prolamin proteins, 36–37
diets, 38, 41
disulfide bonding, 36
grain improvement, 37
gruels, 38
high-*vs.* normal-lysine sorghum, 37
nutritional parameters, 38
rat feeding experiments, 38
sorghum lines, 39–40
transgenic biofortified sorghum, 41–42
wet cooked sorghum, 36
- Protein Digestibility Corrected Amino Acid Score (PDCAAS)
biological value prediction, 31
calculation, sorghum, 31–33
protein quality, 32, 34–35
transgenic biofortified sorghum, 42
- Protein Efficiency Ratio (PER), 31
- Pulsed-field gel electrophoresis (PFGE)
C. difficile genotypes determination, 61–62
patterns, 72
- Q**
- Quality Protein Maize (QPM), 44
- R**
- Rheological method, 132–133
- Ribotyping, 61–62
- S**
- Sorghum protein
biofortification
anthropometric measurements and blood tests, 43
Burkina Faso, 44–45
cereal, 42–43
CMF, 44
definition, 23
lysine plus threonine, 42
micronutrient deficiency, 46
PDCAAS, 45–46
QPM, 44
transferrin and hemoglobin levels, 43
wheat bread, 43
- human health
amino acids classification, 24–25
cereal, 29
- 1985 FAO/WHO/UNU *vs.* 2002 WHO/FAO/UNU requirements, 28–29
- fat, 26
indispensable amino acids, 24
meta-analysis, 28
muscle mass, 26–28
nitrogen and amino acid needs, 28
nitrogen-containing compounds, 25
nutrition security planning, 28
pregnancy and lactation period, 30
protein types, 25
safe level protein recommendation, 29
scoring patterns, amino acid, 30
- quality
chemical mutagenesis, 39
in vitro pepsin method, 41
lysine-rich protein synthesis, 40
and measurement, 31–32
protein body change, 39
protein content and composition, 32, 34–36
protein digestibility, 36–39
sorghum lines, 39–40
sorghum *vs.* other cereals, 34–35, 40–41
stunted and underweight children, Africa, 22–23
- Stress and strain sweep tests, 133
- T**
- Tachyzoites, 3–4
- Tannins, 42
- Temperature sweep tests, 133
- Thermoreversible gels, 127
- Thymol, 96
- Tilapia skin gelatin, 138
- Time sweep tests, 133
- Toxoplasma gondii*. *See also* Toxoplasmosis
control in foods, 13–14
life cycle
 asexual developmental cycle, 3–4
 felines, 3
 interaction, host cells, 3–4
 sexual phase, 5
 stagespecific markers, 4
- Toxoplasmosis
congenital toxoplasmosis, 2
discovery, 3
laboratory diagnosis and treatment
 cerebral toxoplasmosis, 9–10
 differential diagnosis, 10
 DNA detection, PCR, 9

- IgG and IgM antibodies detection, 9
immunocompetent *vs.*
 immunocompromised patients, 9
ophthalmologic examination, 10
serologic tests, 9
misdiagnosis/underdiagnosis, 2
outbreaks, 12–13
pathogenesis and human infection
 spectra
 asymptomatic infection, 7
 immunodeficiency, 8
 infection, pregnancy, 6–7
interferon-gamma (IFN- γ) production,
 8
ocular toxoplasmosis, 8
risk factors, 7–8
transmission
 cyst infection, ME-49 strain, 11
- foodborne transmission, 5
food ingestion, 11
oocysts ingestion, 5
sausage samples, 11
tachyzoite, 5–6
undercook meat, 11
unpasteurized milk, 11
- Trimester, 6–7
- U**
- Unpasteurized milk, 11, 69
- W**
- Water dessert gels, 128
Water troughs, 73–74
Wet distillers grain with solubles (WDGS),
 84–85

INDEX**A**

- Acetaldehyde
 accumulation, 160
 concentrations, 162
 free and bound SO₂, 160–161
- Adulteration, 59, 99
- Alcoholic fermentation, 4
- Allergens, 205
- Amperometric detection, 98
- Aroma, wine
 effects, 172–177
 oxidation, 158–159
- Artificial effervescence, 27
- Artificial neural networks (ANNs), 91–92
- Artificial tongue
 adulteration and food falsification, 59
 analytical techniques
 impedance spectroscopy, 68–69
 potentiometry, 67
 voltammetry, 68
 beverage differentiation, 65
 chemometrics
 classification and class-modeling, 83–93
 exploratory analysis, 79–83
 multivariate experimental design, 71–73
 preprocessing, 73–78
 regression techniques, 93–96
 validation, 96–98
- environmental analyses, 64
- food science
 aging process, 103
 amperometric detection, 98
 ANN models, 100
 biosensors, 103
 commercial electronic tongue, 105
 cross-validation approach, 104–105
 glucose and ascorbic acid
 determination, 104
 hybrid sensor, 99
 impedance measurements, 98
- pasteurization processes, 106
- PCA, 98–99
- potentiometric ion-selective sensors, 104
- potentiometric sensors, 103, 106
- predicting sensorial attribution, 100
- pulse voltammetry, 101
- sensorial analysis, 100–102
- SIMCA models, 99–100
- square wave and cyclic voltammetry, 98
- tea analysis, 104
- water monitoring approaches, 103
- wine
 adulterations, 99
 age prediction, 101
 characterization, 98
 food taste properties, 66
 historical aspects, 62–63
 liquid food, 64–65
 nonspecific analytical responses, 60
 pharmaceutical technology studies, 64
 production phase, 58
 qualitative approach and quantitative
 applications, 63
 research-and-development, 58
 sensations, mammals, 60
 terminology, 61–62
 vanguard analytical strategies, 59
 variability amount implications, 58

B

- Beverages. *See* Champagne and sparkling
 beverages
- Biofilms, 130
- Biosensors, 103
- Bubble
 bubbling regimes, 23–24
 bursting process
 avalanches, 51–53
 flower-shaped structures, 48–49
 hexagonal pattern arrangement, 47–48
 high-speed photography, 43–44

- Bubble (cont.)**
- schematic transversal representation, 50–51
 - shear stresses, 49–50
 - surface active molecules, 45–47
 - close-up time sequence and mechanism, 25
 - growth
 - characteristics, 28–29
 - high-speed photography and strobe lighting, 28
 - pressure, 30–31
 - microparticles, 151
 - micrometric gas bridge establishment, 26
 - size
 - carbon dioxide content, 33–34
 - gravity acceleration, 32–33
 - pressure, 33
 - significant difference, 34
 - temperature dependence, 32
 - two gas pockets, 26
- Bubble nucleation process, champagne**
- artificial effervescence, 27
 - bubbling instabilities
 - bubbling regimes, 23–24
 - close-up time sequence and mechanism, 25
 - micrometric gas bridge establishment, 26
 - two gas pockets, 26
- cellulose fibers**
- bubbling frequency, 20–22
 - CO₂ dissolved concentration, 19–20
 - conditions, 18
 - real gas pocket trapping, 18–19
 - structural levels, 15–16
- critical radius, 12–13
- natural effervescence, 13–15
- C**
- Cabernet Sauvignon wine, 169**
- Cell traction, photosensitizers**
- biofilms, 130
 - cytotoxic species, 125
 - electron microphotographs, *Bacillus cereus*, 128
- fungal cells and yeasts, 127, 130**
- gram negative bacteria, 127, 129**
- gram-positive bacteria, 127–128**
- killing effects, 129**
- metabolic pathways, 127**
- modes of light delivery, 133**
- photoactive fullerene derivatives, 132**
- spore formation, 130**
- viruses and structures, 131–132**
- Champagne and sparkling beverages**
- bubble growth
 - characteristics, 28–29
 - high-speed photography and strobe lighting, 28
 - pressure, 30–31
 - bubble nucleation process
 - artificial effervescence, 27
 - bubbling instabilities, 23–27
 - cellulose fibers, 15–23
 - critical radius, 12–13
 - natural effervescence, 13–15
 - bubbles bursting process
 - avalanches, 51–53
 - flower-shaped structures, 48–49
 - hexagonal pattern arrangement, 47–48
 - high-speed photography, 43–44
 - schematic transversal representation, 50–51
 - shear stresses, 49–50
 - surface active molecules, 45–47
 - bubble size
 - carbon dioxide content, 33–34
 - gravity acceleration, 32–33
 - pressure, 33
 - significant difference, 34
 - temperature dependence, 32
 - chemical composition, 8–9
 - CO₂ dissolved gas molecules
 - blending, 4
 - first alcoholic fermentation, 4
 - second alcoholic fermentation, 5–6
 - flute vs. coupe
 - champagne serving, 36–37
 - CO₂-dissolved concentrations, 37–38
 - time series data recordings, 39–40
 - pressure under the cork, 6–8
 - temperature, role of, 42–43
 - uncontrolled champagne cork, 9–12
- Chemometrics**
- classification and class-modeling
 - artificial neural networks, 91–92
 - class-modeling techniques, 92–93
 - k-nearest neighbors, 85–86
 - linear discriminant analysis, 86–89
 - quadratic discriminant analysis, 88
 - soft independent modeling of class analogy, 90–91
 - unequal class models, 88, 90

column autoscaling, 76–77
 column centering, 76
 exploratory analysis
 clustering, 82–83
 principal component analysis, 79–82
 multivariate experimental design
 experimental factors, 71
 factorial scheme, 71–72
 regression techniques
 ordinary least squares, 93–94
 partial least squares, 94–96
 row preprocessing
 effectiveness, 73–74
 exploratory analysis, 79–83
 first and second order derivation,
 75–76
 forward and backward currents, 76
 signal compression and variable
 reduction
 SELECT, 78
 wavelet transform, 77–78
 signal variations, 75
 standard normal variate transform, 75
 validation
 cross validation, 97
 repeated evaluation set, 98
 single evaluation set, 97
 strategy, 96–97
 Codex Alimentarius Commission (CODEX),
 59

CO₂ dissolved gas molecules, beverages
 blending, 4
 bubbling environment, 35
 first alcoholic fermentation, 4
 flute *vs.* coupe
 champagne serving, 36–37
 time series data recordings, 39–40
 vessel influence, 37–38
 second alcoholic fermentation, 5–6
 temperature, role of, 42–43

Cross validation (CV), 97

Cyanogenic glycosides, 205

Cytotoxic species

- photoexcitation, photosensitizer, 125
- PS-excited triplet reaction, 125–126
- ROS, 126

E

Effervescence process
 artificial effervescence, 27
 natural effervescence
 lumen, 13

mechanism, 14
 time sequence, 15
 visual aspects, 38
 Electronic tongue, 103. *See also Artificial tongue*

F

Fatty acids, 198–200
 Food and Agricultural Organization (FAO),
 59
 Food falsification, 59
 Food processing, morama
 milk
 amino acid composition, 215–216
 chemical composition, 215
 fermented milk products, 217–218
 preprocessing treatment, 216
 small-scale method, 216–217
 thermal treatment, 216
 oil, 218
 protein-rich morama flours
 amino acid composition, 221
 dry heating process, 222
 physico-chemical and protein-related
 functional properties, 223
 preparation, 218–219
 processing procedure, 220
 proximate composition, 219–220
 uses, 222

G

Glucose and ascorbic acid, 104
 Glutathione, 163

H

Hybrid sensor, 99

K

k-Nearest neighbors (k-NN), 85–86

L

Linear discriminant analysis (LDA), 86–89

M

Malachite green, 137
 Methylene blue (MB)
 European blood transfusion, 138
 photoactive dyes, 136–137

- Microoxygenation (MOX)
acetaldehyde
 accumulation, 160
 concentrations, 162
 free and bound SO₂, 160–161
aroma effects, 172–177
microbiological considerations, 179–181
microbullage delivery, 151–152
mouthfeel effects, 177–179
oxygen spatial considerations, 153–154
polymer membrane, oxygenation
 procedures, 152–153
red wine color effects and polyphenol development
 antioxidant assays, 170
 Cabernet Sauvignon wine, 169
 chemical and instrumental analyses, 172
 color intensity, 164
 color properties, 166
 HPLC analyses, 165
Monastrell wine, 166–167
pigment composition, 165
polymeric pigments and color density, 168
red wine maturation, 158
SO₂ influence and wine antioxidants, 162–164
wine oxidation processes
 oxygen in wine, 154–155
 polyphenol-mediated, 155–157
 wine aromas, 158–159
Monastrell wine, 166–167
Morama bean (*Tylosema esculentum*)
 allergens, 205
 ash content, 196
 availability, 232–233
 carbohydrate/dietary fiber, 202
 chemical composition, 195–196
 cultivation, 235–236
 cyanogenic glycosides, 205
 dietary use, 233
 economic importance, 189
 fatty acids, 198–200
 geographic distribution and description, 190–192
 health benefits, 206, 208–212, 233–234
 lipids, 196, 198
 market, 236–237
 milk
 amino acid composition, 215–216
chemical composition, 215
fermented milk products, 217–218
preprocessing treatment, 216
small-scale method, 216–217
thermal treatment, 216
minor chemical components
 minerals, 203
 phytoestrogens, 203–204
 vitamins, 203
moisture, 196
oil, 218
pests and diseases, 192
phenolic compounds, 205–207
phytosterols, 198, 201
potential marketing strategies
 commercialization strategies, 229–230
competition, 225
conjoint analysis, 228–229
consumer purchasing characteristics, 225–227
market size and characteristics, 224
retail environment, 224–225
protein, 201–202
protein-rich morama flours
 amino acid composition, 221
 dry heating processes, 222
 physico-chemical and protein-related functional properties, 223
preparation, 218–219
processing procedure, 220
proximate composition, 219–220
uses, 222
seed morphology, seedling development and growing stages, 192
soil organic matter, 195
soil pH, 193–195
staple food, 234
triacylglycerols, 198
trypsin inhibitor, 204–205
values, 231–232
varieties and classification, 193
MOX. *See* Microoxygenation
MRM, 92–93
Multivariate design of experiments (MDOE)
 chemometrics, 69
 experimental factors, 71
 factorial scheme, 71–72
Multivariate range modeling (MRM), 92–93

N

Natural effervescence
lumen, 13
mechanism, 14
time sequence, 15

O

Ordinary least squares (OLS), 93
Oxidation processes
photosensitized oxidation, 123
wine
aldehydes, 156
aromas, 158–159
condensation processes, 157
oxygen, 154–155
polyphenol quinones, 156

P

Partial least squares (PLS), 94–96
Pasteurization, 106
PDT. *See* Photodynamic treatment
Pests and diseases, 192
Phenolic compound, 205–207
Phenothiazinium dyes, 136
Phloxine B, 137
Photoactive dyes
antimicrobial properties, 134
cationic polymer poly (vinyl amine), 138
cationic porphyrin derivatives, 134
endogenous porphyrins, 135
malachite green, 137
MB, 136–137
medical and therapeutic applications, 133
phenothiazinium dyes, 136
phloxine B, 137
porphyrin derivatives, 135
rose bengal, 137
TBO, 136

Photodynamic treatment (PDT)
application and principles, 123
cell intraction, PSs
biofilms, 130
electron microphotographs, *Bacillus cereus*, 128
fungal cells and yeasts, 127, 130
gram negative bacteria, 127, 129
gram-positive bacteria, 127–128
killing effects, 129
metabolic pathways, 127
modes of light delivery, 133

photoactive fullerene derivatives, 132
spore formation, 130
viruses and structures, 131–132
cytotoxic species
photoexcitation, photosensitizer, 125
PS-excited triplet reaction, 125–126
ROS, 126
effects, 120
environmental cleaning and disinfection
biofilm destruction and inactivation, 140
food-grade PSs, 140
immobilized photoactive dyes, 139
inactivate pathogens, 141
photobleaching, 142–143
self-cleaning materials, 143
virus inactivation, 138

photoactive dyes (*see* Photoactive dyes)
photochemical reaction, 122
photophysical reaction, 121
photosensitized oxidations, 123
photosensitized reactions, 122

Phytosterols, 198, 201

PLS. *See* Partial least squares

Polyphenols
oxidation processes
aldehydes, 156
condensation processes, 157
polyphenol quinones, 156
wine aroma, 158
red wine maturation, 150

Porphyrin derivatives, 135

Potentiometric ion-selective sensors,
104

Potentiometric sensors, 103, 106

Principal component analysis (PCA)
pattern recognition tools, 104
red wine, color effects, 169
voltammograms, 80

Protein-rich morama flours
amino acid composition, 221
dry heating processes, 222
physico-chemical and protein-related
functional properties, 223
preparation, 218–219
processing procedure, 220
proximate composition, 219–220
uses, 222

Q

Quadratic discriminant analysis (QDA), 88

R

- Red wine
color effects
 color development, 166
 PCA projection, 169
 polymeric pigments, 168
 polyphenol antioxidant measures, 170
 wine color parameters, 165, 167–168
maturation, 158

S

- Sangiovese wine, 168
Soft independent modeling of class analogy (SIMCA), 90–91
Sulfur dioxide
antioxidants
 free SO₂, 162
 glutathione, 163
 quinone reduction processes, 163
 wine-aging processes, 163
free and bound SO₂, 160–161

T

- Triacylglycerols, 198
Trypsin inhibitor, 204–205

U

- Unequal class models (UNEQ), 88, 90

W

- Wine
adulterations, 99
age prediction, 101
antioxidants
 free SO₂, 162
 glutathione, 163
 quinone reduction processes, 163
 wine-aging processes, 163
characterization, 98
color parameters
 in Cabernet Sauvignon, 169
 in Morellastrell wine, 166–167
 in Sangiovese wine, 168
oxidation processes
 aromas, 158–159
 oxygen, 154–155
 polyphenol-mediated, 155–157
 red wine (*see Red wine*)
World Health Organization (WHO), 59

INDEX**A**

AFM. *See* Atomic force microscopy
Atomic force microscopy (AFM)
 carrageenan gelation mechanism
 components, 222
 ι -carrageenan, 224–225
 κ -carrageenan, 222–223
 rheological behaviour, 223
 side-by-side aggregation, 225–226
 casein micelle structure and
 nanorheology
 carrageenans, 220
 decomposition, 218
 description, 218
 graphite surface, 221
 HOPG, 218, 220
 milk, 217
 pressure-treated, 219
 rheological properties, 220–221
 surface tension-based model, 222
 Young moduli, 221
 description, 202
 food structure, 206
 gelatin nanostructure and elastic property
 alkaline and acid pretreatment, 212
 ampholyte macromolecules, 208
 annular pores, 212, 214
 Catfish skin, 208–210
 dependence, viscoelastic parameters,
 217
 elasticity determination, 215
 error-signal mode images, 211
 fibril structure, 212, 214
 force-distance curves, 212, 215
 high-friction layer, 207
 hydrolysis, 207
 pretreatment, 212–214
 viscous response, 216
 Young's modulus calculation, 216
gellan gum gelation
 acyl contents and cations, 227–228
 continuous network structures, 230
 description, 226

κ -carrageenan, air, 226–227
 molecular assemblies, 228–229
 potassium and sodium cation, 230
interface phenomenon
 displacement processes, 235–236
 DPPC monolayer structures, 237
 interfacial rheology characteristics, 237
 Langmuir–Blodgett techniques, 234
 phospholipids, 235
 surfactants/proteins, 234
nanofabrication, 202
principles
 cantilevers, 205
 commercial tips, 206
 contact mode, 203
 dynamic imaging mode categories,
 204–205
 interaction force and physical
 properties, 205
 noncontact techniques, 204
 operating modes, 204
 sharp tip scanning, 202–203
 tip-to-sample distance, 203
starch nanostructure and degradation
 mechanism
 glucoamylase–amylose complexes, 233
 glucoamylases, 231
 molecule types, 230–231
 potato and rice amylose, 231–232
 SBD, 231–232, 234

B

Botanical and geographical origin
discrimination, honey
aliphatic acid
 capillary electrophoresis (CE), 116
 chromatographic methods, 115
 enzymatic methods, 114
 IC-CD method, 115
 uses, 113–114
amino acids
 lavender and eucalyptus, 101
 linear discriminant analysis, 99–100

- Botanical and geographical origin**
 discrimination, honey (*cont.*)
 nitrogen content, 98
 pollen and proline, 99
- aroma compounds**
 definition, 101–102
 volatile concentrations and isolation, 102–103
- carbohydrates**
 chromatography methods, 104–105
 fructose and glucose, 103–104
 HMF, 104
 Lithuanian honeys, 104
 maltose, 104
- enzyme activity**
 amylase types, 105–106
 description, 105
 diastase, 106
 storage, 107
- fermentation products**, 107–108
- flavonoids**
 flavanones and flavanones/flavanols, 108–109
 patterns, 110
 Portuguese and Spanish samples, 109
 quinoline alkaloids, 108
- minerals and trace elements**
 ion chromatographic (IC) technique, 112
 metal content, 113
 potassium, 112–113
- phenolic compounds**
 Folin–Ciocalteu method, 117–118
 HPLC, 118
 hydroxybenzoic and hydroxycinnamic acids, 116–117
 polyphenols, 116
- pollen analysis**, 110–112
- proteins**, 98
- stable isotopes**
 ^{13}C values, 120
 honey proteins values, 118–119
 isotope ratio mass spectrometry, 121
 radioactive isotopes, 118
 SIRA, 119–120
- Bovine somatotropin (bST)**, 65–66
- bST**. *See* Bovine somatotropin
- C**
- CA**. *See* Codex alimentarius
- CIP**. *See* Cleaning-in-place
- Cleaning-in-place (CIP)**
- energy, milk plants, 76
 high heat operations, 59
 procedures, 76
 process, 57
- Codex alimentarius (CA)**, 90
- D**
- Dairy proteins**
 casein, 174
 extrusion texturized (*see* Extrusion texturized dairy proteins)
 functional properties
 caseinates, 177
 conformational state, β -LG folding, 179
 emulsification and foaming, 177
 extrusion texturization, 178
 molecular simulations, apoprotein, 178
 thermal denaturation, whey, 177
- health benefits**
 casein-derived phosphorylated peptides, 176
 casein types, 175
 whey protein, 176–177
 sweet whey, 174–175
 ultra filtered and dried WPC, 175
- Detection methods regulation, food allergenic ingredients**
- banana**
 high specificity, 167
 latex-fruit syndrome, 166
- ELISA** (*see* Enzyme-linked immunosorbent assay)
- guideline criteria, validation protocol**
 ELISA performance, 153
 quantitative and qualitative, 152
- kiwifruit**, 166
- limits of detection (LOD)**, 147
- meat**, 167
- PCR method**
 DNA extraction, 156
 target genes, 156–157
 Western blotting and PCR kits, 156, 158
- practical test, monitoring**
 decision tree, 163–164
 outline, local government inspection center, 159, 163
 quantitative analyses, ELISA kits, 159
- reference material and calibrator**
 procedure, preparation, 149
 protein concentration determination, 151

- raw materials and extraction methods, 149–150
- SDS-PAGE, 150–151
- specifications and standardization, 149
- soybean
- ELISA, 163, 165
 - high specificity, 165
- threshold, 147–148
- validation
- buckwheat, 161
 - egg, 160
 - evaluation method, interlaboratory, 157, 159
 - homogeneity test, 157, 159
 - milk, 160
 - model processed foods, 156–157
 - peanut, 162
 - protocol criteria, 148
 - shrimp/prawn, 162
 - wheat, 161
- walnut, 165–166
- Western blotting, egg and milk
- flowchart, 156
 - specificity, 155
- E**
- ELISA. *See* Enzyme-linked immunosorbent assay
- Environmental protection agency (EPA)
- CO₂ emissions, 56
 - GHG emissions, 79
- Enzyme-linked immunosorbent assay (ELISA)
- allergenic ingredients detection
 - antibodies, 153
 - commercial kits, 155
 - FASPEK KIT[®], 154
 - FASTKIT ELISA Ver.II[®], 153
 - retorted and canned foods, 154
 - limits of detection, 147
 - processed foods., 153
- EPA. *See* Environmental protection agency
- Extrusion texturized dairy proteins
- cheese analogs, 193
 - development
 - coextrusion, 190–191
 - cold extrusion, 191
 - corn meal and WPI, 192
 - extrudate expansion, 188–189
 - functionality, 189–190
 - supercritical fluid extrusion, 191
 - high-fibre products, 193–194
- meat analogs and extenders, 193
- nutritional bars, 194
- processing
- definition, 179
 - flavor, 187–188
 - functionality, 186–187
 - proteins, 181–186
 - single-screw, 179
 - soy proteins and gluten, 181
 - temperature, 180
 - thermal denaturation, 180
 - transmission electron microscopy (TEM), 181
 - twin-screw extruders, 179–180
- puffed snacks
- corn starch levels, 193
 - high-protein corn meal products, 192
 - whey, 192
- whey and soy crisps, 194
- F**
- FCV. *See* Feline calicivirus
- Feline calicivirus (FCV)
- chlorine, 18
 - inactivation, 17
 - resistance, 12–14
 - survival, 16–17
- Fluid milk production
- EPA, 43
 - FAO estimation, 43–44
 - food processing industries, 44
 - GHG emissions
 - atmospheric concentration, 42–43
 - on-farm, 62–70
 - processing plants, 70–79
- LCA
- components, 45–46
 - LCIA, 46
 - milk supply chain, 46–62
 - plants, 70–79
 - sustainable development, 44–45
- G**
- Gibbs–Marangoni mechanism, 234
- Greenhouse gas (GHG) emissions, 52–61
- See also* On-farm GHG emission, mitigation; Processing plants and GHG emission mitigation
 - carbon dioxide estimation
 - electricity usage, 55–56

Greenhouse gas (GHG) emissions, 52–61
See also On-farm GHG emission, mitigation; Processing plants and GHG emission mitigation (*cont.*)
 farm, 54
 manure storage, 55
 carbon footprint, 56
 methane emissions estimation
 dairy cows, 53
 fermentation pathways, 53
 microorganisms, 54
 milk processing plant
 benchmarking, 58
 CIP operations, 59
 HTST pasteurization, 57
 refrigerants loss, 59
 SEC, 57–58
 nitrous oxide estimation
 crop production, 52
 direct and indirect, 53
 soils, 53
 packaging
 gallon containers, 60–61
 plastic bottles, 59
 retail, 61
 transportation
 and distribution, packaged milk, 61
 farm to processing plant, 56

H

Hertz model
 elastic deformation, 215
 force–distance curves, 222
 Highly ordered pyrolytic graphite (HOPG)
 casein micelles, 218, 220
 milk/κ-carrageenan mixtures, 220
 High-performance liquid chromatography (HPLC)
 detectors, 116
 and GC, 115
 honey
 amino acids, 100
 authentic honeys, 105
 enantiomeric ratios, 100
 polyphenols, 116
 oligosaccharide profile, 105
 phenolic acids, 115
 polyphenolic compounds, 118
 solid phase extraction (SPE), 114
 High pressure homogenization (HPH), 74–75

High-temperature short time (HTST)
 pasteurization
 GHGs, 72
 heat demand, 77
 milk nutrition, 75
 replacements, 73
 temperature, 57
 UHT, 73
 HMF. *See* Hydroxymethylfurfural
 Hole-in-the-pipe (HIP) model, 52
 Honey
 analytical techniques, 93–94
 authentication
 additives and water removal, 95–96
 botanical origin and mislabeling, 96–97
 geographical origin and mislabeling, 97
 industrial processing, 93, 95
 CA, 90–91
 chemical composition and analytical methods, 98–121
 definition, 90
 hesperetin and methyl anthranilate, citrus honey, 121
 marker compounds
 abscisic acid, heather honey, 121
 3-aminoacetophenone, chestnut honey, 122
 hesperetin and methyl anthranilate, citrus honey, 121–122
 minerals and elements analysis, 92
 mislabeling and adulteration, 91
 protein, identification, 92–93
 HPH. *See* High pressure homogenization
 HPLC. *See* High-performance liquid chromatography
 HTST. *See* High-temperature short time
 Hydroxymethylfurfural (HMF)
 adulteration, 104
 content value, 107

