Index

Note: page references in italics refer to information in figures or tables.

abdominal girth 25
acetyl-CoA 105–7, 178–9
acidity regulators 348
acrylamide 344
additives 10, 346–7, 348
regulation 299–300
sodium-containing 200
adipose tissue 15
component lipids 104
and dietary fat intake 106
endocrine control 103
aflatoxins 345
agricultural residues 10
AIDS/HIV 355–7
nutrition needs 61, 357
alanine 51, 52
albumin 214
aluminium 233–4, 236
Alzheimer’s disease 215
amino acids
biochemical roles and functions 50, 51, 63
discovery and history 50–1
homeostasis and turnover 58–61, 78
metabolic needs 58–64
metabolites and derivatives 53–4
biochemical structures 51–4
body requirements 66–7
by species 62
estimation and determination 65–7
in catabolic states 62, 72
influencing factors 58, 71–2
meeting needs 67–9
classification 54–8
sources 56–7
digestibility 68–9
ammonia 56–7, 61–2
amylase 80
amylase 80
anemia
iron-deficiency 207
megoblastic 175
pernicious 168, 169
and folate 175
and scurvy 183
and vitamin B12 168, 169
animal meat
dietary fats 91–2
drug residues 343
animal studies 311–14
anthropometry 22–3
antioxidants 291
intracellular 61
mode of action 222
apo-proteins 97, 99
impact on cholesterol 119–20
properties 98
appetite 33–4
hormonal regulation 35
metabolic factors 35
neuropsychological factors 34–5
arachidonic acid cascade 109–11, 110
arginine 51, 52, 60
arginine—nitric oxide pathways 54
arsenic 233–4, 236, 344
ascorbic acid see vitamin C
asparagine 52
aspartate 51, 52
aspartic acid 57
assessment of nutritional status see nutritional status assessments
astroviruses 334
atherogenic lipoprotein phenotype (ALP) 103
atherosclerosis
and homocysteine levels 174
lipid-mediated 100, 102–3
cholesterol-lowering drugs 91, 95
nutritional modifications 103–4
postprandial lipemia 98
TAG regulation hypothesis 103–4
athletes, energy requirements 43
ATP production 77
avidin 177
Bacillus cereus 328, 330
bacterial contamination 10, 327
emerging pathogens 326–7
pathogen characteristics 328–33
toxins 345
Barter’s syndrome 196
basal metabolic rate 37–8
and energy intake ratios 269–70
beriberi 153–4
bias 260–3
bile acids 95
bioactives 291
bioavailability of foods, defined 286–7
biochemical markers 130
bioelectric impedance 25–6
bioflavonoids 186
biological markers 130
biotin 176–8
deficiencies 177
functions 177
blood clotting, and vitamin K 150–2
blood glucose, regulation mechanisms 77–9
body composition 12–30
levels
atomic 13
cellular 14
molecular 13
relative relationships 14–15
whole body 14
COPYRIGHTED MATERIAL
body composition (cont.)
measurement techniques 15–27
advantages and disadvantages 27
anthropometry 22–3
bioelectric impedance 25–6
carcass analysis 15–16
creatinine excretion 26–7
CT imaging 21–2
density methods 18–19
dual-energy X-ray absorptiometry (DEXA) 18, 19–21
infrared interactance 25
MRI imaging 22
multicompartment models 20–1
N-methyl-histidine excretion 26–7
skinfold thickness 23–4
ultrasound 25
in vivo neutron activation analysis 16
weight/height indices 22–3

prospects for future 29–30
use and misuse of data 27–9

body fat
biochemical components 104
deposition sites 104
measures 27–9
comparative analysis 29
densitometry 16–18
skinfold thickness 23–4