I

IC–CD. *See* Ionic chromatography–conductivity detection
 Ionic chromatography–conductivity detection (IC–CD), 115

J

Japan food allergen labeling regulation
 characteristics, 146–147
 detection methods, ingredients

banana, 166–167
ELISA, 153–155
guideline criteria, validation protocol, 152–153
kiwifruit, 166
limits of detection (LOD), 147
meat, 167
PCR method, 156
practical test, monitoring, 159, 163
reference material and calibrator, 149–151
soybean, 163–165
threshold, 147–148
validation study, 156–157, 159–162
walnut, 165–166
Western blotting, egg and milk, 155–156

Food Sanitation Law, 144–145
immediate-type, assessment
anaphylaxis cases, 144
cases, 1998–1999, 142
cases, 2001–2002, 143
food sanitary law, 140
questionnaire, 141
survey, 141
ingredients, MHLW, 145
mandatory and recommended stages, 145
patient evaluation
characteristics, surveyed subjects, 168
comprehension and understanding, 169
incidence, accidental intake, 169
questionnaire, 167

L

LCA. *See* Life cycle analysis
LCIA. *See* Life cycle impact assessment
Life cycle analysis (LCA)
application, 46
components, 45
fluid milk supply chain
dairy products, 46
GHG emissions, 47–48
goal and scope, 48–49
inventory analysis, 49–61
LCIA, 61–62
technique, 44
Life cycle impact assessment (LCIA), 46

M

Melissopalynology, 110
Milk supply chain, LCA
dairy products consumption, 46–47
GHG emissions, 47–48
goal and scope definition
boundaries, 48–49
ECM formula, 49
inventory analysis
crop/milk production, 50
distribution, 51–52
GHG emissions sources, 52–61
milk processing, 51
packaging, 51
retail/consumer, 52
transportation, 50–51
LCIA, 61–62
MNV. *See* Murine norovirus
Murine norovirus (MNV)
disinfection, 11
inactivation, 18
removal, fruits and vegetables, 17–18
resistance, 12–14, 17

N

Norovirus (NoV)
description, 2
fomite contamination
epidemiological links, 15
MNV and FCV, 10–14
food handlers
characteristics, 15–16
poor personal hygiene practices, 15
transmission control, 16
genetic types and outbreak association
GI and GII genotypes, 7
GII.4 cluster, 3, 7
infection, 3
open reading frames, 2
person to person
closed/semiclosed settings, 8–9
GII.8
hospitals, 9
hotels/schools, 9
human volunteer studies, 7–8
infection control measures, 10
prevention and limitation, 9–10
reports, outbreak, 4–6
water and food
calcivirus survival, 16
chemical treatment, 17–18

- Norovirus (NoV) (cont.)**
- cooking, 20
 - fruits and vegetables, 20
 - MNV and FCV, 16–17
 - shellfish, 19–20
 - temperature control, 17
 - waterborne, 18–19
- NoV.** *See* Norovirus
- O**
- On-farm GHG emission, mitigation**
- carbon dioxide
 - NT methods, 69
 - SOC, 68–69
 - methane
 - anaerobic digestion, 67
 - biochar, 68
 - bST uses, 66
 - digesters types, 67–68
 - feeding practices, 64
 - management practices, 66–67
 - manure management, 67
 - methanogenesis process, 65–66
 - oil and oilseeds, 64–65
 - probiotics, 65–66
 - propionate precursors, 66
 - thermochemical conversion, 68
 - models, predictions, 69–70
 - nitrous oxide
 - N inputs, soil, 62–63
 - practices, 63–64
- P**
- Pollen analysis**
- authentication, botanical origin honey, 111–112
 - meliissopalynology, 110
 - royal jelly, 110–111
 - usage, 97
- Processing, extrusion texturized dairy proteins**
- definition, 179
 - flavor
 - carbohydrates and lipids, 187
 - retention, 187
 - vitamins, 188
 - functionality
 - foaming and digestibility, 186
 - partial denaturation, 187
 - physical properties, WPI, 186
 - proteins, effect
- amino acids, 181**
- denaturation and aggregation, whey, 182**
- digestibility, 184**
- disulfide bonds, 181–182**
- electron-density mapping, 185**
- electron micrographs, WPI, 183**
- extrusion melt temperatures, 182–183**
- Fourier transforms, 186**
- insolubility test, 182**
- polyacrylamide gel electrophoresis, 182**
- SDS-PAGE, 184–185**
- spatial spectral analyses, 185**
- single-screw, 179**
- soy proteins and gluten, 181**
- temperature, 180**
- thermal denaturation, 180**
- transmission electron microscopy (TEM), 181**
- twin-screw extruders, 179–180**
- Processing plants and GHG emission mitigation**
- CIP procedures, 76
 - energy information data, 71
 - energy management systems
 - CHP, 78
 - dairy industry, 76
 - pinch technology, 77
 - fluid milk process, 72–73
 - implementation
 - energy efficiency, 70–71
 - tools, 71
 - LCA and GHG audits, 72
 - packaging
 - LCA, 78
 - milk containers manufacture, 78–79
 - recycled HDPE resin, 78
 - pasteurization technologies
 - bactofugation and HPH, 74
 - CIP operation, 74
 - HTST and UHT, 73–74
 - sustainability, 75–76
 - transportation, 79
- R**
- Rennet casein, 174, 190**
- S**
- SEC.** *See* Specific energy consumption
- SIRA.** *See* Stable isotopic ratio analysis

A

- Alcoholic fermentation, Vin Santo
 analytical and organoleptic, yeast
 madre, 90–91
 microorganisms, 88
non-Saccharomyces, 88–90
S. cerevisiae strains, 89
vinsantaia, 90
- grape drying, microbial population
 apiculate yeasts, 81
 Greco Bianco and Mantonico Bianco, 82
 lactic acid bacteria, 81
 Malvasia and Zibibbo grapes, 82–83
 microflora, 80–81
 yeasts, 81–82
- madre addition
 description, 83
S. cerevisiae, 83–84
 sensory attributes, 84, 85
Zygosaccharomyces, 83
- passito, 80
- Picolit, 82
- starter inoculum
 Italian passito wines, 84
 mixed, 88
non-Saccharomyces, 87–88
 passito wines, 85
Saccharomyces, 85, 86
Saccharomyces yeast, 84
S. cerevisiae, 84–85
S. cerevisiae and *S. bayanus*, 86
S. uvarum, 86
T. delbrueckii and *Z. bailii*, 88
Z. rouxii strain, 88
- vinsantaia*, 80
- Amarone wine
 alcoholic fermentation and maceration
 advantages, starter strains, 297
 anthocyanin extraction and color
 stabilization, 299
 botrytized, 299
 "cap", 298
 chemical–physical change, 299
- environmental condition, 296
 grape maceration, 298
 hexanols, 298–299
 nutrients release, 297
 phenolic compounds, anthocyanins
 and tannins, 297–298
 prefermentative cold maceration,
 298–299
 starter yeast strains, 297
 strains sequence, 297
 sulfur dioxide and volatile acids,
 296–297
 temperatures, 297
 yeast flora, 297
- area, production
 characterization, 289
 Eastern part, 289
 hills, 288
 natural boundaries, 288
 rainfall, 289
 soils and Prun stone, 289
 temperatures, 289
 valley and Garda Lake, 289
 winds, 289
- biotechnology
 grape dehydration phase, 302–303
 stages, 302
 winemaking process, 303
- grapevine cultivars
Corvina, 290
Corvinone, 290
 genetic heritage, 290
 indigenous varieties, 289
Molinara, 291
Rondinella, 291
 varietal composition, 291
 varietal transplantations, 291
- history
Acinatico, 286
 occurrence, 286
Recioto wine, 287
 sensory attributes, 287–288
 significance, 286
 stuck fermentation, 287

- Amarone wine (*cont.*)
 sweet food/beverage, 287
 tastes, 287
 technology, 286–287
 as “very bitter”, 287
- malolactic fermentation
 autochthonous *O. oeni* strains, 300
 LAB, 299
Leuconostoc oenos, 300
 ribotyping and macrorestriction profile
 analyzes, 300
- maturity, cooperage
 “aging”, 300
 ambient temperature and humidity, 301
 autolysis, yeast cells, 301
 clarification, 301
 fragrance, 301
 humidity control, 301
 oak cooperage, 301
 “protective colloids”, 302
sur lees maturation, 302
 tannins and aldehydes, 300–301
 wood porosity, 300–301
- production
 grape selection, 291–292
 postharvest grapes drying, 292–295
 sensory characteristics, 296
- Amontillado sherry
 characterization, 27
 odor-active compound, 31–32, 33
 two-stage process production, 27
- Apple vermouth
 cider, 265
 flow sheet, preparation, 266
 PCA and descriptive analysis, 266–267
- B**
- Biotechnology, amarone
 grape dehydration phase
 hermohygrometric conditions, 302
 infection, *B. cinerea*, 302–303
- stages, 302
- winemaking process
 aging, 303
 cold and alcohol tolerance, 303
 sensory individuality, 303
- Botrytized wines
 aging and stabilization
Botrytis glucan, 189
 calcium mucate crystals, 189
Cladosporium cellare, 188, 189
- premium sauterne, 188
Szamorodni, 188
Tokaji aszú, 188
- biogenic amines
 formation, 192
 histamine contents, 192–194
 malolactic fermentation, 192
 occurrence, 193
Tokaji aszú, 194
Botrytis cinerea, 148
- fermentation
 chemical composition, 179–185
 technique, 186–187
 yeasts, 176–179
- grape processing
 cold pressing technology, 174–175
 decanting, 175–176
 maceration, 175
 oxidation, 174
puttonyos aszú, 175
 sulfiting, 175
- harvest, production, 173–174
- health promoting attributes
 antioxidant capacity, 191
 polyphenols, 190
 red wines, 190
 resveratrol, 190
Sauvignon/Sémillon grapes, 192
Tokaji aszú, 189–190
- and late-harvest wines, 148
- mycotoxins
 OTA, 194, 195
Penicillium and *Aspergillus* species, 195
- Prädikat wines, 195
- noble rot
 effects, juice composition, 165–170
 grape microbiota, 170–172
 induction and control, 172–173
 infection, *B. cinerea*, 161–162
 process and conditions, 163–165
 sweet, 159–160
- technological and analytical parameters
 French, Australian, South African and
 Californian, 152
 Hungary, Germany and Austria, 150
- types
 German and Austrian, 157–158
 passito wines, 160–161
 Sauternes and French styles, 158–159
Tokaji aszú, 149–156
- Bottle-aged port, 139

C

"Camara de Lobos", 211
 Canteiros, Madeira wines, 213–214
 Carbonic maceration (CM) wines
 berry fermentation, 2
 distinctive sensory characteristics
 aging and shelflife, 4
 aroma compounds, 4
 color depth and tannic sensation, 3–4
 esters, 4
 foxy and raspberry aromas, 4
 economy, 5
 grape berries, AM
 activation and termination, 13
 anoxia, 12–13
 cell exploitation, 11
 CO₂, 12
 cytoplasmic enzymes, 11–12
 intracellular fermentation, 11
 sequence, 12
 grape-berry ripening, 13
 history
 description, 3
 dessert grapes, 2–3
 French Academy of Agriculture, 3
 winemaking process
 devatting, pressing, 8, 9
 diffusion fermentations, 11
 fermentation, 9–11
 grape harvesting, transportation and
 vatting, 6–7
 maceration-fermentation step, 7–8
 steps, 5, 6
 Chemical composition, port wine
 polyphenols
 anthocyanins and flavan-3-ols, 138
 color composition, 138
 oxidative cycloaddition products, 138
 phenolic compounds, 137–138
 red wine, 137
 volatiles
 aroma, young port, 138–139
 bottle-aged port, 139
 dichloromethane extract, Touriga
 Nacional, 141
 old tawny port wines, sulfur
 compounds, 142
 oxidative reaction, 141–143
 oxygen, free SO₂, pH and time/
 temperature, 140–141
 sulfur compounds, young ports, 142
 temperature and pH, 139–140

young ports, 140
 Chemical composition, sherry wines
 alcohols

 acetaldehyde, 24–25
 ethanol, 24
 glycerol, 25
 flor yeast, 23–24
 nitrogen compounds
 amino acids, 25
 S. cerevisiae, 25
 organic acids, 26
 polyphenols
 amontillado-type, 27
 chromatograms, 27, 28
 fino-type sherries, 26
 LDA, 27–29
 oloroso-type, 26–27

D

Douro Demarcated Region (DDR)
 Entreposto of Gaia, 121
 grape varieties
 blue-black, 127
 climatic conditions, 125–126
 red and white, 126, 127
 Tinta Amarela, 128
 Tinta Barroca, 128
 Tinta Roriz, 128
 Tinto Cão, 128
 Touriga Franca (*see* Touriga Franca)
 Vitis vinifera, 126–127

location, 122
 Lower Corgo, 122–124
 rabelo boats, 121
 socalcos-terraced vineyards, 120
 soil and climate
 characterization, 125
 rock formation, 124
 schistous, 125
 temperature, 125
 Upper Corgo, 123, 124
 Upper Douro, 123, 124

E

"Estufagem", 213

F

Fermentation, botrytized musts
 chemical composition
 aroma, 182–183, 184
 carbonyl compounds, 182

- Fermentation, botrytized musts (*cont.*)
 gas chromatography–olfactometry, 183
 high sugar content, 179–182
 nitrogen deficiency, 182
 odorants, 183
 traditional wines, 179, 180
 volatile thiols, 183, 186
- technique
 carbonyl compounds removal, 187
 cessation, 186–187
 dimethylidicarbonate (DMDC), 187
 fermentors, 186
 temperature control, 186
 Tokaj aszú, 187
- yeasts
 alcoholic, 177
 cryotolerant, 177–178
 molecular identification methods, 178
 non-*Saccharomyces* species, 176
 population dynamics, 176
 starter cultures, 179
S. uvarum strains, 178
 taxonomy, 178
 technological traits, 179
- Fino sherry
 aroma, 29–30
 biological aging, 30
 and oloroso wines, 27
 phenolic aldehydes, 27
 volatile compounds, 31
- Flavoring, vermouth
 aging and finishing, 264
 bottling, 264
 fortification and blending, 264
 herbs and spices
 flavorants classification, 260
 plant part used, 261
 methods
 alcoholic infusion, 263
 concentrates, 263
 direct extraction, 263
 macerating, 263–264
- G**
- German and Austrian botrytized wines
 Ausbruch, 158
 Auslese, 157
 beerenauslese (BA) and
 trockenbeerenauslese (TBA), 157
 Ruster Ausbruch, 158
 Schloss Johannisberg vineyards, 157
 vinification technology, 157–158
- H**
- “Hippocratic wine”, 254
- I**
- Italian Vin Santo
 chemical and organoleptic characteristics
 alcohol content, 47
 color, 63
 composition, 62
 ethanol and sugar concentration, 47, 61
 flavor and taste, Tuscany, 65
 inoculated, volatiles compounds, 65
 residual sugar, 50–61
 styles characterization, 63
 sweet and sweet style, 62
 Tuscany, 61, 62
 Vigoleno, Barbieri, 62, 63
 volatile compounds, 62–63, 64
 vs. white and red wines, 63–65
- classification and style
 nonaromatic passito wines, 46, 48
 passito wines, 46, 47
 sweetness and alcohol content, 47
- J**
- Jaune wines, 21–22
- L**
- Lactic acid bacteria (LAB), 299
- M**
- Madeira wine making
 amino acids and biogenic amines
 chemical structure, 237
 concentration, 237–238
 nitrogen source, 236–237
 putrescine and cadaverine, 237
- authenticity
 physicochemical parameters, 242–244
 quality certificates, 242
 statistics analysis, 242–244
- grape varieties
 poios, 211
 Tinta Negra, 210–211
 vineyards, 211
Vitis vinifera varieties, 210–211
- history
 discovery, America, 209
 Germany, 210
 Napoleonic Wars, 210

- Portuguese explorations, 209
production and export, 210
quality control, 210
United States, 210
mineral composition, 238
organic acids, 236
parameters
analytical, 217
physiochemical subdivisions, 215–216
polyphenols, table
antioxidant capacity, 241
beneficial effects, 238, 240
biosynthesis, 239
chemical structures, 241
concentration, 243
metabolites, 239–240
nonflavonoid phenolic compounds, 239, 240
Palheiros red wine, 242
protocatechuic acid, 242
production and marketing
evolution, 214
V. vinifera L. grapes, 214–215
specificity
baking process, “Estufagem”, 213
characteristics, 212
harvesting, 211
sweetness and divisions, 211–212
unit operations, 212
wooden casks support, “Canteiros”, 213–214
volatile and aroma compounds
constituents, 218–228
evolution, aging, 228–232
extraction techniques and analytical methodologies, 216–218
impact odorants, 232–235
Mango vermouth, 265
Mead production
description, 102
fermentation
alcohol content, 111–112
calcium alginate gels/pectate, 113–114
heat treatments, 112
honey, 113
honey pH, 112–113
microorganism, 110–111
optimization, 113
organic acid content, 113
production steps, 112
rate, 115
sugar content, 111
temperature and salt concentration, 113
flavorants, 115–116
honey
composition and physicochemical properties, 103–107
definition, Portuguese law, 103
description, 103
microbiota, 109–110
quality indicators, 107–109
postfermentation adjustments and maturation
aging, 114
bentonite, 114
brandy and alcohol content, 114
HMF and phenolic contents, 115
shelf life, 115
sturdy bottles, 115
sugar content, 114
production, 110–115
scientific and technical research, 102
yeast strain, 115
Montilla-Moriles wines
pedro ximenez, 34
two-stage aging process, 21
- N**
- “Noble late harvest”, 160
Noble rot, botrytized wines
effects, juice composition
acidity, 167
aroma composition, 169, 186
berry sugars, 166
cysteine-S-conjugates, 169–170
exocellular proteolytic enzymes, 167
galacturonic acid, 166–167
 γ -and δ -lactones, 169
glycerol production, 166
nitrogen compounds, 168
polymerized quinones, 169
polysaccharides, 168
sugar content, 166–167
terpenols, 169
grape microbiota
acetic acid, 171–172
biocontrol agent, 171
Candida species, 170–171
lactic acid bacteria, 172
Penicillium and *Aspergillus* species, 171
Saccharomyces species, 171
induction and control

Noble rot, botrytized wines (*cont.*)

- field inoculation, 172
- inoculation, 172
- spore suspensions, 172
- weather condition, 172–173
- infection, *B. cinerea*
 - conidiophore and conidia, 161
 - cutinolytic activity, 162
 - flowers and leaves, 162
 - polyphagous, 161–162
- process and conditions
 - conidial germination, 165
 - micropore formation and wound, epidermis, 164
 - mycelia and conidiophores, 163–165
 - peristomal microfissures, 163
 - phytoalexins production, 165
 - pourri roti, 163–165
 - pourry plein, 163

O

Odor activity values (OAVs)

- odor thresholds, 225–226
- spider-web, odorants, 226, 227

Oloroso sherry

- benzoic and cinnamic acids, 27
- characterization, 26–27
- Z-whisky lactone, 31

P

Passito wines, 160–161

Physicochemical characteristics, vermouth

- apple
 - alcohol, 274
 - sugar levels, 274
- dry and sweet
 - composition, 272
 - plum, 273
- mango, composition, 271, 272
- minerals, 275
- sand pear base wine and sweet, 273
- viscosity, 275
- wild apricot, spices level, 273, 275

Plum vermouth

- alcohol concentrations, 267–268
- spices and herbs, 267

Pomegranate vermouth, 269

Port wine

- benefit
- IVDP, 129
- quantities, 130

scoring system, 129–130

vineyards classification, 130

chemical composition

- polyphenols, 137–138
- volatiles, 138–143

DDR (see Douro Demarcated Region)

description, 120

IVDP, IP, 121–122

production

- alcohol and sugar content, 130
- blending, 132
- bottle aging, 133
- grape crushing, 131, 132
- racking and fining, 131–132
- red port, 130–131
- spirit, 131
- vats/balseiros, 132, 133
- wood casks, 132
- young wine, 131

types

- age indication, 137
- colheita/data de colheita, 137
- color, 135
- crusted, 136–137
- LBV, 136
- reserve, 137
- rosé, 135
- ruby, 135
- sugar content, classification, 133–134
- sweetness, alcohol content and color, 133
- tawny, 135
- traditional, 136
- vintage, 136
- vintage cellar, 134
- white, 135

Production, amarone wine

“aging”, 296

alcoholic fermentation, 295, 296

grape selection

- alcohol content, 291–292

arele and *fruttaio*, 292

harvested clusters, 292

maceration, 295

malolactic fermentation, 296

maturation, 296

postharvest grapes drying

climatic data database, 295

dehydration and weight loss, 292–293

fungal invasion, 293–294

gray rot, 293–294

- lofts, 295
 - loose moisture, 293–294
 - noble rot, 293–294
 - trays role, 294–295
 - sensory characteristics, 296
 - transformation and crushing, 295
- R**
- Red ports, 135
- S**
- Sand pear vermouth
 - dry and sweet versions, 268–269
 - preparation, 268
 - Sauternes botrytized wines, 158–159
 - “Sélection de Grains Nobles” (SGN), 159
 - Sensory quality, vermouth
 - astringency and bitterness
 - sucrose, 278
 - time-intensity measurements, 276–278
 - flavor profiling
 - evaluation methods, 279
 - PCA, 279–280
 - quantitative descriptive analysis (QDA), 279
 - sweetness and viscosity, 278–279
 - wild apricot, levels
 - alcohol, 277
 - spices, 277
 - sugar, 276
- Sherry wines
 - aroma and sensory characteristics, aging
 - acetaldehyde, 29–30
 - α -butyrolactone and pantolactone, 30–31
 - esters, 30
 - fino wines, 31
 - flor yeasts, 30
 - lactones, oak, 31
 - odor-active compounds, 31–32
 - odor activity value (OAV), 31
 - sotolon, 30
 - volatile compounds, 29
 - wood lactone, 31
 - chemical composition, biological and oxidative aging
 - alcohols, 24–25
 - flor yeast, 23–24
 - nitrogen compounds, 25
 - organic acids, 26
- polyphenols, 26–29
 - flor film microbiota
 - amino acids, urea and ammonium ions, 23
 - biological aging, 22
 - enzyme activity, 22–23
 - lactic acid bacteria, 23
 - physiological and molecular characterization, 22
 - making process
 - biological aging, 20
 - categories, 21
 - flor yeast, 19–20
 - jaune, 21–22
 - rocío, 21
 - solera and criadera, 20
 - steps, 19
 - sweet wines, 21
 - solera and criaderas system, 18
 - technology
 - accelerated biological aging, 32–33
 - drying condition, 34
 - organic grapes, 34–35
 - velum, 18–19
- T**
- Tamarind vermouth, 269
 - Tinta Amarela, 128
 - Tinta Barroca, 128
 - Tinta Negra Madeira wines
 - ethyl hexanoate and octanoate, 226
 - volatile compounds, 226
 - Tinta Roriz, 128
 - Tinto Cão, 128
 - Tokaji aszú
 - biogenic amine, 194
 - chemical composition, 156
 - curative powers, 189–190
 - Eszencia/Essencia, 155
 - Fordítás, Máslás and Szamorodni, 155
 - γ -and δ -lactones, 169
 - glycerol production, 166
 - grape cluster, aszú and shriveled berries, 154
 - harvest, 154
 - juice extraction, 175
 - noble-rotted grapes, 149
 - oak barrels, 155
 - vineyards, 149–154
 - Touriga Franca
 - description, 127
 - wine characterization, 128

- Touriga Francesa. *See* Touriga Franca
- Touriga Nacional
 blue-black grapes, 127
Vitis vinifera, 126–127
- V**
- Vermouth
 base wine preparation
 requirements, 258
 sweetening and color intensification, 258
 brandy distillation
 fermentation, 259
 fractions, 260
Saccharomyces bayanus, 259–260
 categories, 252–253, 256
 dry (French)
 alcohol content, 257
 base, 257–258
 Europe, 257
 fortifying alcohol, 257–258
 Martini and Rossi, 258
 flavoring, base wine
 aging and finishing, 264
 bottling, 264
 fortification and blending, 264
 herbs and spices, 260
 methods, 260–264
 history
 France, 254
 Piedmont (Italy), 254
 rosé vermouth, 254–255
 sweet and dry versions, 254
Vinum Hippocraticum, 254
 wormwood, 253
 legal requirements, 280
 medicinal and aromatic value
 oxidative stress, 255
 properties, 255
 nongrape fruits, preparation
 apple, 265–267
 mango, 265
 plum, 267–268
 pomegranate, 269
 sand pear, 268–269
 tamarind, 269
 wild apricot, 269
 quality
 physiochemical characteristics, 270–275
 sensory quality, 276–280
 steps, production, 258, 259
- sweet (Italian)
 American, 256
 California, 256–257
 France, 256
 muscat flavor, 256
 pH addition, 257
- Vinho do Porto. *See* Port wine
- Vin Santo
 alcoholic fermentation
 analytical and organoleptic, yeast, 88–91, 89
 apiculate yeasts, 81
 Greco Bianco and Mantonico Bianco, 82
 lactic acid bacteria, 81
 madre addition, 83–84, 85
 Malvasia and Zibibbo grapes, 82–83
 microflora, 80–81
 passito, 80
 picolit, 82
 starter inoculum, 84–88
 vinsantaia, 80
 yeasts, 81–82
 barrel maturation
 aging, 92
 commercial yeast, 93
 gross lees, 91
 madre, 93
 organoleptic characteristics, 93
 oxidation, 92
 oxygen, 92
 phases, aging, 91
 phenolic compounds, 92
 sensorial characteristics, 94
 sugar metabolism, 91
 temperature, 91–92
 vinsantaia, 91, 93
 definition, 42–43
 description, 42
 drying, grapes
 and aroma compounds, 77–79
 factors, 76–77
 metabolism, 76
 techniques, 75–76
 grape varieties
 passito wines, 74–75
 terpene aromas, 73–74
 Italy
 alcohol content, 44
 chemical and organoleptic characteristics, 47–65
 classification and style, 46–47
 color, 44

- definitions, 43, 44
 and European Union regulation, 66–67
 nonaromatic passito wines, 48
 passito wines grape drying system, 47
 production areas, 43
 sugar concentration, 43–44
 origin history, 45–46
 pressing and barrel filling
 “caratelli”, 80
 juice quality, 79–80
 temperature, 80
 production
 areas, 42
 Florence, 73
 and marketing, 67–73
 in Tuscany, 68, 69, 71
 Vigoleno, 71
- Santorini
 PDO Santorini, 45
 taste, 45
 white grape varieties, 45
- Volatile and aroma compounds, Madeira wine
 constituents
 compositional parameters, 219
 ethyl hexanoate and octanoate, 226
 furan compound values, 235
 higher alcohols, 226
 monoterpenoids, 219–224
 multivariate analysis, 225–226
 OAVs, 225–226
 odor-active, 218–219
 odor descriptors and threshold, 219
 odor thresholds, 220, 225–226
 PCA and SLDA, 224–225
 prefermentative, fermentative and post fermentative, 219
 profile, varietal origin, 225
 short-chain aldehydes and alcohols, 227
 spider-web, odorants, 226, 227
V. vinifera, 224
- evolution, aging
 chemical families, 232
 γ -decalactone, 229
 FAEE and EE concentration, 230
 heterocyclic acetals, 229–230
 linear correlation, concentration and age, 230
 Malvasia wines, aged 1 and 25, 230, 231
 3-methylbutan-1-ol and 2-phenylethanol content, 230
 oak aromas, 228–229
 potential age markers, 230–232
 sensory attributes, 228
 temperature and time, baking, 232
 extraction techniques and analytical methodologies
 compound analysis, low concentrations, 216–218
 gas chromatograph detectors, 218
 GC X GC, 218
 legal limits, 216
 SPME and SPDE, 218
 wine matrix complexity, 216–218
 impact odorants, 232–235
- W**
- Wild apricot vermouth
 evaluation, 269
 preparation
 extract, 270
 flow sheet, 271
- Winemaking process, CM
 anaerobic metabolism, grape berries, 6
 devatting, pressing, 8, 9
 diffusion fermentations, 11
 fermentation, 9–11
 grape harvesting, transportation, and vatting, 6–7
 maceration-fermentation step, 7–8
 steps, 5, 6
- “Wine of hospitality”, 45

SOC. *See* Soil organic carbon

Soil organic carbon (SOC)

 carbon storage, 68

 sequestration, 69

Specific energy consumption (SEC), 57–58

Stable isotopic ratio analysis (SIRA), 119, 121

T

Texturized WPI (TWPI)

 digestibility, 184

 functionality, 186

 spatial spectral analyses, 185

Triple Bottom Line, 44

TWPI. *See* Texturized WPI

U

UHT. *See* Ultrahigh temperature

Ultrahigh temperature (UHT)

 milk, 73

 pasteurization, 57

 process, 73

Unifloral honey, 111

W

Whey protein isolate (WPI)

 extruded, fat mimic, 194

 extrusion melt temperatures, 183

 heat-treated, 184

 microstructural changes, 182–183

 physical properties, 186

 solubility, 190

 twin-screw extrusion, 179

WPI. *See* Whey protein isolate

A

- AAA Ca.** *See* Active absorbable algal calcium
- AAS.** *See* Amino acid score
- ACE.** *See* Angiotensin I-converting enzyme
- Activated partial thromboplastin time (APTT)**
prolongation, 236–237
TT pathways, 236–237
- Active absorbable algal calcium (AAA Ca),** 49
- Adequate intake (AI),** 375
- Alginates,** 91–92
- Alkaline phosphatase (ALP),** 430
- Amino acid score (AAS),** 308–309
- Angiotensin I-converting enzyme (ACE),** 318
- Antiallergic benefit, marine algae**
allergy, 268
compounds, 268–269
therapeutic inhibitors
macroalgae, 269
microalgae, 272–273
phlorotannins, 270
polysaccharides, 270–271
- Antiallergic compounds**
phlorotannins, 270
polysaccharides
marine algae, 270–271
porphyran, 271
- Anticancer compounds, marine macroalgae**
brown algal species, 215
carotenoids, 220–221
functional foods, 221–222
metabolites, 214–215
phlorotannins, 218–220
plants and terrestrial microorganisms,
214–215
- sulfated polysaccharides**
carrageenans, 217–218
fucoidan, 216–217
monomeric units, 215–216
ulvans, 218
- synthetic drugs and natural products,** 214

- Anticancer effect, SPs**
apoptosis in vitro, 397
tumor cell proliferation, 397
- Anticoagulant effect, marine algae**
bioactive substances, 236–237
blood coagulation system, 236
description, 236
heparin, 236, 241
organisms, 236
phlorotannins, 237–239
PT, 241
Sargassum thunbergii, 241
SPs, 237, 240
- Anti-human immunodeficiency virus (HIV) activity**
AIDS, 257
DT1 and DT2, 262–263
gp120 and gp41, 256
lectins
BCA, 262
description, 261
Griffithsin, 261–262
- macroalgae,** 262
- phlorotannins**
6,6'-bieckol, 258
Ecklonia cava, 258
Ishige okamurae, 258
tannins, 257
- polysaccharides**
Adenocystis utricularis, 260
effects, 259
fucans, 259–260
GFP and GLP, 260
Schizymenia dubyi, 260
SPMG, 260–261
therapeutic agents, 256
- Antioxidant effect, SPs**
ABTS radical scavenging, 394–395
antioxidant activity, 394–395
marine algae, 394
natural antioxidants, 395
ROS, 394
structural features, 394–395

Antiviral effect, SPs
 algal sulfated polysaccharides, 395–396
fucoidan, 396
in vitro and *in vivo* infections, 396
 inhibitory effects, 396
 marine algalpolysaccharides, 395–396
APTT. *See* Activated partial thromboplastin time
Asthma
 characteristics
 airway wall, 282–283
 inflammation, 281–282
Ecklonia cava, 278–279
 factors, 279
 macroalgae
 Ecklonia cava, 281–282
 Eisenia arborea, 281–282
 red algal, 282
 mechanism, 280
 microalgae
 blue-green algae, 282–283
 use, 282–283
 remedies and failures, 281
 symptoms, 278

B

Biofilm, chronic infection prevention
 agricultural soil enrichment, 404
 anti-biofilm agents, 408
 bacterial cells, 405–406
 bacterial interactions, 405
 carbon-neutral electricity, 407–408
 chemotherapy, 408–409
 diabetic foot ulcer, 411–412
 environmental dangers, 405–406
 eye infection, 412
 fibrosis-associated infections, 404
 formation, 405
 global wound care expenditures, 409
 health care, 408–409
 histological changes, 405–406
 immunity, 412–413
 kidney relevance, 411
 metabolic waste products, 407
 otolaryngologic diseases, 412–413
 periodontal diseases, 409–410
 physiology/growth state, 406–407
 planktonic cells, 407–408
 proinflammatory cytokines, 408
 quorum sensing, 406–407
 surface attachment, 405–406
 synthesis and degradation, 405–406

wound inflammation, 410
Biological activity, SPs
 description, 328–329
in vitro studies
 animals and cell model, 330
 anticoagulant, 329
 antioxidant, 329
 properties, 329
 sulfate groups, 329–330
Bisphosphonates
 adverse side effects, 419
 osteoporosis, 419
Bone mineral density (BMD), 420
Bone morphogenic proteins (BMPs), 430

C

Ca-mineralization, osteoblastic differentiation
 abnormal bone homeostasis, 430
 ALP levels, 434–436
 anti-inflammatory effects, 431
 BMPs, 430
 CMAP, 432, 433
 fucodiphloethol G, 434
 fucoidans, 434–436
 marine algae therapeutic potential
 bone tissue engineering applications, 437–438
 diet with calcium supplement, 438
 marine compounds, 431
 marine organisms, 430–431
 microalgae and macroalgae, 431
 novel marine metabolites, 431
 osteoblasts and osteoclasts, 430
 phlorotannins, 432–434
 triphloethol-A, 434
***Capsosiphon fulvescens*-polysaccharides (Cf-PS)**
 antioxidant activities, 180
 cell proliferation, 180–181
 description, 180
 ERK1/2 activation, IEC-6 cells
 cross talk model, signaling pathways, 186, 188
 EGFR transactivation, 185–186
 MAPK protein expression, 185
 proliferation, 185, 186
 Wnt signaling, 186, 187
 IEC-6 cell proliferation
 agarose gel electrophoresis, 181–182
 microscopy analysis, 181–182, 183
 MTS assay, 181–182, 183

- PCNA protein expression, 181–182, 183
sea vegetables, 181
- signaling pathways, 180–181
- Wnt signaling components
cell proliferation and division, 182
expression measurement, 184
IEC-6 cells, 184
time-course experiment, 182
- C**
- Cardiolam, 94
- Cardiovascular diseases (CVD)
lipids, 344
risk, 340
- Carotenoids
astaxanthin and fucoxanthin, 220–221
biological activities, 221
- Carageenans
antioxidant and antitumor activities, 217–218
l-carrageenan, 217–218
- Chlorophyta, 73–74
- Coccolith matrix acidic polysaccharide (CMAP), 432
- Cyclooxygenase-2 (COX-2), 343
- D**
- Dietary Reference Intakes (DRIs), 375
- Diet with calcium supplement
bone mineral loss, 438
ingredients, 438
mineral-rich supplement, 438
osteoporosis, 438
- E**
- EAAs. *See* Essential amino acids
- EGFR. *See* Epidermal growth factor receptor
- Eicosapentaenoic acid (EPA)
ALA conversion, 341
DHA, 343
- Epidermal growth factor receptor (EGFR)
signaling pathway, 185
transactivation, 185–186
- ERK1/2. *See* Extracellular signal-regulated kinase 1/2
- Essential amino acids (EAAs)
levels, 307–308
ratio, 307–308
- Estimated Average Requirement (EAR), 375
- Extracellular signal-regulated kinase 1/2 (ERK1/2)
activation, IEC-6 cells
- cross talk model, signaling pathways, 186, 188
- EGFR transactivation, 185–186
- MAPK protein expression, 185
proliferation, 185, 186
- Wnt signaling, 186, 187
- pathway, 181
- F**
- Female health, beauty and longevity,
marine algae on
anticancer activity
apoptosis, 43–44
breast cancer, 43
cervical cancer, 44
chemopreventive agents, 45
estrogen-dependent cancers, 44
- antibesity activity
detrimental effects, 46
foods and pharmaceuticals, 48–49
fucoxanthin, 48
soluble, insoluble and total fiber, 46–48
synthetic antibesity agents, 46
- antiosteoporosis activity
AAA Ca, 49
description, osteoporosis, 49
dietary fucoxanthin, 49
- antiviral activity, 45–46
- Asia, 42
- marine organisms, 42
- nutritional value and health benefits, 42
- skin whitening activity
advantages, 50–51
tyrosinase inhibition, 50
- Fucoidans
anticoagulant and antithrombotic activity
Ecklonia cava, 168–169
fermentation process, 169
heparin, 167–168
mechanism and molecular interaction, 168–169
Sargassum fulvellum, 169
- anti-inflammatory activity
connective tissue destruction, 173
definition, 172
LPS-stimulated RAW 264.7 cells, 172
- antiproliferative/antitumor/anticancer activity
biological activities, 169, 170
chemopreventive agents, 170
inhibitory effects, 169

Fucoidans (cont.)

antitumor and antimetastatic activities, 217
 antiviral activity, 173
 biological properties, 166–167
 chemical structure, 165
 description, 216–217
 fucoxanthin and phlorotannins, 164
 immunomodulatory activity
 activated splenocytes, 171
 dendritic cells, 171–172
 MMP-9, 172
 industrial applications, 173–174

Laminaria

anticancer properties, 92–93
 antioxidant activity, 93
 antivirus effects, 92
 cholesterol content, reduction, 93–94
 molecular mass and sulfate content, 93
 oligosaccharides, 93–94
MMPIs (see Matrix metalloproteinase inhibitors (MMPIs))
 polysaccharides
 description, 164–165
 functional, 164
 purification
 enzyme-assisted extraction
 technique, 166
 marine algae, 165–166
 solvent extraction process, 166
 restenosis, 173
 seaweeds and bioactive components, 164
 toxicology, 173

Fucoxanthin

antiangiogenic activity
 angiogenesis, 121–122
 pathological conditions, 121–122
 siponaxanthin, 122
 anticancer activity
 anti-adult T-cell leukemia effects, 117–118
 apoptosis, 117
 pharmaceutical and food industries, 118
 vs. siphonaxanthin, 117–118
 anti-inflammatory activity
 inhibition, proinflammatory
 mediators, 118–119
 macrophage function, 118
 scientific analysis, 118–119
 antiobesity activity
 adipocyte differentiation, 120
 advantages, 120
 description, obesity, 119

WAT, 119–120

xanthigen, 119–120
antioxidant activity
 applications, 116
 cytoprotective effect, 116
 free radical-mediated process, 115
 radical scavenging, 116
 synthetic antioxidants, 115

health beneficial effects, 112, 113
 marine algae

 food diets and traditional remedies, 112
 pigmentation, 112–113
 marine organisms, 112
neuroprotective effect

 natural and synthetic compounds,
 120–121

 neurite outgrowth, 121
 wakame, 121

osteoclastogenesis, 122–123

profiles and bioavailability
 absorption and esterification, 114–115
 adverse side effects, 115

 amarouciraxanthin A, 114–115
 chemical structures, 113–114

skin protective effect, 122

Fucoxanthin-rich seaweed extract

(Fx-SEE), 202

Fx-SEE. *See* Fucoxanthin-rich seaweed extract

G**Glucose transporter 2 (GLUT2), 209**

GLUT2. *See* Glucose transporter 2

Glutathione (GSH)

 description, 150
 levels

 JNK inhibitor, 158

 measurement and analysis, 150, 155

Green water technique, 79–80

GSH. *See* Glutathione

H**Herpes simplex virus (HSV)**

 classification, 246

 infection, 246

 reproduction, 246–247

Histone deacetylases (HDACs), 420–421

***Hizikia fusiformis*-polysaccharide (Hf-PS-1),**

 protective effects

 botanical products, 145

 description, 145

ethanol-induced gastric damage, rats
caspases, 149, 150
composition, powdered sample, 146,
 147
DNA fragmentation, 149, 151
electrophoresis bands, 146, 148
epithelial cells, 148–149
hemorrhaging, 146–148
intestinal surface, stomach samples,
 146–148
long-term *vs.* short-term experiments,
 146–148
oxidative stress, 150–151
pharmaceutical products and side
 effects, 146
purification procedures, 146, 147
seaweed compounds, 146
gastrointestinal disorders and drugs,
 144–145
IEC-6 cells, ethanol-induced injury
 cell viability assays, 151–152, 153, 154
 downregulation, JNK, 152–157
 IGF-IR and Shc phosphorylation,
 151–152, 155
methanol and ethanol extracts, 144
seaweeds and extracts, 145
HPV. *See* Human papilloma virus
HSV. *See* Herpes simplex virus
Human papilloma virus (HPV)
 carageenan, 45–46
 infection and vaccine, 45

I

IEC-6. *See* Intestinal epithelial cell line 6
IGF-IR. *See* Insulin-like growth factor-I
 receptor
Immunostimulating effect, SPs
 anti-inflammatory activities, 397
 immune system, 397
 macrophages, 396–397
Insulin-like growth factor-I receptor (IGF-IR)
 phosphorylation, 151–152, 155
 signaling pathways, 158
Intestinal epithelial cell line 6 (IEC-6)
 ERK1/2 activation
 cross talk model, signaling pathways,
 186, 188
 EGFR transactivation, 185–186
 MAPK protein expression, 185
 proliferation, 185, 186
 Wnt signaling, 186, 187
 proliferation

agarose gel electrophoresis, 181–182
microscopy analysis, 181–182, 183
MTS assay, 181–182, 183
PCNA protein expression, 181–182, 183
sea vegetables, 181

J

JNK. *See* Jun N-terminal kinase
Jun N-terminal kinase (JNK)
 activation, 150–151
 downregulation, ethanol-induced toxicity
 Hf-PS-1's protective mechanism,
 155–157
 IGF-IR activation, 152–155
 inhibitor SP600125, 155
 MAPK signaling pathway, 152–155, 156
 phosphorylation, 152–155, 156

K

16 kDa fucoidan, 136–137
Kelp. *See* *Laminaria*

L

Laminaria
 biological properties
 alginates, 91–92
 cardiolam, 94
 fucoidan, 92–94
 laminarin, 94
 medicinal benefits, 91
 chemical properties
 alginic acid, 90
 biologically active substances, 90
 chromists, 88–90
 medicinal properties, 90
 mineral extraction, 90
 vitamins, 90–91
 description, 86
 life cycle, 88, 89
 nutrients, 86
 physical properties
 fucoxanthin, 87–88
 genomic information, 87–88
 structure, 87
Laminaria japonica (LJ)
 antidiabetic effects
 algal polysaccharides, 205
 aqueous extract (LJE), 206
 diabetes, 205
 glucose absorption, 206–207
 glucose intake, Caco-2 cells, 207–209

- Laminaria japonica* (LJ) (*cont.*)
 glucose transmission, Caco-2 cells, 207–209
 oral carbohydrate tolerance test, 209
phloridzin, 207–209
 postprandial blood glucose level, 206–207
 rhizoid, 206
 SGLT1 and GLUT2, 209
 structure, glucose transmission test, 207, 208
antioesity effects
 active component, 205
fucoxanthin, 201
Fx-SEE, 202
NSK and *TK*, 202–203
 obesity, 200–201
 sodium alginate, 202
TK, 202
 wakame lipids (WLs), 201–202
 description, 200
 use, 200, 210
Laminarin, 94
Lipids
 phospholipids and sterols, 11
 PUFAs, 10–11
LJ. *See Laminaria japonica*
Low-density lipoprotein (LDL) oxidation, 359
- M**
- MAA.** *See Mycosporine-like amino acids*
Macroalgae
 active components, 452
alkaline phosphatase (ALP), 450
apoptotic cell death, 449–450
bone marrow cell coculture, 449–450
carotenoid fucoxanthin, 449–450
Ecklonia cava, 281–282
Eisenia arborea, 281–282
ovariectomized group, 450
rat femoral-diaphyseal tissues, 449
red algal, 282
Sargassum fusiforme (SME), 449–450, 451
Sargassum horneri, 449
MAPKs. *See Mitogen-activated protein kinases*
Marine algae
 active compounds, 419
bone tissue engineering applications
 calcium phosphate compounds, 437
Corallina officinalis, 437
graft materials, 437
 hydroxyapatite ceramic granules, 437
 inorganic calcium sources, 437–438
 microporous structure, 437
brown macroalgae
 anti-HSV activity, 249–250
fucoidans, 248–249
colorectal cancer
 active compounds, 231
 brown algae, 230–231
 description, 229
 development, 229–230
fucoxanthin, 230
 glycoprotein, 230
 description, 226
 diet with calcium supplement
 bone mineral loss, 438
 ingredients, 438
 mineral-rich supplement, 438
 osteoporosis, 438
 environment, 246
gastricstomach cancer
Capsosiphon fulvescens, 228
 description, 227
 differences, 227–228
fucoidan, 228
Laminaria japonica, 228–229
porphyran, 228
 prevention, 228
gastrointestinal tract cancer, 227
green macroalgae, 250
herpes, 246
microalgae
 HIV-1, 250–251
Spirulina platensis, 250–251
 mineral extraction, 420
 nutritional value, 226
 pharmaceutical research, 226
 purposes, 226
 red, green and brown, 419
red macroalgae
 galactans, 247–248
 polysaccharide and xylomannans, 247
Polysiphonia denudata, 246–247
Marine algal sources
 antibacterial screening
 chlorophyta, 73–74
 macroalgae classification, 73
 phaeophyta, 73
 rhodophyta, 73
 antimicrobial potentials, 72
 bioactive compounds
 bromoditerpenes, 74–75

- halogenated furanones, 75
 lectins, 75–76
 phlorotannins, 74
 sesquiterpenes, 74
 biofilm/antifouling bacteria, controlling, 77, 79
 fish bacterial disease, treatment
 antibacterial activity, 80
 drug resistance, 79
 QS, 79–80
 human pathogenic drug/multidrug-resistant strains
 antimycobacterial activity, 77, 78
 methanol extracts, 76–77
 solvents and extraction method, 76
 infectious agents, 72
 therapeutics, 73
Marine algal sterols. *See* Sterols
Marine collagen peptides (MCP), 420
Marine compound
 BMD, 420
 mineral extraction, marine algae, 420
 osteoblast differentiation
 HDACs, 420–421
 largazole, 421
 MCP, 420
 metaphyseal tissues, 422
 norzoanthamine, 421–422
 prevalent chronic inflammatory diseases, 422
 osteoclast differentiation
 biselyngbyaside, 423
 bolinaquinone, 423
 fucoxanthin, 423
 ikarisoside A, 423
 inhibitor, 422
 symbioimine, 423
Marine edible algae, disease prevention
 cancer prevention, 36–37
 food health promotion
 ancient times, 30
 daily consumption, 30–31
 nutrition facts, 30–31, 32
 human diet and chronic diseases, 30
MetS
 description, 34–35
 prevention, 35–36
 NCDs, 31
Matrix metalloproteinase-9 (MMP-9), 172
Matrix metalloproteinase inhibitors (MMPIs)
 fucoidans
 antiproliferative action, 137–138
 chemical structure, 135–136
Costaria costata, 137–138
 inhibitory effects, 137–138
 16 kDa fucoidan, 136–137
 photoaging, 135–136
 therapeutic ability, 136–137
MMPs and TIMPs, 130
phlorotannins
 chemical structures, 131–133
 dieckol and eckol, 133–134
Ecklonia and *Eisenia*, 135
 eckol and dieckol, 135
 formation, 131–133
 functional groups, 133–134
 osteosarcoma differentiation, 133–134
 phloroglucinol, 134–135
 skin wrinkling, 134–135
 scientific investigations, 138–139
 seaweeds/marine macroalgae, 131
Matrix metalloproteinases (MMPs)
 cell proliferation and metastasis, 137–138
 description, 130
 functional groups, 133–134
 photoaging, 134–136
Metabolic syndrome (MetS)
 description, 34–35
 prevention
 high blood pressure, 35
 wakame, 35–36
MetS. *See* Metabolic syndrome
Microalgae
 antiallergic properties, 272–273
 blue-green algae, 282–283
 in vitro experiments, 448–449
 marine invertebrates, 447
 marine resources, 272
 norzoanthamine structure, 448–449
 symbioimine structure, 447, 448
 use, 282–283
Micro and macroalgal consumption on photoprotection
 food and fuel, 288
macroalgal foods
 Alaria esculenta and *Laminaria digitata*, 294
 blue-green algae, 293
 irish moss, 293
 lettuce, 293–294
 MAA, 293
 proteins and peptides, 292–293
 purple laver, 292
 seaweeds, 293

Micro and macroalgal consumption on photoprotection (*cont.*)
marine environment, 288
microalgal foods
Arthrospira platensis/*Spirulina platensis*, 291–292
Chlorella, 292
Phaeodactylum tricornutum, 292
photoprotection, 288–289
UV, photodamage and photoprotection description, 289
ERK and JNK, 290
ozone layer, 291
RNS and ROS, 289–290
Mineral bioavailability
definition, 385
nutrient synergistic/antagonistic interactions, 385
reciprocal antagonistic/synergic behavior, 386
Mitogen-activated protein kinases (MAPKs)
mammalian cells, 185
protein expression, 150–151, 153, 185
signaling pathway, 152–155, 156, 185–186
MMP-9. *See* Matrix metalloproteinase-9
MMPIs. *See* Matrix metalloproteinase inhibitors
MMPs. *See* Matrix metalloproteinases
Mycosporine-like amino acids (MAA), 293

N

NCDs. *See* Noncommunicable diseases
Noncommunicable diseases (NCDs), 31
Nonshaved kombu (NSK)
and HFD, 202–203
and TK, inhibitory activities (*see* Tororokombu (TK))

O

Osteoclast differentiation
bone loss, 444
drug resistance, 444–445
macroalgae (*see* Macroalgae)
microalgae (*see* Microalgae)
osteoblasts, *in vitro*
cell viability, 447
cervical dislocation, 446
femoral and tibial bone marrow cells, 446–447

macrophage colony-stimulating factor, 446
mouse calvarial cells, 447
multinucleated cells, 447
myeloid hemopoietic lineage, 446
osteoporosis-related fracture prevention, 445
parathyroid hormone, 445
pharmacological and nutritional factors, 444
postmenopausal osteoporosis, 445
trench-digging cells, 445
Osteoporosis treatment
bisphosphonates, 419
bone formation and resorption, 418
bone homeostasis, 418
elderly age, 418
estrogen therapy, 418–419
marine algae
active compounds, 419
red, green, and brown, 419
marine compound
bone mineral density (BMD), 420
mineral extraction, marine algae, 420
osteoblast differentiation, 420–422
osteoclast differentiation, 422–423
osteoblast and osteoclast cells, 418
prevention and treatment, 418–419
Otolaryngologic diseases, 412–413

P

Peptide, marine microalgae
anticancer activity, 318–319
antihypertensive activity
ACE, 318
Chlorella, 318
antioxidant activity
hydrolysis, 317
synthetic, 317
therapeutic modalities, 317–318
application, 314–315
bioactivity
Arthrospira, *Chlorella* and *Dunaliella salina*, 316–317
description, 316
cultivation, 314–315
effects
alcohol, 319
bioactive, 317, 319
NIPP-1 and NIPP-2, 319, 320
human food sources composition, 315–316

Peroxisome proliferator-activated receptors (PPAR- α), 341
Phaeophyta, 73
Phlorotannins
antiallergic effects, 105
anticancer effects
antiproliferative activity, 104
inhibition, cancer metastasis, 104–105
antidiabetic effects, 106–107
anti-inflammatory effects, 106
antioxidant effects
bioresource, 99–102
free radical scavenging ability, 102, 103
oxidative stress, 99–102
photoprotective ability, 102–104
antiproliferative activity, 219–220
classification, 237–238
definition, medicinal foods, 98
derivatives, 237–238, 239
dioxynodehydroeckol, 218–219
MMPIs (*see* Matrix metalloproteinase inhibitors (MMPIs))
secretion and concentration, 99
structures, 98–99, 101
Phytochemicals
flavonoids and carotenoids, 10
halogenated compounds, 10
phlorotannins/polyphenols, 9–10
secondary metabolites, 9–10
Planktonic cells, 407–408
Polysaccharides
alginic acid, 8
carrageenans, 8
fucoidan, 9
laminarin, 8–9
marine algae, 270–271
porphyran, 271
sulfated, 7
ulvan, 9
Polyunsaturated fatty acids (PUFAs)
composition
environmental pollution, heavy metals, 347
FA profiles, 347–350
Fucus serratus, 347
Laminaria japonica, 347
lipid content, 350
nitrogen deficiency, 347
red seaweeds, 350
wild and cultured strains, 347
distribution
FA compositions, 350

TAGs, 350
health importance
biochemical pathways, 341
biological activities, 343
cyclooxygenase-2 (COX-2), 343
desaturases and elongases, 341
diet, 343–346
dispensability, 340–341
EPA and DHA, 343
metabolic transformation, 341
pleiotropic metabolic effects, 341
 ω -6/ ω -3 ratio, 346
Probiotics, 24–25
Proteins and amino acid
bioavailability, digestion and absorption
digestion, 302
mucosal cells, 302–303
quality, 302
transport, 302
requirements
defined, 299–300
nitrogen balance, 300
nitrogen status, 298–299
pregnancy and lactation, 299–300
role
cancer, 302
deficiency, 301
enzymes deficiency, 298
nitrogen waste, 301
seaweeds, 303–309
Prothrombin time (PT)
APTT, TT, 241
prolongation, 241
PT. *See* Prothrombin time
PUFAs. *See* Polyunsaturated fatty acids

Q

QS. *See* Quorum sensing
Quorum sensing (QS)
mechanism, 79
microalgae, 79–80

R

Reactive nitrogen species (RNS), 289–290
Reactive oxygen species (ROS), 289–290, 394
Recommended daily allowances (RDA)
vitamin-dependent function, 359
vitamin E, 360
vitamins B₁ and B₂, 360
Recommended daily intakes (RDIs)
iodine content, 378

- Recommended daily intakes (RDIs) (*cont.*)
 macroelements and microelements, 376
 seaweed, 372, 380
- Recommended nutrient intakes (RNIs), 375
- Retinol equivalent (RE), 360
- Rhodophyta, 73
- RNS. *See* Reactive nitrogen species
- ROS. *See* Reactive oxygen species