see also adipose tissue

body mass index (BMI) 22–3
obesity measures 45
body protein mass 58
bone mass, and calcium 191–2
boron 233–4, 236
bowel cancer
prevention
folate supplements 174–5
role of butyrate 84
Boyle Gay-Lussac’s law 17–18
brain
and lipids 105, 114–15
role of docosahexaenoate 114
bowl/flour, fortified 174, 193
BSE (bovine spongiform encephalopathy) 338–9
bulking agents 348
burning foot syndrome 179–80
butyrate 83–4

cadmium 233–4, 236, 344
calcitriol 143–4

calcium 189–94
absorption and transport 189–91
influencing factors 191
daily requirements 193–4, 194
food sources 193–4, 193
functions 191
deficiency conditions 191–2
homeostatic regulation 190
interactions 194
nutritional status 192–3
tissue distribution 189–91
toxicity 192
and vitamin D 144, 192

Campylobacter 331
cancer
and folate 174–5
and selenium 219
and vitamin B6 164
and vitamin C 185, 219
carbohydrates 74–85
classes 74–5
digestive breakdown and absorption 74–6
fermentation in the colon 82–3
of short-chain fatty acids 83–4
food sources 76
malabsorption problems 75–6
metabolic utilization 77
oral pH and dental caries 84–5
types
glycemic 76–9
nonglycemic 79–84
resistant starch and dietary fibre 81–2
carbon recycling 107
carcass analysis 15–16
cardiovascular disease 351–3
and homocysteine levels 174
and lipids
ALP findings 102–3
cholesterol-lowering drugs 91, 95
homeostasis and transport 95, 100–3, 102–3
hormonal control 103
nutritional modifications 103–4
postprandial regulation 98
triacylglycerol (TAG) hypothesis 103–4
carnitine 186
carotenoids 135–7, 291
antioxidant function 139
see also vitamin A
case-control studies 318, 320
cassava 346
cell membranes 90–1, 104
cell signaling mechanisms, arachidonic acid cascade 109–11, 110
ceruloplasmin 214
cestodes 338
chemicals affecting foods 340–6
acceptable intake levels 341–2
classes 340
chemotherapy, and folate supplements 172–3
children
energy requirements 42
malnutrition 299
chloropropanols 344
cholecystokinin (CCK) 34, 93
cholera 332
cholesterol 86
biliary 95
biosynthesis 114–15
dietary intake 116–17
impact on blood lipids 115–16
role of MUFAs 116
sources 90, 91–2, 114–15
dietary regulation cf. drug lowering regimes 117
functions, brain lipid membranes 105, 114–15
homeostasis 95
genetic factors 119–20
hormonal control 103
LDL receptor pathways 100–1, 102–3
HDL reverse transport pathways 101–2, 102–3
re-esterification processes 96
role of plant sterols 91, 116
triacylglycerol (TAG) hypothesis 103–4
storage, structural pools 104
cholesterol-lowering drugs 117
effectiveness 117
mode of action 95
and plant sterols 91, 116
choline 186
chromium 230–2
chylomicrons 97–8, 100
properties 98
chyme 93
clinical trials 318
Clostridium botulinum 328
Clostridium perfringens 330
cobalamins 167–70
Codex Alimentarius Commission (CAC) 299–300
coding systems 262
coenzyme A (CoA) 178–9
coenzyme Q 187
cohort studies 318, 320–1
colon
bacteria 82–3
carbohydrate breakdown 79–84
colorectal cancer
prevention
butyrate 84
folate supplements 174–5
community nutrition, clinical roles 7
community trials 318
composite dishes, food composition calculations 287–8
congenital hyperthyroidism 224
cuconjugated fatty acid isomers 90
CONSORT guidelines 315
contaminants see bacterial contamination; chemicals affecting foods; viruses and foods
copper 212–17
daily requirements and sources 216–17
functions 213
deficiency conditions 213–14
enzyme components 181, 213, 214
genetic diseases 215–16
interactions 217
metabolism and absorption 213
nutritional status measures 216
supplements 111
toxicity 214–15
transport and tissue distribution 213
corneal conditions 140