S

- Sea lettuces
- culinary use
 animals and humans, 59
 Hawaii, Cuba and Philippines, 59–60
 Japan, 59
 laverbread, 60
- description, 58–59
- fatty acids, 63–65
- lipids, 63
- minerals
 classification, 67
 contents, 67
 iodine, 68
- polysaccharides
 family, 60–61
 ulvan, 61, 62
 water soluble and insoluble fibers, 60–61
- protein and amino acids
 bioactive lectins, 62
 compositions, 62, 63
 Ulva reticulata and *Ulva lactuca*, 62
- seaweeds and health benefits, 58
- vitamins
 contents, 65, 66
 vitamin B complex, 65–66
 vitamin C, 66
 vitamin E, 66–67
- Seaweed
- bioactive peptides, sources
 ACE-inhibitory peptides, 331
 antihypertensive agents, 333–334
 description, 330–331
 heart diseases, 331
 proteins extraction, 331–332
 wakame, 332–333
- dietary fiber and digestive health benefits
 colorectal cancer, 23
 description, 21–22
 gastrointestinal inflammation, 24
 probiotics, 24–25
 types, soluble fiber, 22–23
- food, 18

- human nutrition, enhancement
 carbohydrates, 19
 lipids, 20
 minerals, 21
 proteins, 19–20
 vs. vegetables, 18–19
 vitamins, 20–21
- nutritional assessment
 biochemical aspects, 327
 brown and red, 326
 dietary fiber, 327
 environment, 327
 minerals, 327
- nutritional health benefits
 glycemic control, 26–27
 lipid absorption and cardiovascular diseases, reduction, 26
 obesity reduction, 25–26
 phenolic molecules, 25
- sulfated polysaccharides
 biological activity, 328–330
 preparation, 328
 role, 328
 use, 326
- Seaweed lipids, nutraceuticals
 marine microalgae
 DHA production, 351
 human lymphocytes, 350–351
 microalgal lipids, 351
 Schizochytrium mangrovei, 351
 thraustochytriaceae, 350–351
- PUFAs
 composition, 347–350
 distribution, 350
 health importance, 340–346
- Seaweed minerals, nutraceuticals
 bioavailability
 definition, 385
 nutrient synergistic/antagonistic interactions, 385
 reciprocal antagonistic/synergic behavior, 386
- concentration factors (CFs), 383
- daily requirements
 iodine content, 378
 RDIs, 382–383
 zinc and manganese, 380
- endogenous factors
 cell wall polysaccharides, 383
 diverse affinity, 384
 iodine uptake mechanism, 384
 Palmaria palmata, 383–384
- exogenous factors

- chemical composition, 384–385
 environmental conditions, 384
 physiology and biochemical composition, 385
Porphyra vietnamensis, 384
 sorption mechanism, metals, 385
- human body
 iodine, 372–373
 iron, 373
 manganese, 374–375
 zinc, 374
- requirements, humans
 chronic nutrition-related diseases, 375
 DRIs, 375
 recommended daily intakes (RDIs), 376
- Seaweeds and functional food development**
- biochemical composition analysis
 - amino acids, 7
 - lipids, 10–11
 - minerals and vitamins, 11
 - peptides, 6–7
 - phytochemicals, 9–10
 - polysaccharides, 7–9
 - proteins, 5–6
 - species and bioactive compounds, 5, 6
 - challenges, 12
 - classification and biochemical composition, 4
 - cultivation and research, 4–5
 - disease prevention
 - consumer awareness, 2
 - definition, 2–3
 - dietary transitions, 2
 - digestive health, 3
 - energy and sports drinks, 3
 - ω-3 fatty acids, 3–4
 - soy protein, 3–4
 - innovations and chronic diseases, 12–13
 - photosynthetic algae, 4
 - phycocolloid industry, 12
 - supply structure, 12–13
- Seaweeds proteins and amino acid composition**
- EAA, 307–308
 - glutamic and aspartic acid, 308
 - hydrolysis, 308
 - factors
 - content, red seaweed, 304, 305
 - green and brown seaweed, content, 304, 305
 - polysaccharides, 304–307
 - use, 303
 - value, 304
- nutritional evaluation**
- AAS, 308–309
 - digestibility, 309
 - green and brown seaweed, 306, 309
 - lysine, 309
 - red seaweed, 305, 309
- Seaweed vitamins, nutraceuticals**
- antioxidant activity
 - carotenoids, 365
 - cerebrovascular diseases, 365
 - compounds, 364
 - food industry, 364
 - low lipid content, 365
 - marine algae, 364
 - neutralizing free radicals, 365–366
 - oxidative forms, 364
 - vitamin C dietary intake, 365–366
 - bioavailability and absorption
 - algal vitamin B12, 362
 - fat-soluble vitamins, 361–362
 - food source, 361
 - factors, vitamin content
 - plant metabolism
 - carotenes content affection, 361
 - concentration-and temperature-dependent processes, 361
 - light and oxygen, 361
 - plant metabolism, 361
 - functions, human body
 - antioxidant activity, 358
 - enzyme cofactors, 358
 - intermediary carbon metabolism, 358–359
 - LDL oxidation, 359
 - provitamin function, 359
 - requirements, human
 - antioxidant activity, 359
 - fat-soluble vitamins, 360
 - RDA, 359
 - vitamins B₁ and B₂, 360
 - vitamin composition
 - A, B₂, B₁₂, 362
 - daily requirements, 362
 - DNA methylation, 363
 - Enteromorpha flexuosa* and *Ulva fasciata*, 363
 - Gracilaria changii*, 364
 - red and green algae, 363–364
- SGLT1. *See* Sodium-dependent transporter 1
- Sodium-dependent transporter 1 (SGLT1), 209
- SPMG. *See* Sulfated polymannurogluronate

INDEX

Note: Page numbers followed by “f” indicate figures, and “t” indicate tables.

A

- ACE inhibitor. *See* Angiotensin I converting enzyme inhibitor
- Actinomycetes
 - bioactive compounds
 - Abyssomicin C, 396
 - chronic diseases, 395
 - description, 395
 - development, 395
 - diazepinomycin (ECO-4601), 395–396
 - novel secondary metabolites, 396–397, 398f
 - sporolides A and B, 396
 - thiocoraline, 396
 - secondary metabolites
 - anticancer agent, 368–370
 - anti-tuberculosis (TB) drugs, 368–370
 - marineosins, 368–370
 - proteasome inhibitor, 368–370
 - TNF- α -induced NFkB activation, 368–370
 - 3-[(4-Amino-2-methyl-5-pyrimidinyl)-methyl]-1-(2-chloroethyl)-1-nitrosourea (ACNU), 227–228
- AMPs. *See* Antimicrobial peptides
- Angiotensin I converting enzyme (ACE) inhibitor. *See also* Marine fish-derived bioactive peptides, ACE
 - chitosan, 502–503
 - side effects, 498
- Anthraquinones
 - definition, cancer, 415–416
 - marine microorganisms, 416–417
 - metastasis, 416
 - MMP-2 and -9 expressions
 - cytotoxic effect, HT1080 cells, 417, 418f
 - investigation, isolated compounds, 418–419
 - TIMP_s, 419
 - TNF- α treatment, 418–419
 - signaling pathways, 420
- Anticancer activities, sterols, 265–266

Anti-HIV activities, sterols, 264–265

- Antihypertensive activity
 - Alaska pollack, 254–255
 - Atlantic salmon skin, 256
 - Bacillus licheniformis* alkaline protease, 256–257
 - bioactive peptides, 241
 - bonito bowels autolsate, 255
 - diastolic blood pressure, 256–257
 - gelatin extraction, 254–255
 - noncompetitive mechanism, 254
 - peptides, role, 254
 - sardine and hair tail meat, 256–257
 - shark meat hydrolyze, 256
 - source and enzyme use, 251, 252f
 - structure–activity relationships, 254
 - synthetic drugs, 254
 - Thunnius obesus*, 255

Antihypertensive peptides, 251

- Anti-inflammation activities, sterols, 262–264

Anti-inflammatory effects, EPA and DHA, 215–216

- Antimicrobial activities
 - bioactive peptides, 241–243
 - chitooligosaccharides, 328–330
 - sterols, 264

Antimicrobial peptides (AMPs)

- crustin type, 163
- MNPs, 161–162

Antioxidant activity

- bioactive peptides, 240
- chitooligosaccharides, 331–332
- Antitumor activity, 330–331
- APS. *See* Astragalus polysaccharides
- Asterina pectinifera*. *See* Starfish PLA2
- Astragalus polysaccharides (APS), 21

B

Bioactive antimicrobial peptides, 242f

- Bioactive compounds
 - actinomycetes, 395–397

- Bioactive compounds (*cont.*)
- antibacterial
 - bogorol A, 391
 - multidrug-resistant strains, 391
 - polyketides ariakemicins A and B, 392
 - Pyron, 392
 - anti-inflammatory
 - arachidonic acid pathway, 142–143, 142^f
 - cyclooxygenase activity, 141–142
 - dysidotronic acid, 142–143, 143^f
 - manoalide, 142–143, 143^f
 - antitumor
 - cryptophycins, 394
 - cycloprodigiosin hydrochloride, 393–394
 - cytotoxic alkaloid, 394
 - salinosporamide A, 394
 - treatment, 393
 - antiviral
 - calyceramides A–C, 393
 - exopolysaccharides (EPs), 393
 - Macrolactin A, 393
 - multipotential uses, 392
 - recreational activities, 392
 - Ara-A, 138–139, 139^f
 - Ara-C, 138–139, 138^f
 - cyanobacteria, 397–402
 - drug-resistant infectious diseases, 391
 - extraction, 270
 - hypcholesterolemic
 - cholesterol, 144–145
 - cholesterol biosynthesis pathway, 145–146, 145^f
 - FXR, 145–146
 - identification, 270–271
 - industrial development, 390
 - marine sponges
 - description, 140
 - secondary metabolites, 140, 141^f
 - microorganisms, 390
 - natural pigments
 - colorants, 146–147
 - Hymeniacidon sanguineum*, 147
 - natural sources, 270
 - novel antioxidants, 144
 - nutraceuticals, 139–140
 - sponge collagen, 146
 - sponge metabolite production
 - activities, 147
 - cell culture, 147–148
 - mariculture, 147–148
 - therapeutic importance, 278–279
 - types, 270–271
- Bioactive marine peptides
- fermentation and approaches
 - ACE-inhibitory activity, 87–89, 88^f
 - amino acids and cocompounds, 92–96, 97^t
 - DPPH levels changes, 92–96, 94^f
 - FAS, 89–90, 90^f
 - iron-peptide complex, 92, 93^f
 - meat based products, 92–96
 - molecular mass distribution, 92–96, 95^f
 - MRSPs, 90–91, 91^f
 - olopeptide amino acids, 92–96, 98^t
 - proteolytic activation, 91–92
 - shrimp protein, 92
- fish
 - ACE-inhibitory, 83
 - calcium, 79–82
 - MOP, 82–83
 - resources, 79, 80^t
- lobster, shrimp and crabs, 83
- mollusks and oysters
 - anticoagulant, 86
 - cytotoxic cyclic peptides, 84–85
 - dolastatin structure, 85, 85^f
 - effects, 86
 - HIV-1 protease, 86–87
 - keenamide A, 85, 86^f
- squid, clams and sea urchins, 84
- structural properties
 - ACE-inhibitory activity, 76
 - antioxidative, 76–77
 - C-terminus, 77
 - lipid peroxidation, 75–76
 - N-terminus, 78
 - Tyr, Trp and Phe, 78
- Bioactive peptide, invertebrates
 - AD pathogenic mechanism
 - APP processing, 58–59, 59^f
 - marine zooplankton, 60–61
 - β -secretase, 59–60
 - antimicrobial activity
 - AMPs, 65–66
 - lobsters, 66
 - antioxidant activity
 - marine zooplankton, 62–64
 - oxidative stress, 61
 - shellfish, 61–62
 - aromatic amino acids, 57–58
 - crustaceans
 - Acaudina molpadioidea*, 54–57

- ACE-inhibitory peptides, 54–57, 56^t
description, 48–49
hypertensive mechanism
 RAS, 50
 renin–angiotensin system, 50, 52^f
marine zooplankton, 54, 55^f
nutraceuticals and pharmaceuticals,
 57–58
preparation, 49–50, 51^f
purple sea urchin, 64–65
shellfish
 ACE-inhibiting peptides, 52, 53^t
 freshwater clam hydrolysate, 52–54
 N-terminal sequence, 52–54
 skin pathologies, 67
- Bioactive peptides development
 fish proteins, 244–245
 fish sources, 236–237
 identification, 236–237
 isolation, 236–237
 marine environment, 236
 production
 anticancer effect, 243
 anticoagulant effect, 243
 antihypertensive activity, 241
 antimicrobial activity, 241–243
 antimicrobial peptides, 239
 antioxidant activity, 240
 Atlantic cod hydrolysate, 244
 bone mineralization ability, 244
 Ca absorbtion, 244
 collagen, 239–240
 fishes and fermented fish, isolation, 244
 fish skin gelatin, 239–240
 separation, 239
 sources
 body parts, 239
 fish bone, 239
 fish skin collagen and gelatin, 238
 muscle protein peptides, 238
 structure–activity relationship, 237–238
- Biological activities, chitooligosaccharides,
 332–333
- Bone mineralization, 292, 292^f
- Bovine spongiform encephalopathy (BSE),
 440
- BSE. *See* Bovine spongiform encephalopathy
- C**
- Calcitonin gene related peptide (CGRP)
 blood flow regulation, 486–487
 microcirculation, 486
- neurovascular disorder, 486–487
- Cardiovascular diseases (CVDs)
 antihypertensive effects, 468
 ω-3 FAs, 468
 hypercholesterolemia, 467–468
 n-3 PUFAs, 214–215
- Casein phosphopeptides (CPP)
 CPP II, 291
 FBP intake, 293^t
- CCK. *See* Cholecystokinin
- CGRP. *See* Calcitonin gene related peptide
- Chitooligosaccharides (COSs)
 biological properties
 antihypertensive activity, 327–328
 antimicrobial activity, 328–330
 antioxidant activity, 331–332
 antitumor activity, 330–331
 hydrogen peroxide-induced stress,
 332–333
 inhibit β-secretase activity, 333
 lipid peroxidation compounds,
 332–333
 neurodegenerative diseases, 332–333
 chitosan, 322
 preparation, chitosan
 chemical hydrolysis, 322–324
 continuous production, 326–327
 enzymatic hydrolysis, 324–326
 safety, 333
 water-soluble, 322
- Chitosan
 applications, 122
 biocompatibility and allergy
 crustaceans, 114
 proinflammatory properties, 114
 biodegradation, 115–116
 biological activities, 132
 cross-linking, bioactive agent, 111
 description, 122
 health benefits
 anti-inflammatory activity, 129–131
 antimicrobial activity, 128–129
 antioxidant activity, 125–126
 biological properties, 131
 hypcholesterolemic effects, 126–128
 mechanical strength
 compression test, 111
 load–displacement test, 112
 tensile test, 111
- MW and DD
 description, 109–110
- DNA and siRNA, 110

- Chitosan (cont.)**
- nanoparticles, 110–111
 - plasma and liver cholesterol levels, 111
 - preparation
 - characteristics, 123
 - crustacean chitin, 123, 124*f*
 - sources, 123–125
- Cholecystokinin (CCK)**
- effect, industrial product hydrolysates, 485–486, 485*f*
 - gastrointestinal actions, 482–485
- Chondrocytes**, glucosamine, 339–341
- CLA.** *See* Conjugated linoleic acid
- Collagen and gelatin**
- acid treatment, 500
 - bioactivities, 500
 - biomedical and nutraceutical applications
 - drug carriers, cancer treatment, 501
 - melt-in-the-mouth property, 501
 - fish skin waste, 499–500
 - manufacturing, 499
 - marine-discarded sources, 500
- Conjugated linoleic acid (CLA)**, 357–358
- COSs.** *See* Chitooligosaccharides
- CVDs.** *See* Cardiovascular diseases
- Cyanobacteria**
- bioactive compounds
 - anticancer effect, 402
 - anti-inflammatory activity, 400
 - antiviral effect, 400–401
 - borophycin, 400
 - cryptophycin, 400
 - cyanovirin-N (CV-N), 397–399
 - isolated compounds, 401*t*, 402
 - lipopeptides, 400
 - secondary metabolites
 - antiproliferative activity, 371–373
 - antitumor activities, 371–373
 - lipopeptide, modification, 371–373
 - pharmaceutical applications, 371–373
 - production, vitamins, 371–373
 - weak cytotoxic activity, 371–373
- Cytotoxic substances**
- coral community
 - alkaloids, 178, 179*f*
 - Aplysina*, 178, 178*f*
 - bromotyrosine-derivatives, 178–179
 - Dysidea*, 177–178, 178*f*
 - Laurencia papillosa*, 179–180, 179*f*
 - papillamide, 179–180, 180*f*
 - reefs, 175–176
 - Terpios hoshinota*, 176, 176*f*, 177*f*
- cyanobacteria**
- bisebromoamide, 180
 - description, 180, 180*f*
 - lyngbyacyclamides, 180–182
 - Lyngbya majuscule*, 180–182
- description**, 172
- halichondrins**
- antitumor substances, 173
 - description, 172–173, 173*f*
 - and eribulin, 172–173, 174*f*
 - living organisms, 175
 - structure, 175
 - variations, 173–175
- marine natural products**, 172
- D**
- DD.** *See* Degree of deacetylation
- Degree of deacetylation (DD)**, 123–125
- Depolymerized holothurian glycosaminoglycan (DHG)**, 16–17
- DHA.** *See* Docosahexaenoic acid
- DHG.** *See* Depolymerized holothurian glycosaminoglycan
- Docosahexaenoic acid (DHA)**, 212–213
- E**
- Eicosapentaenoic acid (EPA)**, 212–213
- Enzymatic hydrolysis**,
- chitooligosaccharides, 324–326
- EPA.** *See* Eicosapentaenoic acid
- F**
- Farnesoid X-activated receptor (FXR)**, 145–146
- FAS.** *See* Fermented anchovy sauce
- FBP II.** *See* Fish bone peptides
- Fermented anchovy sauce (FAS)**, 89–90
- Fish bone peptide (FBP).** *See* Teleost fish bone peptide
- Fish bone peptides (FBP) II**, 506–507
- Fish collagen**
- amino acids composition, 112, 113*t*
 - biocompatibility and allergy
 - IgE-reactive protein, 114–115
 - jellyfish, 115
 - SC vascular grafts, 115
 - tilapia, 115
 - biodegradation, 115–116
 - cross-linking, stability, 113
 - degeneration temperature, 112–113
 - mechanical strength, 114

Fish muscle protein
 bioactive compounds, isolation, 236–237
 preparation, 243
 utilization, 236
Fish oil
 degradation, 218
 derived n-3 PUFAs, 213
 NF-κB activation, 217
 soft gel capsules, 212
 source, 212, 218
Fish protein hydrolysates (FPH), 480–481,
 485–486, 489
Fish proteins, bioactivity, 242*t*
FPH. *See* Fish protein hydrolysates
FXR. *See* Farnesoid X-activated receptor

G

GAGs. *See* Glycosaminoglycans
Glucosamine (GlcN)
 biological activities, 346–348
 description, 338–339
 and GlcNAc, MC3T3-E1 cells
 NF-κB ligand, 345–346
 osteoblastic, 342–343
 osteoblastic differentiation markers,
 343–344
 incorporation, GAG, 342
 osteoarthritis (OA), 338
 pathological change, subchondral bone,
 339
 RANKL expression, 349–350
 synovial fluid GAG, 339
 and uronic acids
 HA-metabolizing enzymes, 342
 human synovial cells and
 chondrocytes, 339–341
Glycosaminoglycans (GAGs), 12–13,
 196–198, 197*f*, 199*f*

H

Halichlorine
 LPS-induced NF-κB activation
 BAECs, 188–189, 188*f*
 LDL, 188–189
 VCAM-1, 187–188
 L-type Ca²⁺ channel
 effect, 189–190, 190*f*
 voltage relationships, 189–190, 190*f*
 structures, 186, 187*f*
Health benefits, chitosan
 anti-inflammatory activity

acute and chronic inflammation,
 129–130
COX-2 expression, 130–131
TNF-α and IL-6, 130–131
antimicrobial activity
 DD and MW, 128–129
 food additive, 129
 MIC value, 128
antioxidant activity
 deacetylation, 125–126
 ROS, 125
 treatment, 126
biological properties, 131
hypcholesterolemic effects
 bile acids, 126
 DD and Mv, 126
 digestive system, 127
 hypolipidemic activities, 126–127
 mechanism, 127–128

Hoki bone
 Ca-binding activity, 291
 chemical composition, 289–290
 isolation and biochemical properties,
 290–291

Holostane group structure, 299*f*
Human synovial cells, glucosamine, 339–341
Hyaluronic acid
 HA at 0.25–1mM, 341, 341*f*
 human chondrocytes (SW1353) at
 0.1–1mM, 340, 340*f*
 human synovial cells (MH7A) at
 0.25–1mM, 339–340, 340*f*

Hypertension
 humans, 250
 prevalence, 250
 prevention and treatment, 250

I

ICAM-1. *See* Intercellular adhesion molecule-1
iGluR. *See* Ionotropic glutamate receptor
Inflammation
 EPA and DHA effects, 214*f*
 muscle and adipose tissue, 217–218
 obesity, 217–218
 reduction, 216–217

Insulin resistance
 depression, 213
 EPA and DHA, effects, 214*f*
 reduction, 214

Intercellular adhesion molecule-1 (ICAM-1)
 E-selectin, 188–189

Intercellular adhesion molecule-1 (ICAM-1)
(*cont.*)

VCAM-1, 187–188

Ionotropic glutamate receptor (iGluR),
373–375

L

LDL. *See* Low density lipoproteins

Lipase

pelagic fishes, 425

reactions, 424–425

temperatures, 425

Low density lipoproteins (LDL), 438–440

M

Marine-derived substances (MDSs)

anti-inflammatory effects, 465

antioxidant activity, 466–467

probiotics, 470

Marine fish-derived bioactive peptides,

ACE

antihypertensive activity

Alaska pollack, 254–255

Atlantic salmon skin, 256

Bacillus licheniformis alkaline protease,

256–257

bonito bowels autolysate, 255

diastolic blood pressure, 256–257

gelatin extraction, 254–255

noncompetitive mechanism, 254

peptides, role, 254

sardine and hair tail meat, 256–257

shark meat hydrolyze, 256

source and enzyme use, 251, 252t

structure–activity relationships, 254

synthetic drugs, 254

Thunnus obesus, 255

antihypertensive peptides, development,

251

hypertension, 250

physiological functions, 250

sources, 250

synthetic drugs, 250

Marine invertebrates

description, 154

MNPs, 154–155

phylum bryozoa, 158–159

phylum Cnidaria

corals, 157–158

jellyfish, 158

phylum molluska

abalone, 160

AMPs, 161–162

corn shell, 160–161

description, 159

oyster shells application, 159–160

sea hares, 161

phylum porifera

description, 156

MNPs, 157

use, 156–157

sample collection, 155–156

Marine microbial enzymes

activities, 424

advantages, 431–432

lipase, 424–425

microorganisms, 424

polysaccharide-degrading enzymes,

426–431

protease, 426

Marine natural products (MNPs)

marine sponges, 156–157

production, 155–156

source, 157–158

types, 162

Marine nutraceuticals, dairy products

advantages, 470–471

anti-inflammatory

diseases, 465

effects, MDSs, 465

antimicrobial

activities, chitosan and COS, 469

bacteriocins, 469

milk, 469

minimum inhibitory concentrations,

469, 469t

antibiose

fat catabolism, 467

uncoupling protein 1 (UCP1), 467

antioxidant

activity, 466–467, 466t

MDS, 466–467

prevention, tissue damage, 465–466

antitumor

anticancer activity, 462, 463t

β-carotene, 462–464

inhibition, cell apoptosis, 462

MMPs, 464–465

bioactive peptides, 460

β-carotene, 471–472

carotenoids, 461

CVD, 467–468

description, 458

- ω-3 FAs**, 472–473
final product, 471, 472f
food formulations, 458
MDSs, 459
phenolic compounds, 461
polysaccharides
 chitin, 460
 N-acetyl glucosamines, 460
 structural role, 459
polyunsaturated fatty acids, 461
prebiotics, 470
probiotics, 470
Marine phospholipids
 antiobesity compounds
 KK-A^y intake, 41–45, 43f
 UCP1, 41–45, 44f
 UCP1 mRNA expression, 41–45, 44f
 WAT, 41–45
 cancer cell differentiation
 c-myc mRNA downregulation, 35–37, 37f
 PC, PS, 35–37
 retinoic acid effects, 35–37, 35f
 TGFβ-1 expression, 35–37, 38f
 cancer suppression
 Agaricus blazei, 38–40
 chitosan mucoadhesive function, 41
 effect, 41, 42f
 liposomes, 38–40, 40f
 squid meal liposome, 41, 42f
 tumor size, 38–40
 tumor weight, 38–40, 39f
 water extraction, 38–40
DHA/EPA, 32
triacylglycerol
 description, 32–34
 lipid content, rats serum, 32–34, 33f
 rat fetus brain, fatty acid composition, 32–34, 34f
 SHR rats, 34–35, 34f
Marine probiotics
 antibiotics, 355
 antimicrobial and antitumor agents, 359
 approaches
 interaction, 358
 isolation and identification, potential strain, 358–359
 aquaculture, 355
 beneficial effects, CLA, 357–358
 definition, 354
 food ingredients, 356–357
 growth, enteropathogens, 357
prerequisites
 advantageous, medicinal uses, 355–356
 high-quality products, 355–356
 probiotic strains, 354–355
Marine sulfated polysaccharides (MSPs)
 chemical structure, 198–200
 external fertilization in sea urchins, 198–200
 interaction with coagulation (co)factors
 algal molecules, 200–201
 clinical activities, 200
 in vitro anticoagulant assays, 201
 mammalian GAG, 200
 plasma proteases, 201
SFs and SGs, 196–198, 197f, 199f
structural feature
 anticoagulant activity, 203f
 influence by sugar type, 201–204
 influence by sulfation pattern, 205–206
 preferential conformation binding, 204–205
Matrix metalloproteinase (MMP-2 and -9)
 expressions
 chrysophanol, physcion and emodin
 cytotoxic effect, HT1080 cells, 417, 418f
 investigation, isolated compounds, 418–419
 TIMPs, 419
 TNF-α treatment, 418–419
MDSs. *See* Marine-derived substances
Medicinal foods
 crustaceans
 COS, 6
 shell fish, 6
 shrimp and crab, 6
 description, 2
 fish
 fisheries, 3–5
 products, 5
 values, 5
 marine animal, 2
 marine species, 2–3, 4f
 mollusks and echinoderms
 abalones, 7
 consumption, 7
 cuttlefish bones, 7
 octopus and squids, 7
 oyster shell and juice, 7
 phytoplankton, seaweeds/grasses, 2–3
 seahorse, 7–8
Metabolic disorders, 216–218

- M**
- Metabolite
description, 186
halichlorine, 186–190
- Methicillin-resistant *Staphylococcus aureus*
(MRSA)
antimicrobial activity, 373–375
cell membrane, 366–367
cytotoxicity, 368–370
- MMP-2 and -9 expressions. *See* Matrix
metalloproteinase expressions
- MNPs. *See* Marine natural products
- Molecular weight (MW), 123–125
- MRSA. *See* Methicillin-resistant *Staphylococcus aureus*
- MRSPs. *See* Mussel-derived radical scavenging peptides
- MSPs. *See* Marine sulfated polysaccharides
- Mussel-derived radical scavenging peptides (MRSPs), 90–91
- MW. *See* Molecular weight
- N**
- n-3 polyunsaturated fatty acids (n-3 PUFAs)
anti-inflammatory effects, EPA and DHA, 215–216
and cardiovascular diseases, 214–215
eicosapentaenoic and docosahexaenoic acid, 212–213
EPA and DHA effects, 213, 214f
fish oil-derived, 213
health concerns, 218
hypotriglyceridemic effects, 214
and metabolic disorders, 216–218
- O**
- O-GlcNAc. *See* O-linked β -N-acetylglucosamine
- O-linked β -N-acetylglucosamine (O-GlcNAc), 12
- Osteoblastic cells, 343–344
- Osteoporosis-modeling rats, 292–294
- P**
- Phospholipase A2 (PLA2)
BSE, 438–440
catalysis, 438–440, 438f
LDL, 438–440
lysolecithin, 438–440
starfish
activity, 440–442
application, 450–452
- enzymatic properties, 442–445
structural properties, 445–448
structure–function relationship, 448–450
- studies, 439t
- types, 438–440
- PLA2. *See* Phospholipase A2
- Polysaccharide-degrading enzymes
agarases
acid degradation, 428
use, 428
- alginate lyases, 427
- amylases, 430
- Bacillus circulans*, 431
- carrageenases, 428–429
- cellulose and hemicellulose hydrolase
hydrolysis reaction, 429
use, 429
- xylanases, 430
- chitinase and chitosanase
chemical structure, 426–427
production, 427
- fucoidan, 431
- Polysaccharides
ascidians
CS inhibitory effects, 19, 20f
- CSPG, 18
- inflammation, 19
- NF- κ B, 19
- Styela plicata*, 18–19
- tadpole-type larvae, 18
- chondroitin sulfate, 14
- disaccharides structures, 13–14
- GAGs, 12–13
- nudibranchs
description, 22
- GAGs synthesize, 24
- mammalian mucus, 24
- mucus functions, 22–23
- sea slugs, 24, 25f
- O-GlcNAc, 12
- sea cucumber
Apostichopus japonicus, 15–16
- body wall, 14–15
- collagen fibrils, 16–17
- CSE, 17
- DHG, 16–17
- GAG, 14–15
- methylation analysis, 16–17, 17t
- physicochemical properties, 15
- sea urchins
APS, 21

- Astragalus membranaceus*, 21
hepatocarcinoma, 21–22
SEP, 21–22
- Protein and peptides, seafood processing by-products
ACE inhibitory, 497–498
antioxidative activities, 498–499
bioactive agents, 499
coagulation factors, 498
fish muscle, 497
osteoclasts, 498–499
tuna backbone, 498
- R**
- RAS. *See* Renin–angiotensin system
Reactive oxygen species (ROS), 125
Renin–angiotensin system (RAS), 50
ROS. *See* Reactive oxygen species
- S**
- Scaffold properties
chitosan. *See* Chitosan
diffusivity and permeability, 109
fish collagen. *See* Fish collagen
functions, 109
parameters, 109
requirements, 108–109
tissue
engineering, 108–109
regeneration, 109
- Sea by-products
ACE, 480–481
agro-alimentary French market, 480
antioxidant peptides
amino acid sequences, 487–488, 488t
ascorbic acid, 487–488
diseases, 487–488
inhibition, lipid oxidation, 487–488
CCK secretion stimulating peptides, 482–486
CGRP, 486–487
enzymatic process
bioactive peptides, 482, 483t
protein hydrolysates, 481–482
reaction, 482
FPH, 480–481
production, 480
Sea cucumber. *See* Triterpene glycosides, sea cucumbers
Seafood processing by-products
application, fish bone
- FBP II, 506–507
hydroxyapatite, 506–507
production, calcium, 506–507
- bioactive compounds, 496–497
chitin and chitosan
ACE inhibitory activity, 502–503
antibacterial action, 502
anticancer activity, 503
antioxidant activities, 502
cardiovascular disease, 503
enzyme immobilization, 503–504
medical application, 504
production, 501–502
collagen and gelatin, 499–501
fish catch, 496
protein and peptides, 497–499
separation and application, fish oil
gelatin, 504–505
production, margarine, 505–506
types, fatty acids, 504–505
wet and steam rendering methods, 504–505
- Sebum
human identification, 225
secrete, 225
- Secondary metabolites, drug discovery
actinomycetes, 368–370
bioactive metabolites, 365
chemical diversity, 364–365
collaborative and interdisciplinary research, 378
cyanobacteria, 371–373
infections, 364, 378
- marine bacteria
antibacterial, antiviral and cytotoxic activities, 366–367
anticancer agents, 368
depsipeptides, 366–367
lysozyme, 366–367
MRSA, 366–367
- marine fungi
antiplasmodial activity, 370–371
cytotoxicity activity, 370–371
polyphenolic compounds, 370–371
spirodioxynaphthalene metabolite, 370–371
- microbial symbionts
antileukemic agent, 373–375
bryostatins, 373–375
iGluR, 373–375
yellow pigment, 373–375
- mutagenesis techniques, 378–379

- Secondary metabolites, drug discovery (cont.)**
- natural products
 - bioinformatics approach, 376–377
 - isolation and cultivation, 376–377
 - limitations, 375–376
 - microbial cells, 376
 - oceans, 365
- SEP. *See* Strongylocentrotus nudus eggs**
- Shark liver oil**
- components, 225
 - contains, 227
 - and olive oil, 226
 - protective effect, 231
 - squalene source, 224–225
- Squalene and squalane**
- biological roles
 - anticancer, 227–228
 - anti-infectant, 231
 - antioxidant, 226–227
 - detoxifier, 230–231
 - drug delivery agent, 229–230
 - human skin, 225
 - industrial area, 225–226
 - skin care, 228–229
 - synthesis, 225
 - chemical structures, 224–225, 224f
 - components in shark liver oil, 225
 - detoxifying and anti-infectant effects, 231
 - natural sources, 231
 - role, 224–225
 - saturated derivative, 225
 - supplementation, 231
 - triterpene, 224–225
- Squalene gemcitabine, 230**
- Starfish PLA2**
- activity
 - estimation, molecular weight, 440–442
 - gel filtration, 440–442
 - marine invertebrates, 442, 443t
 - studies, 439t, 440–442
 - application
 - distribution, DHA and EPA, 450–452
 - fatty acids, phosphatidylcholine and phosphatidylethanolamine, 450, 451t
 - enzymatic properties
 - acetone treatment, 442–443
 - A. pectinifera*, 444–445, 444t
 - gel filtration, 444
 - structural properties
 - amino acid sequences, 445–447, 446f
- Sterols**
- characteristic structure, 448
 - reaction cycle, 447–448
 - structure–function relationship
 - mutation, 449–450
 - polar-group specificity, 448
 - recombinant, 448–449
- Sulfated polysaccharides (SPs), 196–198, 197f, 199f**
- T**
- Teleost fish bone peptide**
- Ca source, 288–289
 - hoki bone
 - Ca-binding activity, 291
 - chemical composition, 289–290
 - isolation and biochemical properties, 290–291
 - in vitro* and *in vivo* osteogenic effects
 - Ca bioavailability in ovariectomised rats, 292–294
 - osteoblast-like MG63 cell, 292
 - numerous functions, calcium, 288
- Terpenoids, marine fungi**
- building blocks, 410
 - chronic malfunctions, 412
 - diversity
 - meroterpenoids, 410–411
 - natural products, 411
 - health benefits and biological activities
 - antioxidants, 411–412
 - antiproliferative activity, 412

structures, 410

Therapeutic drugs

- chemical composition, fish
 - carbohydrates derivation, 271–272
 - collagen and gelatin, 272–273
 - compositions, 271
 - minerals, 278
 - protein derivation, 272
 - protein hydrolysate and bioactive peptides, 273–275
- fat derivation
 - applications, omega-3 fatty acids, 277–278
 - description, 275
 - extraction and purification, 276
 - omega-3 fatty acids, 275–276
- fish by-products, 270–271
- marine organisms, 270
 - natural products isolation, 270

TIMPs. *See* Tissue inhibitors of matrix metalloproteinase

Tissue inhibitors of matrix

- metalloproteinase (TIMPs), p0045, p0055, 416

Triterpene glycosides, sea cucumbers

- bioactivities
 - anticancer activity, 300–314
 - antifungal activity, 314–315
 - marine organisms, 298

PROS and CONS, drug development, 316

structure

- holostane group, 298–299, 299f
- holostane type sea cucumber glycosides, 300
- isolation, 300, 301t
- nonholostane type glycosides, 300
- saponins, 298–299

structure–activity relationships, 315

U

UCP1. *See* Uncoupling protein 1

Uncoupling protein 1 (UCP1), 41–45, 44f, 467

Uronic acids

- HA-metabolizing enzymes, 342
- human synovial cells and chondrocytes, 339–341

V

Vascular cell adhesion molecule-1 (VCAM-1)

- expression, 186
- ICAM-1, 187–188

VCAM-1. *See* Vascular cell adhesion molecule-1

W

WAT. *See* White adipose tissue

White adipose tissue (WAT), 41–45

INDEX

Note: Page numbers followed by "*f*" indicate figures, and "*t*" indicate tables.

A

- Acid detergent acid fiber (ADF), 78–79
- ADF. *See Acid detergent acid fiber (ADF)*
- Agar characteristics, 114, 115^t
- Age-standardized rate (ASR)
 - CRC, 90–91, 91^f
 - mortality/incidence, 92
- Algal polysaccharides, human nutrition
 - biological activities
 - blue-green freshwater algae, 125–126
 - green freshwater algae, 126–127
 - seaweed polysaccharides, 127–132
 - description, 76–77
 - freshwater and seaweed, 77
 - habitats, 100
 - roles, 100–101
 - significance, dietary fiber (*see Dietary fiber*)
- Alginate, 120
- Anticancer activity, dietary fiber
 - CRC, 90–91
 - malignant diseases, 90–91
- Antifungal lab
 - animal feed, 230–231
 - biopreservatives
 - antagonistic compounds, 223
 - antimycotic activity, 224, 225^t
 - description, 223
 - prevention, mycotoxin contamination, 223–224
- bread
 - antifungal components, 224–229
 - fungal spoilage, 224
 - phenyllactic acid, 224–229
 - sourdough, 224–229
- dairy products, 229
- fresh fruits and vegetables, 230
- industrial importance, 232
- patents distribution, 231, 231^f, 232^f

B

- BCAA. *See Branchedchain amino acid (BCAA)*
- Biopreservation, 218–219
- Branchedchain amino acid (BCAA), 181–182

C

- Carbohydrates, dietary
 - body weight and composition, 160
 - description, 159
 - index and load, glycemic, 159–160
 - mechanisms, 160–161
- Cardiovascular diseases (CVDs)
 - description, 148–149
 - dyslipidemia, 150–151
 - fiber and protein, 149
 - hypertension, 150
 - hypcholesterolemic effect, 96–97
 - insoluble fibers, 97–98
 - insulin resistance, 151
 - LDL cholesterol, 96
 - lupin (*see Lupin*)
 - macronutrients (*see Macronutrients*)
 - mortality and dietary fiber intake, 95, 95^f
 - overweight and obesity, 150, 151–153
 - proportion, 149
 - risk factors
 - blood lipids, 197–198
 - blood pressure, 196–197
 - glucose and insulin, 198–199
 - stressful lifestyle, 151
 - TDF, 96
 - total serum and low-LDL cholesterol level, 94–95
 - water-soluble components, 97
- Carrageenans
 - anticoagulant activity, 131
 - use, 114–117

Charmat/Granvas method
 CO₂ pressure, 14–15
 pressure and temperature, 14
 riddling and disgorging steps, 16–17
 tank, 14, 15f
 thermal treatment, 16

Colorectal cancer (CRC)
 ASR, 90–91, 91f
Bifidobacteria, 93–94
 bile acids, 93
 fats and meat intake, 94
 methane, 94
 SCFAs, 92–93
 wheat bran content, 93

Color, sparkling wines
 compounds
 carbohydrates, 32
 carotenoids, 29–30
 flavonoids, 30–31
 hydroxycinnamates, 31–32
 phenolic, 30
 quinones, 31–32
 sweet, 29–30
 yellow, 31

vinification
 hydroxycinnamic acids, 32
 laboratory conditions, 32
 phenolic composition, 32–33
 white and red grapes, 29

CRC. *See* Colorectal cancer (CRC)

CVDs. *See* Cardiovascular diseases (CVDs)

D

Dietary fiber
 characteristics
 cellulose, 80
 chitin and chitosan, 83
 fructans, 82
 β -glucan, 81–82
 gums and mucilges, 82–83
 hemicellulose, 81
 lignin, 83
 pectin, 81
 plant cell wall, 80
 resistant starch, 83

classification, 79, 161

definition, 77–78

energy intake control
 effects, 166
 mechanisms, 166

FAO/WHO scientific update, 79–80

freshwater algae polysaccharides
 composition, 101–108

health benefits
 anticancer activity, 90–94
 CVDs, 94–98
 digestive process, 90
 DRI, 89–90, 89f
 time- and cost-consuming research process, 88–89

mechanisms, 166–167

NDF and ADF, 78–79

obesity development
 intervention studies, 168
 population studies, 167–168

physiological effects
 description, 83–84
 fermentation, 85–86
 gut microflora, 86
 hypocholesterolemic and hypoglycemic activities, 88
 pH value, colonic environment, 85
 SCFAs, 86–87
 transit time, 88
 types, 84–85
 upper intestine, 84

water-holding/hydratation capacity, 84

possible negative effects, 98–99

seaweed polysaccharides composition, 108–124

TDF, 78–79

Dietary reference intakes (DRIs), 89–90, 89f

DRIs. *See* Dietary reference intakes (DRIs)

Dyslipidemia

description, 187–188

fiber
 cardiovascular health, 190
 insulin, 191
 intervention trials, 190–191
 population studies, 190

protein
 isoflavone, 189–190
 ketogenic diets, 189
 LDL, 189
 plant, 188–189

E

Elaboration process, sparkling wines
 aging
 enzymatic self-degradation, 17–18
 MET image, 17, 18f

polysaccharides, 18–19

protease A, 17–18

ribonucleotides, 19

Sur lies, 17

yeast cell, 19

expedition

agglomerate corks, 22

bottles, 22, 22*t*

disgorging, 20

dosage, 20–22

filtration and bottling, 19–20

riddling, 20

sugar content, 20, 21*t*

red/white grape, 10–11

second fermentation

champenoise, classic/traditional method, 12–14

Charmat/Granvas method, 14–17

definition, *prise de mousse*, 12

white vinification, 11–12

Energy balance

description, 153

disruption, 155

expenditure, 154–155

foods/nutrients, 154

supply and intake, increase, 154

F

FAO. *See* Food and Agriculture Organization (FAO)

Fat, dietary

description, 158

role, 159

Fermentation

champenoise, classic/traditional method

bottle glass, 14

expedition liqueur, 12–14, 13*f*

Charmat/Granvas method

CO₂ pressure, 14–15

pressure and temperature, 14

riddling and disgorging steps, 16–17

tank, 14, 15*f*

thermal treatment, 16

definition, *prise de mousse*, 12

Foam, sparkling wines

bubbles

air/gaseous phase, 24, 24*f*

enologic practices, 26

micelle concentration, 24–25, 25*f*

potential interactions, 26

surface tension, 24–25, 25*f*

tensioactive molecules, 23, 24

viscosity, 25

carbon dioxide/liquid interphase, 23, 24*f*

effervescence

carbon dioxide, 28

glasses, 29

induced homogeneous nucleation, 26–27

microcavities, 26–27

sensory descriptors, 27–28, 27*f*

tasting cards, 28

Food and Agriculture Organization (FAO), 221–222

Food quality and safety

chemical preservative agents, 222–223

contamination, 221

FAO, 221–222

fungal spoilage, 222

mycotoxin contamination, 222

national and international policies, 221

Freshwater algal polysaccharides

biological activities, 125

blue-green, 125–126

composition

amino sugars, 108

blue-green and green, 102

Chlorella sp., 101–102

Chlorococcales, 101

description, 101

glucosamine content, 108

glucose, 106

granules, starch, 106

polysaccharides characteristics, 101–102, 103*t*

Spirulina platensis, 106

starch structure, 106

starch synthesis, 102

green, 126–127

Fucoidan, 120–123

Furcellaran, 117–119

G

Glucose and insulin

description, 198

effects, 199

lupin flour-enriched diet, 198

mechanism, 199

Green preservatives

antifungal activity, 219

bacterial antagonism, 231–232

biopreservation, 218–219

Green preservatives (*cont.*)

- fermentation processes, 218–219
- food quality and safety, 221–223
- LAB (*see* Antifungal LAB)
- mold spoilage, 219
- mycotoxins, 219, 220*t*

H

Hypertension

- description, 183–184
- fiber and blood pressure, 186–187
- protein and blood pressure
 - beneficial effects, 185–186
 - intervention studies, 184–185
 - mechanism, 185
- population studies, 184
- sources, 184

I

Insulin resistance

- description, 180–181
- fiber, 182–183
- protein
 - BCAA, 181–182
 - DASH diet, 181
 - diets, 181

LLactic acid bacteria (LAB). *See* Antifungal lab

Lipoproteins (LPS), 60

Low density lipoprotein (LDL)

- cholesterol concentrations, 189, 190–191
- fiber intake, 190
- lupin protein upregulation, 197
- LPS. *See* Lipopolysaccharides (LPS)
- Lungs, sea food processing
 - hypersensitivity pneumonitis, 53
 - irritant-induced asthma, 52
 - occupational allergic asthma, 52
 - RADS, 52

Lupin

- description, 192
- enriched foods
 - CVD risk factors, 196–199
 - satiation and energy intake, 195–196
- health benefits, 195
- history, Australia, 192
- human food, 195

Lupinus angustifolius, 192–194

- research, 195

Lupinus angustifolius, bioactive components

- fat, 193
- fiber, 193
- nutritional composition, 192, 193*t*
- phytochemicals, 193–194
- protein, 192–193

M

Macronutrients

- carbohydrates (*see* Carbohydrates, dietary)
- description, 157
- fat (*see* Fat, dietary)
- fiber (*see* Dietary fiber)
- protein (*see* Protein, dietary)
- protein and fiber, 180–191
- satiation
 - assessment, 158
 - energy intake, 157
 - food intake, regulation, 157, 158*f*
 - hunger, 157–158

Mycotoxins

- antimycotic activity, 224, 225*t*
- contamination, 221–222, 223–224
- food and feed, 219, 220*t*

NNDF. *See* Neutral detergent fiber (NDF)

Neutral detergent fiber (NDF), 78–79

O

Occupational allergies, seafood-processing workers

- allergen families, 54–58
- allergenicity and airborne exposure levels
 - assessment studies, land and aboard workers, 62, 63*t*
 - codfish, 62
 - crab-processing workers, 62–64
 - crab workers, 62
 - fish-processing operations, 62–64
 - food processes, 61
 - immunological reactivity techniques, 64
 - nonthermal processes, 61
- components

- aerosol, 54
- anthropods, 53–54
- cross activity, 60
- description, 48
- diagnosis
 - definition, hypersensitivity, 66
 - in vitro* and *in vivo* methods, 66
 - immunodiagnostic tests, 68
 - isotypes, immunoglobulins, 66–68
 - mediators, 66
 - sensitization and identification test, 66, 67^t
- environmental factors, 65
- health effects
 - lung, 52–53
 - skin, 53
- high-risk work process
 - dermatological symptoms, 51
 - description, 49–51
 - fishmeal production, 49–51, 51^f
- host associated factors, 64–65
- immune system and inflammatory response
 - agents, 58–60, 59^t
 - hypersensitivity, 58
 - LPSs, 60
 - mechanisms, 58, 59^f
- industry, 48–49
- population, risk, 49
- prevention, 68–69
- Organoleptic characteristics, sparkling wines
 - aroma
 - furanic compounds, 34
 - hydrophobicity, 34
 - sulfur components, 33–34
 - Sur lies*, 33
 - volatile compounds, 33
 - yeast, 34
 - color
 - carotenoids and phenolics, 29
 - compounds, 29–32
 - vinification, 32–33
 - foam
 - bubbles, 23–26
 - effervescence, 26–29
 - tensioactive components, 23, 24^f
- Overweight and obesity
 - causes
 - dietary composition, 156–157
 - dietary patterns, 156
 - energy balance concept, 153–155
 - genetic predisposition/susceptibility, 155–156
 - classification, 152
 - description, 151–152
 - health consequences, 153
 - prevalence, 152–153
- P
- Protein, dietary
 - energy intake control
 - body weight and composition, 170
 - mechanisms, 170–174
 - RDI, 170
 - and fiber
 - dyslipidemia, 187–191
 - hypertension, 183–187
 - insulin resistance, 180–183
 - obesity development
 - intervention studies, 175–179
 - population studies, 174–175
 - protein leverage hypothesis, 179
- R
- RADS. *See* Reactive airways dysfunction syndrome (RADS)
- RDI. *See* Recommended dietary intake (RDI)
- Reactive airways dysfunction syndrome (RADS), 52
- Recommended dietary intake (RDI), 170
- S
- SCFAs. *See* Short-chain fatty acids (SCFAs)
- Seafood allergen families
 - fish, 57–58
 - shellfish, 56–57
 - species, 54–58, 55^t
- Seaweed algal polysaccharides
 - biological activities
 - antibacterial, 132
 - anticoagulant, 131
 - antiobesity, 130–131
 - antitumor, 128–129
 - antiviral activity, 129–130
 - description, 127–128
 - composition
 - agar, 114
 - alginates, 120
 - carageenans, 114–117

- S**
- Seaweed algal polysaccharides (*cont.*)
 - fucoidan, 120–123
 - furcellaran, 117–119
 - laminaran, 109–113
 - mannitol, 109
 - species, 108–109
 - storage, 109
 - structural, 113–114
 - ulvans, 123–124
 - Short-chain fatty acids (SCFAs)
 - description, 86–87
 - production, 87–88
 - Sparkling wines
 - champagne, 3
 - climate and soil conditions
 - grape cultivation, 7
 - irrigation, 8
 - moisture, 7
 - rain fall, 7
 - vineyards, 7
 - cultivation techniques, 9
 - definition and types
 - carbon dioxide, 5
 - Crémants, 6
 - DO Cava, 6
 - European categories, 5–6
 - Italian spumanti, 6
 - Schaumwein and Qualitätsschaumwein, 6
 - elaboration process
 - aging, 17–19
 - definition, base wine, 10–11
 - expedition, 19–22
 - red/white grape, 10–11
 - second fermentation, 12–17
 - transfer and Charmat method, 10–11
 - white vinification, 11–12
 - fermentation process, 5
 - grape juice, 2

- grape varieties
 - Champenoise method, 8, 8*t*
 - cultivars, 8
 - phylloxera crisis, 8–9
- grapevines, 4–5
- liqueur de tirage*, 3–4
- organoleptic characteristics (*see*
 - Organoleptic characteristics,
 - sparkling wines)
- production and consumption data
 - evolution, 35, 35*f*
 - exportation, 36
 - forecast, 35, 36*f*
- ripening control
 - alcohol volume, 9, 10
 - berries, 10
 - Botrytis cinerea*, 10
 - type, press, 10
 - vinum titillum*, 2

T

- TDF. *See* Total dietary fiber (TDF)
 Total dietary fiber (TDF), 78–79

U

- Ulvans, 123–124

W

- White vinification
 - alcoholic fermentation, 12
 - juice extracted, 11
 - oxidation, 12
 - phenolic compounds, 11
 - static method/dynamic method, 11
 - tartaric stabilization, 12

INDEX

Note: Page numbers followed by “f” indicate figures, and “t” indicate tables.

A

- AA. *See* Antioxidant activity (AA);
Arachidonic acid (AA)
- Acyl homoserine lactones (AHLs), 271–272
- AHLs. *See* Acyl homoserine lactones (AHLs)
- ALA. *See* α -Linolenic acid (ALA)
- Antibiotics and bacterial resistance
 - description, 192–193
 - human and veterinary medicine, 192–193
 - plant/animal origin, 193
 - Salmonella* strains, 193
- Antioxidant activity (AA)
 - capacity, 106
 - determination, 108–109
 - drying process, 107
 - extraction methods, 107
- Antioxidants, medical plants
 - carotenoids, 86
 - and oxidation processes, 77–81
 - phenolic components, 82–85
 - properties, 124
 - sources
 - activity, 87–88, 89t
 - Apiaceae family, 96–97
 - Asteraceae family, 105
 - Ginkgoaceae family, 104–105
 - Lamiaceae family, 88–99
 - Myrtaceae family, 106
 - plant preparations, 87
 - polar solvents, 87
 - uses, 86–87
 - Zingiberaceae family, 101–104
 - vitamins, 85–86
- Apiaceae family
 - caraway, 101
 - cumin, 99–100
 - fennel, 100–101
- Arachidonic acid (AA)
 - ω -6, 174
 - and EPA, 173
 - glycerides, 175
- Ascending-bubble-driven flow patterns

- bubble nucleation, 312–313, 313f
- CO₂ sensor, near-IR technology
- commercial champagne wine and beer, 335
- description, 334
- 3D view, 334, 335f
- gaseous concentrations, 335, 336f
- pouring process, 335–336
- effervescence
 - CO₂ concentrations, 325–326, 325f
 - ethanol concentrations, 325–326, 326f
 - experimental setup, 323–324, 324f
 - flute vs. coupe, 326–331
- laser tomography
 - effect, shear stresses, 313–314, 315f
 - flute pouring, 315–317, 316f
 - optical workbench, 314–315, 316f
 - Rilsan particles, 314–315
 - swirling motion generators, 314–315
- molecular mechanism, dissolved CO₂, 322–323, 323f
- spontaneous self-organized 2D
 - convective cells, 320–322, 321f
- stability
 - “bubbling environment”, 317
 - coupes symmetry, 319, 320f
 - time sequence, flute effervescence, 317–319, 318f, 319f
 - temperature, 331–334, 333f
- Ascorbic acid, 49–50
- Asteraceae family, 105

B

- Bacterial pathogens
 - advantages and disadvantages, 255
 - analytical characteristics, 264–265
 - application, phage, 263–264
 - bacteriophage-host cell complex
 - (*see* Bacteriophage-host cell complex, bacterial pathogens)
 - bacteriophage-mediated lysis
 - description, 272

- Bacterial pathogens (*Continued*)
 intracellular metabolites, 272–273
 phage amplification assays, 273–276
Campylobacter, 217
 commercialization and governmental approvals, 256–257
C. perfringens, 218–219
 culture methods (*see* Culture methods, bacterial pathogens)
E. coli O157:H7 (*see* *E. coli* O157:H7) in foods, phages
 bacterial resistance evolution and phages dilution, 253–254
 electrospinning process, 254 factors, 250
 “farm-to-fork” approach, 253 incubation temperature, 250–251 liquid environments, 249–250 MOI, 250
Salmonella phage (P7), 249–250 food spoilage prevention, 261–262 host specificity, 248–249 infections, phages, 252–253 *Listeria monocytogenes*, 217–218 lytic and lysogenic phages, 249 microflora components, 252–253 phage biocontrol (*see* Phage biocontrol) phage therapy, 249 reporter phages (*see* Reporter phages, bacterial pathogens) safe tool, 252 *Salmonella* (*see* *Salmonella*) selection, phage, 251–252 surface decontamination and biofilm formation, 262–263 *Vibrio parahaemolyticus*, 218–219 virulent phages, 249
- Bacteriophage-host cell complex, bacterial pathogens biosorbents, 267–269 description, 266 receptors, capturing agents, 269–270 staining agents, 266–267
- Bacteriophages bacterial pathogens biocontrol tools, 248–264 detection, 264–276 biology environmental conditions, 243–245 genomes, 243 morphological structure, 243, 244f role, capsid, 243 TEM image, 243, 245f description, life cycle, 245 discovery, 242 lysogenic and lytic pathways, 247–248, 248f lytic cycle adsorption, 246 description, 245 latent period, 246–247 lysis/release, 247 maturation/morphogenesis, 247 penetration/injection, 246
- Bayes’ theorem, 14
- Biofilm formation description, 262 *Listeria* phage P100, 262
- Bioluminescent reporter phage (BRP) assays, 270–271
- Blending art, 294–295
- BRP assays. *See* Bioluminescent reporter phage assays
- Bubbles. *See* Ascending-bubble-driven flow patterns
- C**
- CA. *See* Caffeic acid (CA)
- Caffeic acid (CA) activities, 83–84 defined, 83 moieties, 92–93
- Campylobacter*, 217
- Capillary electrophoresis (CE) CE-MS, 9–10, 15–16 separation, components, 9
- Carbon dioxide (CO₂) release, champagne glasses within bottle blending art, 294–295 champagne aging, 301–302 disgorging and corking, 297–301, 298f, 300f first alcoholic fermentation, 294 second alcoholic fermentation, 295–296

- uncorking, 302–304
dissolved, serving
 flute *vs.* coupe, 310–311
 high-speed IR imaging, 307–309
 and temperature, 304–307
- Cardiovascular disease
 carotenoids, 117
 fennel, 117
 LDLs, 116–117
- Carotenoids
 astaxanthin and canthaxanthin, 46
 bixin and norbixin, 47
 defined, 45–46
 UV light range, 46–47
- CE. *See* Capillary electrophoresis (CE)
- CHA. *See* Chlorogenic acid (CHA)
- Chain propagation, 78
- Champagne glasses
 ascending-bubble-driven flow patterns
 (*see* Ascending-bubble-driven flow patterns)
 average composition and ionic strength, 290–291, 292*f*
 classical flute and coupe, 293
CO₂ dissolved, serving
 bottle to glass, liquid “tongue”, 304, 305*f*
 “champagne-like” and “beer-like”, 304–305, 305*f*
 concentrations, 306–307, 307*f*
 description, 304
 flute *vs.* coupe, 310–311
 pouring step, high-speed IR imaging, 307–309, 308*f*, 309*f*
 time sequences, 304–305, 306*f*
- CO₂ within bottle
 blending art, 294–295
 disgorging and corking, 297–301
 first alcoholic fermentation, 294
 impact, champagne aging, 301–302, 301*f*
 second alcoholic fermentation
 (*prise de mousse*), 295–296
 uncorking, 302–304
- ethanol, 291–293
- hydroalcoholic systems, 290–291
- role, effervescence, 291–293
- VOCs and CO₂ pathways, 291
- Champagne tasting, 291, 299, 317
- Chlorogenic acid (CHA), 83–84
- Chlorophyll, 43–44, 52
- Crohn’s disease, 144–145
- Culture methods, bacterial pathogens
 description, 265
- E. coli* O157:H7-specific phage (AR1), 265–266
- host-specific bacteriophage, 265–266
- Live/Dead BacLight bacterial viability stain, 266
- metabolic activity and microbial growth, 265–266
- visual observation/turbidimeters, 265
- D**
- Disgorge and corking, CO₂
 caps removal, 297–299, 298*f*
 dissolved CO₂ concentration, temperature dependence, 299, 300*f*
 gaseous CO₂, temperature and parameters, 297–299
 standard, magnum and half bottles, 299
- temperature dependence, pressure *P*, 299, 300*f*
- yeast autolysis, 297
- E**
- E. coli* O157:H7
 E. coli 1307 and Nissle strains, 214
 foodborne illness, EHEC, 214
 in vitro cell culture models, 214–215
 wild-type probiotics, 215
- EHEC. *See* Enterohemorrhagic *E. coli* (EHEC)
- Eicosapentanoic acid (EPA), 171, 173–174
- Enterohemorrhagic *E. coli* (EHEC), 208–209, 214
- Enteropathogenic *E. coli* (EPEC), 208–209, 214–215
- EPA. *See* Eicosapentanoic acid (EPA)
- EPEC. *See* Enteropathogenic *E. coli* (EPEC)
- Ethanol release, champagne glasses.
 See Ascending-bubble-driven flow patterns
- Extraction techniques
 antioxidants, 86–87, 88–92
 plant preparations, 87

F

- FAO. *See* Food and Agriculture Organization (FAO)
- "Farm-to-fork" approach, 253
- Fatty acid profile, oilseeds
- conventional, 150–156
 - dietary lipids, categorization, 142–143
 - genetic engineering, 172–174
 - lipids
 - human nutrition, 143–145
 - requirements, human beings, 146–147
 - sources, human consumption, 148–149
 - SCOs (*see* Single-cell oils (SCOs))
 - triglycerides, 141–142
 - unconventional, 156–172
 - unsaturated acid, 142
- ω -3 Fatty acids
- ALA, 150, 156
 - EPA, 172–174
 - LCPUFA, 173
 - PUFA, 145, 151–155
 - VLPUFA expression, 173–174
- ω -6 Fatty acids
- AA, 174
 - EPA, 172–174
 - LA, 155
 - PUFA, 145, 151–155
 - substrate specificity, 173–174
- FID. *See* Flame ionization detection (FID)
- First alcoholic fermentation
- grape cultivars, 294
 - yeast contribution, 294
- Flame ionization detection (FID), 9, 10
- Flavonoids
- anthocyanins, 47–49
 - quercetin, 49
 - structures, photosensitive molecules, 47, 48*f*
- Flute *vs.* coupe
- carbonic anhydrase, 310
 - champagne glasses, false-color time sequences, 329–330, 330*f*
 - CO₂ concentrations, 326, 327*f*, 328
 - CO₂ volume flux, 326–328, 328*f*
 - ethanol concentration, 329, 329*f*
 - false-color IR time sequences, gaseous CO₂ desorbing, 330, 331*f*

- geometrical parameters, 311*t*, 312–313
- grayscale time sequencing, 310, 313*f*
- liquid phase, bubbles, 328
- in reservoirs, 329–330
- zones, 330–331
- Food and Agriculture Organization (FAO), 195–196, 196*f*
- Foodborne pathogens
- antibiotics and bacterial resistance, 192–193
 - bacteriophages, 191–192
 - biological methods, 191–192
 - delivery system, probiotics to gut
 - alginate gels, 222–223
 - chitosan, 223
 - DNA-based gels, 223–224
 - extrusion and emulsification technique, 222–223
 - hypermellose phthalate, 223
 - microencapsulation, 222–223
 - PET, 222
 - supplements, 222
 - description, 186
 - and diseases
 - classification, 187–188, 189*t*
 - etiologic agents, 186, 187*t*
 - illnesses, hospitalizations and deaths, 186–187
 - illness occurrence, 187–188
 - gut health and disease prevention
 - beneficial effects, probiotics, 193–194
 - cocktail and bacteria, probiotics, 194
 - diet *vs.* health, 193–194
 - industrial production, probiotic-based functional foods, 195
 - probiotic-induced enhanced butyrate production, 194
 - gut microbiota *vs.* probiotics (*see* Gut microbiota *vs.* probiotics)
 - lactic acid, 188–191
 - microbial contamination, 191
 - microbial population, guts, 192
 - oils extraction, 188–191
 - preharvest and postharvest interventions, 188
 - probiotics (*see* Probiotics)
 - safety assessments, probiotics

- decision network, SCAN, 195–196, 196^f
- FAO and WHO guidelines, 195–196, 197^f
- pathogenicity and virulence traits, 195–196
- strain-specific characterization, 195
- vaccine and antibody therapy, 192
- wild-type and bioengineered probiotics (*see* Wild-type and bioengineered probiotics)
- Food processing. *See* Bacterial pathogens
- Food science. *See* Metabolomics, food science
- Functional foods
- components, 27
 - market, 26
 - nutritional/bioactive, 45
 - packaging selection, 27
- G**
- Genetic engineering
- synthesis, PUFA, 173
 - VPUFA, 172–174
- Ginkgoaceae family, 104–105
- GLA. *See* γ -Linolenic acid (GLA)
- Gut microbiota *vs.* probiotics
- description, 209–210
 - gastrointestinal tract components, 211
 - gene expression *in vitro*, 209–210
 - gram-positive bacteria, 209–210
 - inflammatory conditions, 211–212
 - L. casei* and *L. plantarum* administration, 211
 - metabolic pathway outcomes, 212
 - transcriptional microarrays, 211–212
- H**
- Health effects protection, medical plants
- anticancer
- aromatic plants, 115–116
 - research, anticarcinogens, 111–115
- antimicrobial, 110–111, 112^t
- cardiovascular disease, 116–117
- constituents, *in vivo*, 110
- selection, medical plants, 118, 118^t
- uses, folk medicine, 109–110
- Henry's law, 296, 301–302
- Hurdle technology, 257
- I**
- Infrared (IR) spectrometry
- detection, 10
 - extracted metabolites profile, 8
- IR spectrometry. *See* Infrared spectrometry
- Isoprene, 85
- L**
- LA. *See* Linoleic acid (LA)
- Lamiaceae family
- basil, 95–96
 - common and lemon balm, 97–99
 - defined, 88
 - marjoram, 94–95
 - mint, peppermint, spearmint, 96–97
 - oregano, 93–94
 - rosemary, 88–92
 - sage, 92–93
 - thyme, 95
- LCPUFA. *See* Long-chain polyunsaturated fatty acids (LCPUFA)
- Light energy, food quality and packaging selection
- antioxidants, 62
 - bioactive compound, 26
 - chemical energy, 28–29, 29^f
 - compounds, 26
 - definitions, terms, 27–28, 28^t
 - and food molecules
 - chlorophyll, 43–44
 - defined, 33–34
 - lipids, 34–35
 - proteins, 36
 - and quality, 44–59
 - vitamins, 36–43
 - light-induced oxidation, quality, 32–33
 - photosensitizers (*see* Photosensitizers, food)
 - protection, 59–61
- Linoleic acid (LA), 144, 155, 173
- α -Linolenic acid (ALA)
- ω -3, 150, 156
 - and GLA, 161–162, 171
 - synthesis, PUFA, 173
- γ -Linolenic acid (GLA), 161–162, 173

- Linseed oil, 156
- Lipid hydroperoxides (LOOH)
- autoxidation, foods, 78
 - formation, 79
 - oxidation, 78
- Lipids
- chlorophyll, 34
 - defined, 34
 - fatty acids, 33–34
 - human nutrition
 - ω -3 and 6 fatty acids, 144–145
 - dietary requirement, 144
 - fats and oils, 143–144
 - infant diet, 144
 - lipid-derived mediators, 145
 - myelin, 144
 - requirements, human beings, 146–147, 147*t*
 - sources, human consumption, 148–149, 149*t*
 - structures, photosensitive molecules, 35, 35*f*
- Listeria monocytogenes*
- description, 217–218
 - recombinant probiotics, 217–218
- Long-chain polyunsaturated fatty acids (LCPUFA)
- ω -3, 173
 - substrate specificity, ω -6 fatty acids, 173–174
 - synthesis, 174
- LOOH. *See* Lipid hydroperoxides (LOOH)
- Low-density lipoprotein (LDL)
- atherosclerosis, 116–117
 - carotenoids, 117
 - oxidation products, 79
- Lucerne, 164
- Lytic cycle
- adsorption, 246
 - description, 245
 - latent period, 246–247
 - lysis/release, 247
 - maturity/morphogenesis, 247
 - penetration/injection, 246
- M**
- Mass spectrometers (MS)
- fingerprinting, 6
 - metabolites detection, 9
- PDA, 10
- Medical plants. *See also* Antioxidants, medical plants
- antioxidants
- AA, 106–109
 - carotenoids, 86
 - and oxidation processes, 77–81
 - phenolic compounds, 82–85
 - sources, 86–106
 - vitamins, 85–86
- natural and artificial exemplars, 77
- pharmaceutical industry, 76–77
- protection, health effects (*see* Health effects protection, medical plants)
- WHO, 76
- Metabolomics, food science
- analysis flowchart, 7, 7*f*
 - components
 - analysis, 9–10
 - and interactions, 1–2
 - compound identification, 10–11, 11*f*
 - coupling, 17–18
 - data analysis, 11–12
 - definitions, 2–6
 - food safety
 - microbiology, 13–14
 - toxicology, 12–13
 - matrix components extraction, 8
 - processing, 14–15
 - quality, 15–16
 - role, nutrition, 18
 - synthesis, 18–19
 - toxicity assessment, 17
- Microbiology, food, 13–14
- MS. *See* Mass spectrometers (MS)
- Myoglobin, 52–53
- Myrtaceae family, 106
- N**
- NMR. *See* Nuclear magnetic resonance (NMR)
- Nuclear magnetic resonance (NMR)
- compound identification, 10
 - mango cultivars, 8
 - metabolites detection, 9
 - metabolomics techniques, 14–15
 - noninvasive, 17

O

Oilseeds. *See also* Genetic engineering conventional composition, oil, 155 cottonseed, 155 edible oils global production, 2010, 150, 151^t fatty acid distribution, 150, 153^t flaxseeds, 156 groundnut oil, 155 maize oil, 155 olive, 155 palm oil, 150 rapeseed, 150 sesame seed, 156 soybean oil, 150 sunflower seed, 151–155 unconventional apple seeds, 159–160 *C. amaris*, 158–159 crude oil content and fatty acid composition, 166–167, 167^t distribution, lipid, 164–165 drumstick, 159 extraction, fixed oil, 171–172 fatty acid profile, black cumin crude seed oil, 165–166, 166^t GLA and ALA, 161–162 levels, PUFA, 169, 169^t lipid content and fatty acid composition, 159–160, 160^t lipid fractions, 168 melon family, 159 oleic and linoleic acids, 168 seed oil content, fruit tree, 162–163, 162^t tree seeds, 171, 172^t USFA and SFA, 170 utilization, food processing, 156–157 vegetable seeds, 158 wild lupin, 164

Oleaginous microorganisms, 174

Oxidation

and antioxidants, foods lipid, 78 LOOH, 78 mechanisms, lipid peroxidation, 78–79 peroxides, 79–80

humans, antioxidants, 80–81

light-induced effect, food quality, 32–33 linoleic acid, 34 photosensitized, 31 singlet oxygen, 36, 42–43

P

Packaging, food films, 59–60 materials, 59, 61 PET, 60 UV-permeable/impermeable, 60–61 PET. *See* Probiotic encapsulation technology (PET)

Phage biocontrol animal origin, bacteria *Campylobacter* phages y CP8 and y CP34, 259–260 foodborne pathogen, in foods, 259, 260^t 5-log reduction, 259 lytic *Listeria* phage P100, 259 risk assessment models, 258 *Salmonella*, 259 description, 257 plant origin, bacteria diseases, 257–258 *in vitro* treatment, *Salmonella*, 258 *Listeria* phage cocktails, 258 *Xanthomonas campestris*, 257–258

Phenolic compounds

acids, 83–84 antioxidant properties, 82 aromatic system, 82 defined, 82 flavonoids, 84–85 intake, 82 terpenes, 85

Phospholipid bilayer, 145

Photodiode array (PDA)

compound detection, 10 identification, 11 metabolites detection, 9

Photosensitizers, food

effect, light energy, 29–30 energy transfer, 30

- Photosensitizers, food (*Continued*)
 structures, 30, 31*f*
 transition, energy, 31–32, 32*f*
- Polyunsaturated fatty acids (PUFA)
 ω-3 and 6, 145
 dry weight, adult brain, 144
 linoleic acids, 150
 microbial sources, 174
 peel lipids, 161–162
 SFA replacement, 144–145
 synthesis, 173
- Pouring step, high-speed IR imaging
 bottle-like and beer-like serving,
 307–308, 309*f*
 description, 307–308
 dissolved CO₂ concentrations loss, 309,
 310*t*
 gaseous CO₂ discharge, 308–309
 visualization setup, 307–308, 308*f*
- Probiotic encapsulation technology (PET),
 222
- Probiotics
 antimicrobial action and cytoprotective
 effects
 bactericidal peptides and SCFAs,
 207–208
 bacteriocins and microcins, 207–208
 defensins and cathelicidins, 206–207
 description, 206–207
 EPEC and EHEC binding, 208–209
in vivo effect, bacteriocins *vs.* enteric
 pathogens, 208–209, 210*t*
 barrier function
 chronic inflammation, 201–202
 enterocyte cell-cell adhesion, 201–202
 gut microflora populations, 199–201
in vitro and *in vivo* experiments, 201,
 202, 203*t*
 mucus and goblet cells, 201
 pathogens and harmful agents, 199–201
 pretreatment, 202
 TLRs, 201–202
 classifications, 198
 description, 196–197, 200
 health benefits
 attributes, 199
 ideal criteria, 198–199, 199*t*
 immunomodulation
- cytokines, 205–206
 effects, 205–206, 206*t*
in vivo and *in vitro* studies, 204
 innate and acquired immune responses,
 204–205
 intestinal immune system, 202–204
 microbial colonization, 202–204
 mechanisms and health benefits, 199, 200*t*
- Procapsids, 247
- Proteins
 collagen, 56
 disulfide bonds, 55
 structures, photosensitive molecules, 36, 36*f*
- PUFA. *See* Polyunsaturated fatty acids
 (PUFA)
- Q**
- Quality, food
 effects, light-induced oxidation, 32–33
 and light-responsive molecules
 ascorbic acid, 49–50
 carotenoids, 45–47
 chlorophyll, 52
 colorants, 53–55
 flavonoids, 47–49
 myoglobin, 52–53
 nitrogen-containing compounds, 57–59
 photoresponsive compounds, 44–45
 proteins, 55–56
 riboflavin, 50–52
 tocopherol and retinoic acid, 56–57
 metabolomics, 15–16
 packaging, protection, 59–61
- R**
- Reactive oxygen species (ROS)
 accumulation, plastids, 85–86
 generation, 81
 oxidative processes, humans, 80
 participation, 79
- Reporter phages, bacterial pathogens
 advantages, β-galactosidase, 271
 AHLs, 271–272
 BRP assays, 270–271
 description, 270
- Riboflavin
 β-carotene, 51–52
 defined, 39

degradation, 39–40, 50
Havarti cheese, 51
UV and visible light wavelengths, 50
Rilsan® particles, 314–315
ROS. *See* Reactive oxygen species (ROS)

S

Safety, food, 12–14
Salmonella
cocktails, probiotic, 216
foodborne gastroenteritis, 215
innate and adaptive immune responses, 216–217
probiotic feeding, 215
SCAN. *See* Scientific committee on animal nutrition (SCAN)
Scientific committee on animal nutrition (SCAN), 195–196, 196f
Second alcoholic fermentation (*prise de mousse*)
application, Henry's law, 296
Henry's law constant, 296, 297f
molar volume, 295–296
Van't Hoff-like equation, 296
yeast and sugar addition, 295–296
SFE. *See* Supercritical fluid extraction (SFE)
Single-cell oils (SCOs)
composition, commercial, 175, 176t
oleaginous microorganisms, 174
production, microbial oils, 174
safety evaluation studies, 175–177
Soxhlet method, 159–160
Sparkling wines
bars, clubs and restaurants, 304
kinetics, CO₂, 335–336
role, effervescence, 291–293
Steam distillation and hydrodistillation methods, 111
Supercritical fluid extraction (SFE)
antioxidants, 86–87
balm, 97–99
rosemary extracts, 88–92
and steam distillation, 87

T

TLRs. *See* Toll-like receptors (TLRs)
Toll-like receptors (TLRs), 201–202
Toxicology, food, 12–13

U

Ultrasound sonification, 107
Uncorking, CO₂
escaping and expanding, gaseous CO₂, 302–303
flute/coupe pouring, 303–304
time sequence, 302–303, 303f

V

Van't Hoff-like equation, 296
Very-long chain polyunsaturated fatty acids (VLPUs)
ω-3 expression, 173–174
plants, 173–174
synthesis, 172–173
Vibrio parahaemolyticus, 218–219
Vitamins
defined, 36–37
protection, diseases, 37
riboflavin, 39–40
vitamin A
carotenoids, 37
singlet oxygen quenching, 38–39
structures, photosensitive molecules, 37, 38f
vitamin C, 40–41
vitamin D, 41–42
vitamin E, 42–43
VLPUs. *See* Very-long chain polyunsaturated fatty acids (VLPUs)
VOCs. *See* Volatile organic compounds (VOCs)
Volatile organic compounds (VOCs)
aromatic perception, 291–293
ascending bubbles, 293
uncorking, 291

W

WHO. *See* World Health Organization (WHO)
Wild-type and bioengineered probiotics
bacterial pathogens
Campylobacter, 217
E. coli O157:H7, 214–215
L. monocytogenes, 217–218
miscellaneous, 218–219

- Wild-type and bioengineered probiotics
(Continued)
- Salmonella*, 215–217
 - vs. foodborne pathogens, mechanisms, 213, 213*f*
 - toxins neutralization
 - aflatoxin (AFB-1), 220–222
 - fungal pathogens, 220
 - patulin and fumonisin, 220–222
 - probiotic strains, 220–222
 - viral pathogens
- description, 219
- lactic acid bacteria-based intervention strategies, 219–220, 221*t*
- receptor mimetics, 219–220
- World Health Organization (WHO), 76, 109, 195–196, 196*f*
- Z**
- Zingiberaceae family
- ginger, 103–104
 - turmeric, 101–103

INDEX

Note: Page numbers followed by “*f*” indicate figures, and “*t*” indicate tables.

A

Actinidia chinensis

A. deliciosa and *A. setosa* complex, 21–22
cultivars, 26–28
scientific and horticultural literature,
22–23

Actinidia deliciosa

A. chinensis and *A. setosa* complex, 21–22
cultivars, 26–28
scientific and horticultural literature,
22–23

Actinidia species

A. arguta and *A. kolomikta*, 28
A. chinensis, *A. deliciosa* and *A. setosa*
complex, 21–22
cultivars, 26–28
cultivation, 20
diploid species, 20
domestication, 25–26
fruit diversity, 23–25
genus revision, 19
origin, 28
ploidy races, 19–20
polyploidization, 20
scientific and horticultural literature,
22–23

Actinidin, 328–329

Actinidia, 64–65
applications, 67–68
beef muscle protein-based diet, 164
casein hydrolysis, 151–152
catalytic activity, 66–67
cross-reactivity, 329
description, 328
digestion
 foods, 150
 gelatin, 158
 protein, 156
gastrointestinal enzymes, 328
gastrointestinal motility
 figs, 229
 in vivo investigation, 228–229

ion transport and ion channels, 229
potential bioactivity and role, 229

kiwifruit extract (KE), 151

occurrence, 65
optimal pH, 158
protease family C1A, 328–329
severity of symptoms, 328
structure and properties, 65–66
upper-tract digestion, 161–163

Adaptive immunity, 302, 309

Allergens, kiwifruit

Act d 3, 331
actininidin (Act d 1), 328–329
adverse food reactions, 322
description, allergens, 326, 327^t
diagnosis, 325–326
differences, allergenicity, 334–335
epidemiology, 323–324
food allergy sources, 322
kiwellin (Act d 5), 332
major latex protein (Act d 11), 334
monosensitization, 323
nsLTPs, Act d 10, 333–334
pathogenesis-related protein (PR-10),
 Act d 8, 333

pectin methylesterase (Act d 7), 333

pectin methylesterase inhibitor (Act d 6),
 332

phytocystatin (Act d 4), 331–332

profilin (Act d 9), 333

sensitization, 322–323

symptoms, 324

TLP, Act d 2, 329–330

treatment, 326

ANFs. See Antinutritional factors (ANFs)

Animal studies, vitamin C, 139–140

Antinutritional factors (ANFs), 170, 177

Antioxidants

and cancer prevention, 296–297

defenses, 296

description, 295

environmental stresses, 285–286

- A**
- Antioxidants (*Continued*)
 - FRAP values, 285–286, 285*t*
 - in vitro* assays, 286, 286*f*, 287
 - metabolic reactions, plants, 285–286
 - micronutrient effects, humans
 - biomarker, 287
 - endogenous damage, 288, 291*f*
 - intervention trial, 288, 290*f*
 - placebo-controlled crossover design, 287–288
 - power calculation, 287
 - samples, 287
 - sensitivity, lymphocytes, 288, 290*f*
 - Vitamin C and lymphocytes, 287–288, 289*f*
 - NER activity, 292–294, 294*f*
 - Ascorbate
 - animals, 126
 - bioavailability, 141–142
 - cofactor, 128*t*
 - deficiency, 129
 - high concentrations, 127
 - plants, 126
 - supplementation, 140*t*
- B**
- Bacteriocins, 215
 - Base excision repair (BER) activity
 - description, 290–292
 - lymphocyte, supplementation, 292, 293*f*
 - measure, enzymes, 292, 293*f*
 - NER activity, 292–294
 - BER activity. *See* Base excision repair (BER) activity
 - Bioavailability, vitamin C
 - biological activity
 - copper-containing hydroxylases, 127
 - enzymes, cofactor, 128*t*
 - chronic diseases prevention, 130–131
 - content, kiwifruit
 - DHAA, 133–134
 - storage, 134
 - description, 126
 - dietary, 126
 - food sources
 - content, 131–132, 132*t*
 - cooking, 131–132
 - meat, 131–133
- C**
- kiwifruit
 - animal studies, 139–140
 - plasma vitamin C, 136–137
 - supplementation, humans, 134–136, 135*f*
 - tissue levels, 137–139
 - natural *vs.* synthetic, 142–143
 - plant components effect
 - AA-economizing factor, 141
 - bioflavonoids, 141–142
 - plants and animals, 126
 - RDI (*see* Recommended dietary intake (RDI))
 - respiratory diseases
 - common cold, 131
 - pneumonia, 131
 - scurvy, 126–127
 - Bristol Stool Scale, 221–222, 222*t*

- hyperlipidemia, 278
platelet aggregation, 276–278, 278t
supplementation period, 276–278
triglyceride levels, 278–279
in vitro studies, 275, 276t, 277f
- Cardiovascular disease (CVD)
antioxidant-rich diet, 279
development, blood lipids, 280
hyperactivity, 274
hypertension, 274
mortality, 273–274
platelet reactivity, 280–281
prevention, 279
risk factors, 273–274
- Caveolae-mediated endocytosis, 189–190
- Cell-wall polysaccharides, kiwifruit
cellulose, 87
changes
development and ripening, 88
foregut digestion, 88–89
hemicelluloses, 86–87
noncellulosic polysaccharide constituents, 83–84
pectic polysaccharides, 84–86
- Clathrin-mediated endocytosis, 189–190
- Colonic microbiota modification
kiwifruit carbohydrates
carbohydrate-degrading mechanisms, 209
gram-negative, cell-associated system, 210
gram-positive, extracellular system, 210
in vitro batch fermentation system, 210–211
lachnospiraceogenic and bifidogenic prebiotics, 214
microbial fermentation, 213–214
NSPs, 209
organic acids, 207–208
percentage change, organic acid concentrations, 214t
prebiotics, 207–208
real-time quantitative PCR, 211
16S rRNA pyrosequencing, 211–213, 212f
structural differences, 210
- kiwifruit fermentation, 215
- polyphenolic compounds
antimicrobial activity, 206–207
commercial preparations, 207
fluorescent bacteria adhesion assay, 207
vitamin C, 207, 208f
- polyphenols, 206
- Composition and nutritional value, kiwifruit
ADEa, ME and AE, 43t
free amino acids, amines and peptides, 53t
nutrient density and nutrient adequacy scores, 41t
nutritional composition, 36t
organic acids, 49t
sugar content, 45t
vitamin C content, 47t
vitamin E content, 48t
- Constipation
Bristol Stool Scale, 221–222, 222t
causes, 221
description, 220–221
functional
definition, 221–222
diagnostic criteria, 221t
- IBS, 222–223, 223t
- kiwifruit
age and sex-matched case control study, 224–225
colonic transit, 226
defecation diary recording, 226
elderly subjects, 223–224
healthy subjects, 227
IBS-C patients, 225–226
laxative properties, 223
laxatives, 222
pediatric populations, 222
- Copper
ceruloplasmin, 236
chloride ions, 243
homeostasis, 236–237
metalloproteinases, 243
- CVD. *See* Cardiovascular disease (CVD)
- D**
- Defining characteristics, genus *Actinidia*
dioecy, 17–18
fruit structure, 18
growth habit, 17
morphology, female flowers, 18

- Defining characteristics, genus *Actinidia*
(Continued)
- natural distribution, 18–19
- Dietary fiber
- classification, 187–188
 - composition, 82–83
 - definition, 82, 187–188
 - digestion and absorption
 - components, 191, 192^t
 - dietary polysaccharides, 193
 - fecal bulk, 194
 - fermentation, fiber, 194
 - mastication, 191–192
 - SCFAs, 194
 - small intestine, 193
 - solubility, 192
 - viscogenic soluble fibers, 192–193
 - functional properties (*see* Functional properties, kiwifruit dietary fiber)
 - structure, cell-wall polysaccharides
 - cellulose, 87
 - gold kiwifruit, 83–84
 - hemicelluloses, 86–87
 - pectic polysaccharides, 84–86
- Dietary minerals
- ascorbic acid, 246
 - Caco-2 cells, 247–248, 248^f
 - calcium (*see* Calcium)
 - copper, 236–237, 243
 - description, 234
 - digestive system, mineral absorption
 - (*see* Mineral absorption)
 - ferritin, 246, 247^t
 - iron, 240–241
 - magnesium, 235, 242
 - mineral content and percentage, RDI, 244, 245^t
 - mineral interactions, 244
 - mineral uptake, 234
 - nutritional composition, 249
 - pigs fed gold kiwifruit, 248–249, 249^t
 - potassium, 237, 243
 - side effects, dietary supplements, 244
 - transferrin receptor, 246
- Digestion and absorption
- chyme squirts, 189
 - clathrin-mediated and caveolae-mediated endocytosis, 189–190
 - description, 188
 - gastric secretions, 188–189
 - human gut microbiota, 190
 - large intestine, 190
 - nutrients, 189
 - SCFAs, 191
- Digestion, kiwifruit fiber
- casein-based test diets, 195–196
 - in vitro* and *in vivo* models, 198
 - in vitro* digestions, 197–198
 - ileal organic matter digestibility, 195–196, 196^t
 - ileal protein digestibilities, 196
 - mean diet transit time, 197^f
 - NSP content, 194–195
 - oxalate-soluble pectin fraction, 196
 - reduced gastrointestinal transit time, 197
 - simulated gastric digestion, 195
 - water-holding capacity, kiwifruit-containing diets, 197
- Digestion-resistant residue (DRR)
- description, 270
 - glucose diffusion, retardation, 264–265, 265^f
 - retardation of mixing
 - measurement, 267–268, 267^f
 - plastic tube, 266–267, 266^f
 - soluble polysaccharide, 268–269, 268^t
 - swollen volume, 264, 264^f
 - DNA damage and repair
 - antioxidants (*see* Antioxidants)
 - catalase and superoxide dismutase, 284–285
 - chronic diseases, 283–284
 - dose, kiwifruit juice, 295
 - effects, kiwifruit supplementation
 - BER activity (*see* Base excision repair (BER) activity)
 - NER activity, 292–294, 294^f
 - phytochemicals, 297
 - foodmutagens, 284
 - fruits and vegetables, 284
 - gene expression, 294–295, 297
 - intervention trials, 295–296
 - supplementation trials, 295
- DRR. *See* Digestion-resistant residue (DRR)

F

Ferric reducing activity of plasma (FRAP), 285–286, 285*t*
Flavonoids, kiwifruit, 115
Folin-Ciocalteu method, 114
FRAP. *See* Ferric reducing activity of plasma (FRAP)
Functional bowel disorders, 220
Functional properties, kiwifruit dietary fiber
 beneficial effect, blood lipids, 89
 foregut and hindgut, 89
 gastrointestinal conditions, 89–90
 hydration, 90–92
 large bowel
 apparent survival, 94, 95
 fermentation, hindgut bacteria, 93
 fiber-free diet base, 94
 increment, fecal dry weight, 94, 95*t*
 short-chain fatty acids, 95–96
 retardation, 92–93
soluble and insoluble undigested polymer fractions, 89

G

Gastrointestinal motility
 actinidin and protein fractions, 228–229
constipation, 220–223
functional bowel disorders, 220
kiwifruit fiber
 gut microflora, 228
 large intestine, 227–228
phytochemicals, 229
GGEs. *See* Glycemic glucose equivalents (GGEs)
GI. *See* Glycemic index (GI)
Global fruit bowl
 “Chinese Gooseberry”, 2–3
 commercialization, Zespri®, 4
 description, 2–3
 exotic vine, 2
 global health trends, 11–13
 green-fleshed “Hayward” variety, 3
 growing consumer demand, 10–11
 London-based nursery firm, 1–2
 mainstream fruit option and remains, 10
 markets, 9, 10
 medicinal uses, 3–4

New Zealand-grown kiwifruit, 2–3
novelty fruit, markets, 3
plant and fruit, 2
production profile
 Europe accounts, 7
 FAOSTAT, 6
 major exporters, 2007–2010(%), 6–7, 7*t*
 official statistics, 4
 producing countries 2000, 5, 6*t*
 producing countries 2010, 5, 5*t*
 1970 to 2010, 4, 5*f*
 world value, exports, 7–8, 8*f*
products, 3
regular consumers, 8–9
trade agreement, 10
Western world, 2
world share, major fruit groups, 8, 9*t*
Global production
 official statistics, 4
 from 1970 to 2010, 4, 5*f*
Glycemic glucose equivalents (GGEs), 259–260, 260*f*, 261
Glycemic index (GI)
 calculation, 258–259, 259*t*, 261
 description, 270
 diabetes management, 261
 estimation, 260, 260*f*
 GGE value, 259–260
 vs. glycemic impact, kiwifruit, 261, 262*f*
 vitamin C, 261–262
Glycemic potency
 calculation, GI, 258–259, 259*t*
 description, 258
 GGEs, 259–260, 259*t*
 glucose disposal rate, 260, 260*f*
 in vitro determination, 260, 260*f*
Gut mucin production
 chemical and physical properties
 A. deliciosa, 179
 hemicellulosic polysaccharides, 178
 insoluble needle-shaped calcium oxalate raphide crystals, 178–179
 lignin fraction, 178
 organic acids, 179
 WHC, 178
 dietary factors
 ANFs, 177

Gut mucin production (*Continued*)
 oral administration, α -lactalbumin, 177–178
 soluble and insoluble fibers, 177
 empirical evidence
 caco-2 cells, 179
 goblet cells, 181
 regression analyses, 181, 181f

H

Hemicelluloses
 constituent sugar and glycosyl linkage analyse, 86
 galactoglucomannan, 86
 glycosyl linkage analysis, 86–87
 XG, 86, 87f
 Hydration properties, kiwifruit cell walls
 freeze-dried rehydrated kiwifruit fiber, 91f
 freeze drying, 91
 swelling and water retention, 90, 92f
 Hypovitaminosis C, 127

I

IBS. *See* Irritable bowel syndrome (IBS)
 IBS-C. *See* IBS with constipation (IBS-C)
 IBS with constipation (IBS-C)
 IBS-CC and IBS-CK, 226
 natural laxative option, 226
 Immune responses
 adaptive immunity, 302, 309
 carotenoids and polyphenols, 303
 description, 302
 human intervention trials
 CD4 + CD8 + T cells, 315, 316f
 cold/flu-like illness, 315
 comparison, SIV, 315–318
 freeze-dried kiwifruit, 314
 T lymphocytes, 315, 317f
 upper respiratory tract infections, 313–314
 inflammation, 309–310
 innate immune effects (*see* Innate immune effects)
 ovalbumin (OVA), 312–313
 rat $\gamma\delta$ T cells
 CD25 expression, 311, 311f
 feed supplementation, 311–312, 312f

gastric degradation, 311–312
 vitamins and folic acid, 303
 Inflammation, 309–310
 Innate immune effects
 cell proliferation assays, 308–309
 β -defensins production, 304, 305f, 306f
 direct antimicrobial activity, 303–304
 epithelial barrier integrity, 304–307
 gold and green kiwifruit fermenta, 304–307, 307f
 priming, rat $\gamma\delta$ T cells, 308–309, 308f
 type 2 immune defense mechanisms, 302

Iron

ascorbic acid, 246
 Caco-2 cells, 247–248, 248f
 deficiency, 235
 duodenum, 240
 enterocyte, heme iron, 241
 ferritin, 246
 ferrous, pathway, 241
 ferroxidase, 236
 heme and nonheme, 240
 hemoglobin and myoglobin, 234–235
 paraferritin, 240–241
 supplementation, 244
 transferrin receptor, 246
 Irritable bowel syndrome (IBS)
 gastrointestinal dysmotility, 222–223
 subtypes, 223, 223t

K

Kirola, 69
 Kiwellin, 332
 definition, 63
 fragments, 68
 gold kiwifruit, proteins measurement, 61, 62t
 major kiwifruit proteins, nomenclature, 63t
 proteins measurement, green kiwifruit, 61, 62t
 Kiwi Crush™, 164–165
 Kiwifruit. *See also* Protein digestion, kiwifruit
 Actinidia deliciosa, 258
 anthocyanidins and flavonols, 274–275
 blood lipids, 280

- carbohydrate availability
(*see* Carbohydrates)
- cardioprotective properties, 275–279
- chemical composition, 34–35
- CVD (*see* Cardiovascular disease (CVD))
- domestication and commercialization, 29*t*
- enzymes characterization, 70*t*
- fermentation
- bacteriocins, 215
 - gut microecology, 215
- fruit and vegetable consumption, 273–274
- global fruit bowl (*see* Global fruit bowl)
- glycemic potency (*see* Glycemic potency)
- gut barrier and mucous layer significance
- barriers, layers of defense, 171–172, 172*f*
 - dendritic cells, 171–172
 - goblet cells, 173
 - gut ecosystem, 171*f*
 - hydrophobicity, 173–174
 - intestinal goblet cells, 173
 - intestinal IgA, 171–172
 - MUC2 and MUC3 expression, 175
 - mucins, 174, 175
 - mucin turnover, 176–177, 176*f*
 - mucus degradation, 175–176
 - RELM β , 173
- gut mucin production (*see* Gut mucin production)
- “Hayward” cultivar, 102–103
- hyperlipidemia, hypertension and hyperactivity, 274
- macro components
- dietary fiber, 44
 - energy, 42–43
 - lipid, 44
 - protein, 43
 - sugars, 44–45
- minor components
- free amino acids, amines and peptides, 53–54
 - myo-inositol, 52–53
- modulation, gastrointestinal motility (*see* Gastrointestinal motility)
- mucins (*see* Mucins)
- nomenclature, 63*t*
- nutrient density scores, 35–42
- nutritional composition, 35
- organic acids
- citric, quinic and malic acid content, 49, 49*r*
 - description, 49
 - oxalate, 50
- phytochemical content, 34
- pigments
- anthocyanins, 52
 - carotenoids, 50–51
 - chlorophylls, 51–52
- platelets, 280
- polyphenolic compounds, colonic
- microbiota modification, 206–207
- proteins measurement, soluble extracts and purees, 62*t*
- secondary metabolite components
- (*see* Secondary metabolite components, kiwifruit)
- thrombosis prophylaxis, 280–281
- total protein content, 60, 60*t*
- vitamin C, 102
- vitamins
- folate, 49
 - vitamin C, 46–48
 - vitamin E, 48
- Kiwifruit and mineral nutrition. *See* Dietary minerals
- ## M
- Magnesium
- deficiency, 235
 - pH range, 237
 - small intestine, 242
 - vitamin D, 236
- Major latex protein (Act d 11), 334
- Mineral absorption
- brush border, microvilli, 238–239, 239*f*
 - passive/active transport, 239
 - pH, 237
 - small intestine, 238, 238*f*
 - toxic levels, 239–240
- Mucins. *See also* Gut mucin production
- degradation, 175–176
 - description, 174
 - genes, 175
 - neutral, 174
 - oligosaccharide chains, 174
 - subfamilies, 175

N

- Natural *vs.* synthetic vitamin C
bioavailability, 142
“Ester C”, 142–143
synthetic AA, 142
- NER activity. *See* Nucleotide excision repair (NER) activity
- Nonspecific lipid-transfer proteins (nsLTPs), 333–334
- Nonstarch polysaccharides (NSPs), 209
- nsLTPs. *See* Nonspecific lipid-transfer proteins (nsLTPs)
- NSPs. *See* Nonstarch polysaccharides (NSPs)
- Nucleotide excision repair (NER) activity, 292–294, 294*f*, 297
- Nutrient density, 35–42, 41*t*
- Nutrient density enhancement, kiwifruit, 117–118
- Nutritional composition, kiwifruit, 35, 36*t*

O

- Osteogenic Disorder Shionogi (ODS) rat, 141
- Oxalate, kiwifruit
A. chinensis, 119
description, 118
raphides, 118–119

P

- Pathogenesis-related protein (PR-10), 333
- Pectic polysaccharides, 192
classification, 84–86
RG II, 86
structures, 85*f*
- Pectin methylesterase, 333
- Pectin methylesterase inhibitor, 332
- Phenolic acids
aglycone, 115
detection methods, 114
- PhloëTM, 164–165
- Phytochemicals, gastrointestinal motility, 229
- Phytocystatin, 331–332
- Platelet aggregation
ADP and collagen, 276–278, 278*t*, 280
in vitro, 275, 277*f*
inhibitory effects, 280

- thrombosis and arteriosclerosis, 274
- whole-blood aggregation and ACE activity, 279, 279*t*
- Platelet hyperactivity, 274, 279
- Potassium, 237, 243
- Prebiotics, definition, 207–208
- Profilin, 333
- Protein digestion, kiwifruit
actinidin, 150
benefits and commercial preparations
KE, 164
PhloëTM and Kiwi CrushTM, 164–165
- small intestine
actinidin, 161–163
beef muscle protein, 164
KE, 162*t*, 164
Na-caseinate, 161–163
11S-globulin-like protein, 163–164
Z19 and Z22 α -zeins, 163
- stomach
actinidin (*see* Actinidin)
beef muscle protein, 156
cottage cheese and yoghurt, 160
dietary proteins classification, 150–151
egg proteins, 161
in vitro approach, 151–152
in vivo studies, 152–154
KE, gastric digestion, 152–154, 152*t*
meat and fish proteins, 159–160
Na-caseinate, 154–155
nutritional homeostasis, 150
pepsin inhibition, 150–151
tofu, 161
wheat gluten, 156–158
- Proteins and enzymes, kiwifruit
actinidin (*see* Actinidin)
1-aminoacyclopropane-1-carboxylate synthase, 73
- ascorbate, 73
- digestion, 63–64
- involvement, ripening process
cell wall metabolism, 72–73
characterization, 69, 70*t*
measuring activities, 69–71
postharvest, 69
in silico study, 69
small amounts, 69
- starch and sugar metabolism, 71

kirola, 69
kiwellin and fragments, 68
major soluble proteins and patterns, 61–63
polyphenol oxidase, 74
protein content, 60–61
superoxide dismutase, catalase, and peroxidase, 74
thaumatin-like protein, 68–69
volatile esters, formation, 73

R

RDI. *See* Recommended dietary intake (RDI)
Recommended dietary intake (RDI)
basal plasma levels, 129–130
description, 129
human studies, 129
pharmacodynamics, 129
toxicity, 129–130

RELM β . *See* Resistin-like molecule beta (RELM β)

Resistin-like molecule beta (RELM β), 173
RG II. *See* Rhamnogalacturonan II (RG II)
Rhamnogalacturonan II (RG II), 83–84, 86
Ripening process
cell wall metabolism, 72–73
characterization, 69, 70t
in silico study, 69
measuring activities, 69–71
postharvest, 69
small amounts, 69
starch and sugar metabolism, 71

S

SCFAs. *See* Short-chain fatty acids (SCFAs)
Scored human immunological vigor (SIV), 315–318
Secondary metabolite components, kiwifruit
carotenoids and chlorophylls, 103
green and gold kiwifruit, 103, 104t
health enhancing properties
methods, 117
nutrient density, 117–118
metabolite discovery
exact ion chromatograms (EIC), 120–122, 121f
LC-MS, 120–122, 120f
lipids, 120–122
metabolomics, 119–120

negative impact, health (*see* Oxalate, kiwifruit)

phenolics, 103–115

vitamins
folate/vitamin B₉, 117
vitamin C, 115–116
vitamin E, 116–117
vitamin K, 117

Short-chain fatty acids (SCFAs)

acidification, digesta contents, 191
butyrate, 191
in vitro fermentation models, 194
ileal and hindgut luminal flows, 197–198
metabolism, 190–191

SIV. *See* Scored human immunological vigor (SIV)

16S rRNA pyrosequencing, 211–213, 212f

T

TFPs. *See* Trefoil factor peptides (TFPs)

Thaumatin-like protein (TLP)
characterization, 329
cross-reactivity, 330
definition, 68–69
description, 329
green kiwifruit, proteins measurement, 61, 62t
identification, 68–69
major kiwifruit proteins, nomenclature, 63t
proteins measurement, gold kiwifruit, 61, 62t
PR-5 proteins, 330

TLP. *See* Thaumatin-like protein (TLP)

Trefoil factor peptides (TFPs), 173

V

Vitamin C

A. eriantha, 20
A. kolomikta, 20
animal studies, 139–140
bioavailability (*see* Bioavailability, vitamin C)
concentration, 116t
content, 23–25, 115–116
glycemic index (GI), 261–262
kiwifruit, 46–48
and lymphocytes, 287–288, 289f

- Vitamin C (*Continued*)
natural *vs.* synthetic
 bioavailability, 142
 “Ester C”, 142–143
 synthetic AA, 142
 polyphenolic compounds, 207, 208f
- Vitamin D
 calcium, 236
 magnesium, 236
- Vitamin E
 composition and nutritional value, 48*t*
 kiwifruit, 48
- Vitamins, secondary metabolite
 components, kiwifruit
 vitamin C, 115–116
 vitamin E, 116–117
 vitamin K, 117
- W**
- Wild and cultivated plants, kiwifruit
Actinidia species (*see* *Actinidia* species)
appearance, 16
“Chinese gooseberry”, 16
domestication and commercialization,
 29, 29*t*
- genus *Actinidia*
dioecy, 17–18
fruit structure, 18
growth habit, 17
morphology, female flowers, 18
natural distribution, 18–19
“Hayward”, 16
“Hort16A”, 29–30
“mihoutao”, 16
traded international, 16

INDEX

Note: Page numbers followed by “f” indicate figures, and “t” indicate tables.

A

- Acyl acceptor, 201
- Acyl donor, 201
- Agglomeration mechanisms
 - DA (*see* Dimensional analysis (DA))
 - description, 57–58
 - fluidized bed, 58–61
 - food powders, 57–58
 - low shear mixer, 61–73
 - powder flows and stress transmission, 75–79
 - sensors, 79–81
 - under static pressure, 73–74, 74f
 - wet, 74–75
- Appetite and satiety
 - eating behavior, 108, 109
 - nutrients, 109–110
 - peptides, 109
 - psychobiological system, 108
 - subjective ratings, 109
- Aspergillus* sp., 202

B

- Bacillus* sp., 202–205
- Biotransformation, polyphenols
 - chemical methods
 - conjugation with proteins/amino acids, 186–191
 - esterification, 191
 - miscellaneous, 192
 - polymerization, 191
 - enzymatic methods
 - cellulase, 200
 - enzymes employed, 192, 193t
 - esterases and proteases, 199
 - laccase, 198–199
 - lipase, 196–197
 - peroxidase, 200
 - tannase, 197–198
 - transf erase s, 200
- enzyme-mediated transformation
 - acyl acceptor, 201

acyl donor, 201

- solvent, 201
- temperature, 201
- water activity, 201
- improved bioavailability, 210
- increased bioactivity, 209–210
- metabolite production, 208–209
- microbes
 - bacteria, 202–205
 - fungi, 202
- plant cell cultures, 205–208
- solubility and stability in lipophilic preparations, 210–211

C

- Capsicum frutescens*, 207
- Carbohydrates
 - dietary fiber, 131–143
 - digestibility, finger millet, 26–27
 - foods, 30–31
 - Gi, 128–131
 - nutrient composition, 6, 7t
 - quality and quantity measurement, 2–3
- Cellulase, 200
- Cereals and breads
 - bacon and eggs, 138
 - crushed or rolled oats, 137
 - defined, 134
 - β-glucans, 136–137, 138
 - grain servings, 134
 - lupin-kernel flour, 136
 - oatmeal, 140
 - rye flour, 135–136
 - snacking behaviors, 139–140
 - whole-grain bread consumption, 134–135, 139
- Chennai Urban Rural Epidemiology Study (CURES), 4–5
- Citrus paradisi*, 207–208
- CURES. *See* Chennai Urban Rural Epidemiology Study (CURES)

D

DA. *See* Dimensional analysis (DA)

Dairy powders

- spraydrying temperature, 49–50
- surface, 48–49

Dairy products

- branched-chain amino acids (BCAA), 114–115
- “calcium appetite” theory, 115–116
- calcium intake, 115–116
- casein and whey protein, 114
- fat mass, lean body mass and waist circumference, 118
- hunger ratings, 116–117
- isoenergetic meals, 116
- milk proteins and consumption, 115
- opioid peptides, 114
- satiety, 116, 117
- weight status *vs.* dairy consumption, 117–118

Debranning/decortication methods, 13–15

Degree of gelatinization (DG), 26–27, 31

DG. *See* Degree of gelatinization (DG)

DI. *See* Digestibility index (DI)

Diabetes

- meal plan, ragi-based products, 30, 30*t*
- nutritional management, 29, 31–32
- and obesity, 27, 30
- protein glycation, 17
- type 2, 2–3, 31–32

Dietary fiber

- breads and cereals, 134–140
- classification, 131–132
- effects, 132
- fiber from fruits, 133
- fruits and vegetables, 140–143
- gastric satiety, 132
- influence, 133
- intake, 133

Dietary proteins

- energy expenditure, 111
- energy intake, 112
- gluconeogenesis/de novo synthesis, 111
- high-protein diets, 113
- legumes, 122–125
- meat, fish and eggs, 118–122
- milk and milk products, 113–118

nuts, 125–128

protein-induced satiety, 111

The Recommended Dietary Allowance

(RDA), 112

thermic effect, nutrients, 110

tryptophan, 112

3-week crossover trial, 111–112

Digestibility index (DI), 26–27

Dimensional analysis (DA)

description, 82–83

guidelines, 91–95

liquid atomization modeling, 86–91

wet agglomeration process, 83–86

Durum wheat

agglomeration, 66*f*

semolina, 77–79, 80, 81*f*

E

Eleusine coracana L. *See* Finger millet

Energy density

defined, 152

high-ED diet, 153–154

low-energy density foods, 152

meals, 153

selected foods, 154, 154*t*

sugar sweetened beverages, 154

water content, 152

Esterases and proteases, 199

Eucalyptus perriniana, 207

F

Fats

appetite perceptions, 148–149

bariatric surgery, 145–146

delaying lipid digestion, 147–148

duodenal infusion, 12-carbon fatty acids, 146–147

energy-dense macronutrient, 149

FA chain length, 144

fat-soluble compounds, 144

finger millet lipids, 10

food texture, 143–144

ileum exposure, 145

infusion, triglycerides, 146

lipases, 142

medium chain triglycerides (MCT), 147

OlibraT, 147–148

- palatable and unpalatable foods, 145
PinnothinT, 147
- Finger millet
calorie-restricted diet, 2–3
carbohydrate digestibility (*see In vitro studies, finger millet*)
composition, nutrient, 6–11, 7*t*
consumption, India, 4–5
CVD and type 2 diabetes, 31–32
dancing grain, 3–4
description, 2
domesticated plant, 4
GI (*see Glycemic index (GI)*)
GR studies, 28–30
health beneficial properties, 17–26, 18*t*
low cost, 3
nachni, 4
nutritional significance, 5
phytonutrients/phytochemicals, 11–12
whole grains and cereal fiber
 consumption, 2–3
- Fluidized bed agglomeration
agglomerate diameter evolutions, 60, 61*f*
amorphous components, 58–59
growth mechanism, 61, 63*f*
heat transfer zone, 60
isothermal zone, 60
liquid distribution, spray zone, 59
low shear device, 58
median diameter evolutions, 60–61, 62*f*
particle size distribution evolutions,
 60–61, 63*f*
spraying and drying, 58
spray zone, 60
surface reactivity, particles, 58–59
thermal zones, 59–60, 59*f*
wetting-active zone, 60
- Food intake and body weight
carbohydrates (*see Carbohydrates*)
dietary proteins (*see Dietary proteins*)
energy density, 152–155
fats, 143–149
meal plans, 156–162
teas, caffeine and pungent foods, 149–152
- Food powders
agglomeration (*see Agglomeration mechanisms*)
- characterization, physicochemistry
 process and constraints, 48, 49*f*
definition, 42
description, 42–43
external stress and molecular scale, 44–45
hydrotextrual diagram, 50–57
microscopy, 47
multiscale approach, 44, 44*f*
NMR microimaging experiments, 48
particle surface reactivity, 45–46, 46*f*
polarity properties and physicochemical
 reactivity, 44–45
reactivity and surface properties, 44–50
spectroscopy techniques, 47
spray-drying process, 48–50
surface extraction techniques, 47
surface sorption techniques, 47
water activity (a_w) and glass transition (T_g)
 concepts, 50
- Fruits and vegetables
adiposity, 143
annual weight change, 143
carrots and spinach, 141
consumption, dried fruit, 142
energy density and fiber content, 140–141
oranges and apples, 142
salads, 141–142
satiety, 140–141
- G**
- GI. *See Glycemic index (GI)*
- Glycemic index (GI)
ad libitum reduced-GL diet, 130, 131
area under the curve (AUC), 128–129
CALERIE trial, 130
capillary blood glucose, 30–31
carbohydrate quality measurement, 2–3
deconticated, 29
and DG affects, 27
dietary factors, 131
finger millet, 29–30
glycemic load (GL) concept, 129
hepatic glucose production, 129
high-Gi diet, 130
low-Gi diets, 129
low to high categories, 30–31
meta-analysis, 130

- Glycemic index (GI) (*Continued*)
 protocols, 28
roti preparations, 27
 testing, finger millet preparations, 31–32
- Glycemic responses (GRs) studies, finger millet
 capillary samples, 28
 decorticated, 29
 diabetes nutritional management, 29
 disadvantages, 29–30
 and GI, 29–30
 malting and fermentation process, 28–29
 NIDDM, 28
ragi-based products, diabetic meal plan, 30, 30t
- H**
 “High satiety” (HS) plan, 159–161, 162
- Hydrotextural diagram
 gas volume, 51
 granular media and REV, 50–51
 mapping, 56–57, 57f
 nuclei, agglomerate and paste states, 52, 53f
 path-connected space
 fluid phases, 55–56
 solid phase, 55
 rheological states, 54–55, 54f
 saturated states, 53–54, 54f
 schematization, real porous medium and definition, 50–51, 51f
 true and apparent densities, 51, 52, 52t
 wet granular medium, 52–53
- I**
In vitro studies, finger millet
 carbohydrate digestibility and glycemic properties, 26–27
 cooking and cooling, 27
 DG and DI, 27
 RS, 26, 27
 starch, 26
- L**
 Laccase, 198–199
- Legumes
 breads, 122–123
 chick peas, 123
- pulses, 122, 124
 soy proteins, 123–125
- Lipase, 196–197
- Liquid atomization modeling, DA
 aerodynamic Weber number, 86–87
air–liquid velocity, 86–87
 bifluid nozzles, 88
 different regimes, jet breakage, 87
 droplet size, 89–91, 90f
 mean size droplets, 86
 mono- and bifluid nozzles, 86–87, 88, 89f
 nozzle configuration, 87
 physicochemical properties, 87, 88
 process relationship, 88, 89
 wet agglomeration process, 85–86
- Low shear mixer agglomeration
 bed surface, 69
 fractal dimension, 71–72
 granular medium, 69
 heuristic model, 61, 72
 hydrotextural diagram, 62–63, 65f
 mechanical mixing conditions, 69
 paste transition, 72–73, 73f
 physical/biological systems, 72
 polydispersed particle population, 69
 population balance, structure, 63–64, 65f
 porous structure, 71–72
 potential barrier and grain size, 69–70
 saturation degree, water content, 69–71, 70f
 shear stresses, blades, 69
 size distribution curves and median diameter, water content, 62–63, 64f
 solid volume fraction and diameter, 71–72, 71f
 wetting–mixing stage, 61–62
 wetting/nucleation, 64–68
- M**
 Malt flour, 15
 Malting, 15
 Meal plans
 fiber content range, 156–159
 “high satiety” (HS) plan, 159–161, 162
 individual foods, 156–159, 156t
 1200 kcal/day, 156–159, 158t
 1600 kcal/day, 156–159, 158t
 2000 kcal/day, 156–159, 160t

- sample menu, American diet, 159–161, 161*t*
- Micronutrients, 7*t*, 10–11
- Milling, 13
- N**
- National Nutrition Monitoring Bureau (NNMB), 4
- Near infrared (NIR) spectroscopy, 80–81, 82*f*
- NNMB. *See* National Nutrition Monitoring Bureau (NNMB)
- Nutrient composition, finger millet carbohydrates, 6, 7*t*
fat, 7*t*, 10
micronutrients, 7*t*, 10–11
proteins, 6–10, 7*t*
- Nuts
- almond supplementation, 126
 - consumption, 126–127
 - description, 125
 - peanuts, 126, 127
 - physical properties, 125
 - resting energy expenditure (REE), 126
 - walnuts, 125–126
- O**
- Obesity
- description, 106–107
 - and diabetes, 27, 30
 - health hazards, 106–107
 - lifestyle modification, 107
 - longevity, 106
 - prevalence, 106
 - weight-loss dietary regimen, 107–108
- P**
- Paecilomyces variotii*, 202
- Paste transition
- agglomerate, 72–73, 73*f*
 - median diameter growth and population balance, 72–73
 - power law exponent values, 73
- Peroxidase, 200
- Phytonutrients/phytochemicals, finger millet
- decortication, 13–15
 - different processing techniques, 12, 13*f*
- malting, 15
- milling, 13
- nutrient composition, 12, 14*t*
- phenolic compounds, 11–12
- popping, 15–17
- traditional foods, 12, 12*f*
- Plant cell cultures
- advantages, 206
 - bioconversion, polyphenols, 206, 206*t*
 - Capsicum frutescens*, 207
 - Citrus paradisi*, 207–208
 - Eucalyptus perriniana*, 207
 - glycosylation, 205–206
- Polyphenols
- biotransformation (*see* Biotransformation, polyphenols)
 - classification, 185–186
 - description, 184
 - scavenging free radicals, 184
 - structural classification, 186, 190*t*
 - substantial daily intake, 184–185
- Popping
- air popper device, 15–16
 - dietary fiber, 15–16
 - EDTA, 16–17
 - fermented beverages, 16–17
 - flavor and aroma, 15–16
 - fortification, 16–17
 - ready-to-eat products, 15–16
 - whole-grain product rich, 15–16
- Powder flows and stress transmission, agglomerators
- blade and intermediate scale, 79
 - characterization elements, powder bed, 77–79
- displacement fields and granular stresses, 77–79
- drag forces and dissipated energy, 77–79
- dry flowing regimes and wet-controlled, 75–76
- frictional regime, 77–79
- granular medium, 79
- growth models, 76
- intruder motion induces and particle motions, 77–79
- mixer agglomerators and powder behavior, 76

- Powder flows and stress transmission,
agglomerators (*Continued*)
particle impact velocity and blade tip,
76–77
PIV techniques, 76–77
potential barrier and velocity gradient, 79
quantification, granular stresses and
displacement fields, 77–79
semolina, vertical rise of blade, 77–79, 78f
shear and velocities, powder bed scale, 79
stress
patterns, 75–76
transmission, 76, 79
unidirectional blade and powder bed,
77–79
velocity and trajectory fields, 76
- Protein-rich foods
eggs, 119–120
essential amino acids (EAA), 118–119
fish, 119
meat products, 120–122
protein synthesis, 119
- R**
Random close packing (RCP), 55
RCP. *See* Random close packing (RCP)
Representative elementary volume (REV),
50–51
Resistant starch (RS)
cooking and cooling, 27
isolation, 27
puffing, 26
REV. *See* Representative elementary
volume (REV)
RS. *See* Resistant starch (RS)
- S**
Satiety. *See* Appetite and satiety
SCM. *See* Seed coat matter (SCM)
Seed coat matter (SCM), 13–15, 31–32
Sensors, agglomeration
blade torque/motor power
consumption, 80
energy consumption measurements, 80
in situ, 79–80
NIR spectroscopy, 80–81, 82f
physical and hydrotextural changes,
79–80
water addition level, 80, 81f
Streptomyces sp., 205
- T**
Tannase, 197–198
Teas, caffeine and pungent foods
c-AMP, 149–150
capsaicin, 150–152
EGCG–caffeine mixture, 150
energy expenditure, 149
methylxanthines, 150
Transferases, 200
- W**
Wet agglomeration
description, 74–75
dimensional analysis (DA)
fine powder recycling, 94
food engineering tools, 84
food materials, 83–84
food process, 85
key process parameters, 94
liquid atomization mechanism, 85–86
minor drying pilot, 91, 92f, 94
powder characteristics, 83–84
raw material behaviors, 84–85
spray-drying, 91
stochastic methods, 83
system parameters, 91–94, 93f
target parameter, 94
drying stage and unit operations, 74–75
equipment classification, 74–75
mechanical mixing, 75
pneumatic mixing process, 75
Wetting/nucleation
agglomeration, durum wheat semolina,
64–66, 66f
capillary bridge-building, 64–66
drop and grain sizes, 68
hydration, 68
physicochemical properties, binders, 67,
68f
semolina, 67
surface tension and viscosity, 66–67, 67f

INDEX

Note: Page numbers followed by "f" indicate figures, and "t" indicate tables.

A

- Amino acids
 - glycemia
 - animal-to-plant protein, 26
 - blood glucose, 23
 - chocolate milk, 25
 - cottage cheese, 23–24
 - egg white protein, 22–23
 - gluconeogenesis, 24–25
 - glucose and insulin responses, 25–26
 - plasma glucose, 24
 - source and content, 26–27
 - urinary glucose, 22
 - insulin secretion
 - alanine, 12–13
 - arginine, 13
 - carbohydrate, 20
 - cysteine and selenocysteine, 18
 - GDH, 15–16
 - GIP, 20–21
 - glucose homeostasis, 12
 - glutamine, 18–20
 - glycine, 13–14
 - isoleucine, 14–15
 - leucine, 15–16, 17–18
 - lysine, 14
 - phenylalanine, 16–17
 - plasma membrane, 12
 - proline, 17
 - valine, 17
 - α -Amylase inhibitors
 - chemical structures, 122, 123f
 - curcumin, 124
 - dicaffeoyl quinic acid isomers, 124
 - endo α -(1,4) glycosidic linkages, 122
 - HPA and PPA, 122
 - mono- and disubstituted caffeoylquinic acids, 124
 - myricetin-3-O-rhamnoside and europetin-3-O-rhamnoside, 122–124
 - protein-based ones and secondary metabolites, 122

B

- Barley, cereal-based ingredients
 - blood glucose and HbA1c levels, 193–194
 - 2 g β -glucan test meals, 194
 - β -glucan, 193–194
 - glucose tolerance and insulin sensitivity, 194–195
 - glycemic response, food items, 194–195
 - Himalaya 292, 194–195
 - in vitro* starch digestibility, chapattis, 196–197
 - lactic acid, 196
 - postprandial glycemic response, 196–197
 - prevention, diabetes, 193–194
 - randomized controlled trial, 196–197
 - rice, high-GI food, 194
 - whole-day glucose tolerance, 194
- Basal metabolic rate (BMR), 73
- Blood glucose
 - cereal-based ingredients, 193–202
 - and chronic diseases (*see* Chronic diseases and blood glucose)
 - description, 182
 - diabetes-related complications, 182–183, 183t
 - and dietary fiber (*see* Dietary fiber and blood glucose)
 - effect, protein and fat (*see* Protein and fat, blood glucose)
 - factors, GI of food (*see* Glycemic index (GI))
 - fruit-based ingredients, 202–207
 - legume-based ingredients, 210–213
 - postprandial hyperglycemia, 183
 - prediabetes, 182
 - role, food (*see* Food, blood glucose)
 - spices (*see* Spices, blood glucose)
 - sugars and sugar alcohols, 216
 - types, diabetes, 182

- Blood glucose homeostasis
concentration, 3–4
description, 3
dietary proteins and amino acids, 5–6
hyperglycemia, 3
kidney and liver, 4–5
role, 5
skeletal muscle and adipose sugar, 5
- BMI. *See* Body mass index (BMI)
- BMR. *See* Basal metabolic rate (BMR)
- Body mass index (BMI), 54
- C**
- Carbohydrates and proteins, glycemia
gelatin, 29–30
glucagon, 27
glucose and egg white, 27–28
glycemic control, 29
hydrolysate, 28–29
insulin secretion, 27
noninsulin-dependent diabetes, 30–31
plasma glucose, 31
serum insulin, 30
- Cereal-based ingredients
barley, 193–197
description, 193
insoluble fibers, 193
oats, 197–200
rye, 200–202
starchy foods, brown rice, 193
- Chalcones, 119–120, 119f
- Chronic diseases and blood glucose
ad libitum low-GI diets, 188–189
advanced CHD, 186
counter-regulatory hormones, 186–187
effect of GI, health outcomes, 185–186
hypoengetic reduced-fat diet, 188
hypoglycemia, 187–188
low-GI diets, 186–187
NEFA levels, 186–187
reduction, gastric emptying, 188
satiety, 187–188
weight loss/reduction, 187–188
- D**
- DB technique. *See* Douglas bag (DB) technique
- Dietary fiber and blood glucose
food characteristics, 191
in food industry, 191–192
food ingredients, 192–193
gastrointestinal absorption, cholesterol, 191
glucomannan in Konjac, 190–191
gum Arabic, 191–192
physicochemical properties, 190–191
plantago psyllium mucilage, 191–192
viscosity properties, soluble dietary fiber, 191
- Digesta rheology
changes, rheological properties, 161, 162f
gastric function, 161–163
inhibitory action, 163
ionic interactions, starch and gum, 163
presence of gums, 161–163
solution viscosity, 161–163
viscosity, cooked potatoes, 161
- Douglas bag (DB) technique, 73–74
- E**
- Encapsulation technology, GI
acarbose, 126–127
anthocyanins and proanthocyanidins, 126–127
description, 125
ellagitannins, 126
functional food product formulation, 125
 α -glucosidase and α -amylase inhibitors, 126
olive leaf extracts, 126
- Energy cost, children and adolescents
BMR, 73
compilation, physical activities, 74, 75t
- DB technique, 73–74
laboratory environments, 81
PARs, 73
physical activities, 81
SWA, 80
TEE, 72–73
- Energy expenditure (EE)
energy intake, 53
estimation, 74–80
obesity, 53

- SWA, 80
TEE, 72–73
- F**
- Flavonoids, polyphenols
chemical structures, compounds 1–14,
114, 114*f*
isoprenylated flavanes and kazinol A, B.
116
myricetin-3-O-rhamnoside and
europetin-3-O-rhamnoside,
115–116
nongallated catechins, 114
3,5,7,3',4'-pentamethoxyflavone, 115
prenylated quercetin derivatives, 116
quercetin and isorhamnetin, 115–116
saponarin, 115
tea drink, 114
5,7,3',4'-tetramethoxyflavone, 115
5,7,4'-trimethoxyflavone, 115
vitexin and isovitexin, 115
- Food, blood glucose
carbohydrates, 183–184
defined, GI, 184
GI and GL values, 184–185
metabolic diseases, 184–185
physiological characteristics, 185
- Food matrix
addition, toppings/fillings, 163–164
alginate, 160–161
 α -amylases inhibitors, 166
commercial starch-blocking products,
166–167
compositions, 163–164
dextransubpopulations, 165–166
dietary fiber, 167
effect, guar gum (0.5%) addition,
158–159, 159*f*
enzymatic digestibility, starch and
glycemic response, 157–158
enzymatic resistance, pure amylose and
lipid complexes, 165–166
extrusion cooking, 167
fatty acids complexes, 165
galactomannan-based gums, 157–158
gastric response, meal viscosity, 160–161
gluten to gluten-free flour, 163–164
hydrocolloids, 158–159
- hydroxyl groups, glucose residues, 165
in vitro and *in vivo* digestibility, 160
legume crops, 166–167
phytic acid, 167
pig meals, 160
protein fractions, 163–164
reducing agents, 163–164
rheology, digesta (*see* Digesta rheology)
thermal processing methods, 167
viscous fiber, 160
water availability, 159–160
- Food microstructure and starch digestion
cell wall polymers, 140
change, cooking, 140–141
characteristics, 140–141
cultivar type, physicochemical
composition and postharvest storage,
140–141
in vitro and *in vivo*, 141
living cotyledon cells, 141
navy beans (*see* Navy beans, food
microstructure)
potato (*see* Potato, food microstructure)
raw foods, 140
- Food processing, starch digestion
cereals, 170–171
dispersed polymers, 171–172
effect, 168, 169*t*
extrusion cooking, 168–170
gelatinization, 171–172
irradiation and degradation, 171
microwave heating, 171
RDS, 170–171
reduction, cohesiveness, 170–171
retrogradation properties, 171–172
structure and nutritional characteristics, 168
traditional and conventional processing
methods, 168–170
in tubers and legumes, 168
water penetration and α -amylase action,
168
- Fruit-based ingredients
bioflavonoid extraction, sugar cane,
206–207
blood glucose control, healthy and type 2
diabetes subjects, 207, 207*t*
cranberries, 206
extracts of berries, 202–204

- Fruit-based ingredients (*Continued*)
 GI, 202–204, 206
 grape products, 204–206
 healthy and diabetic subjects, 202
 white bread's glycemic response, 204–206
- G**
 Gastric inhibitory peptide (GIP), 20–21
 GDH. *See* Glutamate dehydrogenase (GDH)
 GI. *See* Glycemic index (GI)
 GIP. *See* Gastric inhibitory peptide (GIP)
 Global School-based Student Health Survey (GSHS), 56–57
 Glucagon secretion, 21–22
 α -Glucosidase inhibitors
 chalcones, 119–120, 119f
 glycomimetics, 112
 polyacetylenes, 120, 120f
 polyphenols (*see* Polyphenols)
 stilbenes, 121–122, 121f
 terpenoids (*see* Terpenoids)
 Glutamate dehydrogenase (GDH), 15–16
 Glycemia
 alanine, 32
 amino acids (*see* Amino acids)
 arginine, 33
 gelatin, 32–33
 gluconeogenic amino acids, 31–32
 glutamine, 35
 insulin and glucagon, 32
 isoleucine, 34
 leucine, 33–34
 lysine, 34–35
 phenylalanine, 35
 plasma glucagon, 35–36
 proline, 35
 proteins and carbohydrates
 (*see* Carbohydrates and proteins, glycemia)
 Glycemic index (GI)
 active compounds, 125
 cereal grains, 189–190
 diabetes patients, 125
 encapsulation technology, GI, 125–127
 factors, response to foods, 189–190, 189t
 hyperglycemia, 125
 response, cooking procedures, 190
 starchy foods (*see* Starchy foods, GI)
- Glycomimetics, 112
 GSHS. *See* Global School-based Student Health Survey (GSHS)
- H**
 HBSC. *See* Health Behavior in School-aged Children (HBSC)
 Health Behavior in School-aged Children (HBSC), 58–59
 HPA. *See* Human pancreatic α -amylase (HPA)
 Human pancreatic α -amylase (HPA)
 Curcuma longa, 124
 description, 122
 isookanin, *Bidens bipinnata*, 122
 and PPA, 122
- I**
 Insulin secretion
 amino acids (*see* Amino acids)
 proteins
 amino acids, 9
 beef meal, 10–11
 carbohydrate meals, 10–11
 incretin hormones, 11
 pancreatic β -cells, 9
 plasma amino acid levels, 9–10
 In vitro starch digestibility
 navy beans
 SEM, gastric and intestinal digestion, 155–157, 156f
 simulated intestinal conditions, 155
 starch granules, cotyledon cells, 154–155, 154f
 starch hydrolysis (%), 154–155, 155f
 potato
 CLSM images, real-time small intestinal digestion, 150–151, 150f
 components, 149–150
 lower levels, hydrolysis, 149–150
 SEM, Agria cooked potatoes, 151–153, 151f, 152f
 small intestinal digestion, 148–149
 starch hydrolysis (%), 148–149, 149f
- L**
 Legume-based ingredients
 “atta mix” flour, 211

leguminous and nonleguminous foods, 211–212
low-GI effect, pulses, 212
molasses and sugar, 212–213
pasta products, 210–211
postprandial glycemic response, 210–211
types, beans, 211–212
white kidney bean extract, phase 2, 213

M

Methyl hydroxychalcone polymer (MHCP)
active ingredient, cinnamon, 208
polyphenol compound, 208
MHCP. *See* Methyl hydroxychalcone polymer (MHCP)

N

Navy beans, food microstructure
cell wall xyloglucans, 153–154
cooked, 153–154, 153f
cotyledon cells, 153–154, 153f
raw, 153–154, 153f
starch digestion *in vitro* and digesta
(*see* *In vitro* starch digestibility)
NEFA. *See* Nonesterified fatty acid (NEFA)
Nonesterified fatty acid (NEFA)
adipose tissue, 186–187
high-insulin response, 187–188
postprandial rebounds, 186–187

O

Oats, cereal-based ingredients
bran muffins, 199
functional food products, 198–199
 β -glucan and glucose AUC, 198–199
glycemic response, 197–198
healthy subjects, 199
high fat content, 198
intact kernels, 197–198
size, test meals, 199–200
starch gelatinization, food disruption,
197–198
varieties, steel cut and rolled, 200

Obesity

childhood and adolescence, 51
description, 50
EE, 51–52, 53
and overweight, 53–54
PA, 52

PF, 52–53
prevalence rates, 51
tropical countries, 50–51
Overweight
adolescents, 57–58, 57f
BMI, 54
classifications, 54
description, 53–54
factors, 55–56
GSHS, 56–57
HBSC, 58–59
health consequences, 54–55
prevalence, 59, 60f

P

PA. *See* Physical activity (PA)
PAR. *See* Physical activity ratio (PAR)
PF. *See* Physical fitness (PF)
Physical activity (PA)
adolescents, 69–70
adolescents percentage, 62, 63f
Cayman Islands, 63–65
energy cost
body mass, 87–88
EE, 87
obesity, 88
TDEE, 86–87
walking and running, 88
fitness components, 70
and GSHS, 65
and HBSC, 65
indicators, 69–70
male and female, 66–67
and obesity
adolescents, 84–85
BMI, 83, 84f
description, 82
GSHS, 85
sedentary behavior, 82–83
sedentary, 63–65
Physical activity ratio (PAR), 73
Physical fitness (PF)
Asian countries, 71
children and adolescents, 71
description, 68–69
health-related, 69
and obesity, 85–86
and PA, 69–71

- Polyacetylenes, 120, 120f
- Polyphenols
- 1,7-bis (4-hydroxyphenyl)heptane-3, 5-diol, 117
 - bromophenol and bis(2,3-dibromo-4, 5-dihydroxybenzyl) ether, 117
 - chemical structures, compounds 15–25, 116, 117f
 - cis-N-p*-coumaroyltyramin, 117
 - coumestrol, dolichandroside A and aloe saponarin II, 116
 - flavonoids, 114–116
 - hispidin, hispolon and inotilone, 116
 - 6-hydroxy-2,4,7-trimethoxy-phenanthrene, 117
 - tannins, 112–114
 - trans-N-p*-coumaroyltyramine, 117
- Porcine pancreas α -amylase (PPA)
- endo-type amylase, 122
 - in vitro* digestion measurement, 122
 - noncompetitive inhibitory mechanism, 122–124
- Potato, food microstructure
- Agria potato cultivar, cooked tuber parenchyma, 142, 144f
 - CLSMs, 142, 144f
 - cooked tuber parenchyma cells, TEM, 145, 147f
 - microscopic and rheological techniques, 142
 - Moonlight, Agria, 142–145, 143f
 - Nadine, Moonlight, Red Rascal, 142, 143f
 - raw and cooked tuber parenchyma, 142, 143f
 - raw, SEM micrographs, 142, 144f
 - starch digestion *in vitro* and digesta (*see In vitro* starch digestibility)
 - swelling and gelatinization, starch granule, 142–145
 - TEM, raw tuber parenchyma cells, 145, 146f
- PPA. *See* Porcine pancreas α -amylase (PPA)
- Protein and fat, blood glucose
- addition, vinegar to white bread, 216
 - almond, 214
 - bread, 215
 - fermentation process, 214
 - GI values, 216
- insulinotropic effect, 215
- lower glycemic response, 213–214
- milk products, 213
- sourdough fermentation process, 215
- starchy foods, 214–215
- Proteins
- amino acid composition, 8t, 9
 - blood glucose homeostasis, 3–6
 - consumption, 2–3
 - description, 2
 - glucagon secretion, 21–22
 - glucose metabolism, 3
 - glycemia, 22–36
 - insulin secretion, 9–11
 - intake, Europe and North America, 2
 - vegetable sources, 6
- R**
- Rye, cereal-based ingredients
- blood glucose control, overweight and type 2 diabetes subjects, 201–202, 205t
 - blood glucose, healthy subjects, 201–202, 203t
 - capillary and venous blood sampling methods, 201–202
 - fiber contents, 200–201
 - kernels, 201
 - low-GI values, 201–202
 - metabolic syndrome, adults, 200–201
 - types, 200–201
- S**
- SenseWear[®] Pro₂ Armband (SWA), 80
- Spices, blood glucose
- cinnamon, MHCP, 208
 - fenugreek seeds, 209
 - 3 g cinnamon consumption, healthy patients, 209
 - GI, 208
 - green tea consumption, 209–210
 - hypoglycemic and hypoinsulinemic effects, 208
 - and legumes, healthy and type 2 diabetes subjects, 209–210, 211t
 - stimulation, insulin receptor, 209
 - use, herbal teas, 208
- Starch digestion
- composition, food matrix, 163–167

- description, 138
and food matrix (*see* Food matrix)
food processing (*see* Food processing,
starch digestion)
lipids and proteins, 138–139
mammalian enzymes, 139–140
microstructure, natural foods (*see* Food
microstructure and starch digestion)
polysaccharide-based gums, 138–139
processing, post-processing storage and
composition, 138–139
salivary α -amylase, 139–140
SDS and RDS, 138
- Starch hydrolases inhibitors
 α -amylase (*see* α -Amylase inhibitors)
chromogenic molecular probes, 104–112
diabetes mellitus, 104
DNSA assay, 104–112
from edible plants, 104
enzymes catalyzation, 104
 α -glucosidase inhibitors, botanical sources
(*see* α -Glucosidase inhibitors)
low GI (*see* Glycemic index (GI))
microbial and mammal amylases, 112
from natural plants, 104, 105†
- Starchy foods, GI
antidiabetic compounds, 127
buckwheat, 129
cinnamon, 127–128
fenugreek, 128–129
green tea, 129–130
raspberry and blueberry, 129
sweet potato, 127
- Stilbenes, 121–122, 121f
- Sugars and sugar alcohols, 216
- SWA. *See* SenseWear® Pro2 Armband
(SWA)
- T**
- Tannins, polyphenols
chemical structures, hydrolyzable and
condensed, 112–113, 113f
natural products, 112–113
oligomeric proanthocyanidins, 113–114
yeast α -glucosidase, 112–113
- TEE. *See* Total energy expenditure (TEE)
- Terpenoids
arjunolic and asiatic acid, 119
- chemical structures, compounds 26–36,
117–118, 118f
corosolic acid, 119
Lagerstroemia speciosa, 119
Momordica charantia, 117–118
momordicoside M and momordicoside A,
117–118
- oleanolic, maslinic and 23-hydroxyursolic
acids, 119
- pistagremic acid, 118–119
- 2,3-seco-20(29)-Lupene-2,3-dioic acid,
119
- ursolic acid, 118–119
- Total energy expenditure (TEE)
and BMR, 73
and EE, 72–73
- V**
- Viscosity
of cooked potatoes, 161
dietary fiber, 167
enzymatic digestibility, starch and
glycemic response, 157–158
food matrix, 138–139, 149–150
gastric response, 160–161
ionic interactions, starch and gum, 163
physiological processes, 160–161
pig meals, 160
soluble dietary fiber, 157–158
solution, 161–163
- W**
- Whey proteins, 20–21
- X**
- Xanthoangelol inhibitors, 105t, 119–120
- Y**
- Yeast
 α -glucosidase inhibitor with IC50 values,
114
quercetin and isorhamnetin, 115–116
tannins isolation, 112–113
- Z**
- Zingiberaceae family (*Kaempferia parviflora*),
115

SPs. *See* Sulfated polysaccharides

Sterols

- description, 192
- health benefit activities
 - antibacterial, 193–194
 - anticancer, 194–195
 - antidiabetic, 195
 - antihypercholesterolemic, 196
 - antihypertensive, 195–196
 - antioxidant, 194
- marine algae, 192–193
- plant, 192

Sulfated polymannurogluronate (SPMG), 260–261

Sulfated polysaccharides (SPs)

- biological activities, 393
- carrageenan, 237, 238, 392–393
- classification, 237
- fucoidan, 237, 238, 392–393
- medicinal benefits and biological activities
 - anticancer effect, 397
 - antioxidant effect, 394–395
 - antiviral effect, 395–396
 - immunomodulating effect, 396–397
- novel extraction and separation
 - techniques, 393
- polymers, 392–393
- ulvan, 237, 238, 392–393

T

Thrombin time (TT), 236–237

TIMPs. *See* Tissue inhibitors of metalloproteinases

Tissue inhibitors of metalloproteinases

(TIMPs), 130

Tororokombu (TK)

- description, 202
- and HFD, 202–203
- and NSK, inhibitory activities
 - alginate, 203, 204
 - alkaline-soluble fraction (AS), 203, 204
 - antiobesity effects, 202–203
 - pancreatic lipase activity, 203

Transforming growth factor

β (TGF- β), 430

TT. *See* Thrombin time

U

Ulvans

- applications, 62
- chemical structure, 61
- description, 218

V

Very low density lipoprotein (VLDL), 341

W

WAT. *See* White adipose tissue

White adipose tissue (WAT), 119–120

Wnt signaling components

- cell proliferation and division, 182
- expression measurement, 184
- IEC-6 cells, 184
- time-course experiment, 182