coronary heart disease, fish oil supplementation 117–18
correlation 310
coxsackie viruses 334
creatine 53
creatinine 61
excretion 26–7
creatinism 224
Creutzfeldt-Jakob disease (CJD) 339–40
cross-sectional studies 318, 320
Cryptosporidium parvum 339
CT imaging, body composition analysis 21–2
cultural beliefs 8
cyanide 10
Cyclospora cayetanensis 339
cysteine 51, 52, 54, 61
cystic fibrosis 114
cystine 52
cytochrome C oxidase 214
daily nutrient recommendations see dietary reference standards
data accuracy and validity 247–8, 266–8, 305–6
data analysis 305–10
densitometry 16–18
dental caries
and fluoride 229–30
role of carbohydrates 84–5
depression, and food intake 35
desaturation processes 108–9
developing countries 353–5
impact of HIV/AIDS 355–7
infectious disease 355
nutrient deficiencies 354–5
obesity and NCDs 354
poverty and malnutrition 353–4
DHA see docosahexaenoate
diabetes 78, 351–3
and dyslipidemia 103
and vitamin D status 144
diet history information 259–60
see also nutritional status assessments
diet quality assessments 272
diet-induced disease see nutrition-related diseases
dietary assessment methods see nutritional status assessments
dietary data, accuracy and validity 247–8, 266–8
dietary fats 90, 92
digestion and absorption 92–8
nutritional and metabolic effects 112–14
see also lipids
dietary fiber 81–3, 116
intake levels 82
dietary patterns 294–5, 358–9
dietary reference standards 122–31
concepts and approaches 122–3
changes to 125
definitions and terminology 123–5
future studies 131
identification methods 128–31
animal experiments 130–4
balance studies 129
biochemical markers 130
biological markers 130
deprivation studies 128–9
factorial methods 129–30
radioactive tracer studies 129
tissue nutrient level measures 130
interpretation and uses 125–7
for population studies 127–8
digestion
carbohydrates 74–6
fats 92–8
food intake regulation 34
proteins 68–9
dihydrofolate reductase 172–3
dioxins 343
disaccharides 80
disease
body energy needs 44
evolutionary perspectives on diet 114
food-borne illnesses 325
disease (cont.)
global challenges 350–9
in developed countries 351–3
in developing countries 353–5
nutrient intake goals 352–3
docosahexaenoate 118
early brain development 114
dopamine 53
double labeled water (DLW) measures 39–40, 269
Down’s syndrome 216
dual-energy X-ray absorptiometry (DEXA) 18, 19–20
multicomartment models 20–1
dUMP suppression test 175–6
discussion 309
dyslipidemia 103

echovirus 334
ecological studies 318, 321
eicosanoids 109–11
eicosapentaenoic acid 117–18
elderly
energy requirements 42
height/weight measures 24
emulsification processes 92–3
emulsifiers 348
energy availability, carbohydrate metabolism 77
energy balance
concepts and definitions 31–2
components 32–3
future perspectives 47–8
in disease and trauma states 44
in infancy and childhood 42
in old age 42
in physically active individuals 43
in pregnancy and lactation 43
measures 268–71
energy expenditure 35–40
concepts and definitions 32–3, 35–6
historical aspects 36
influencing factors
physical activity 39
resting metabolic rate 37–8
thermic effects of feeding 38–9
measurement 36–7, 268–71
double labeled water (DLW) 39–40, 269
urinary nitrogen measures 268–9
energy intake 32, 33–5
dietary sources 33
influencing factors 34–5
regulation mechanisms 33–4
energy requirements 40–2
Entamoeba histolytica 339
enterohepatic circulation 95
environmental contaminants 10, 343–4
epidemiological designs 316–22
cross-sectional studies 320
experimental studies 316–19
non-experimental studies 319–20
error 246–7
recall problems 263–4
sources 260–2
essential fatty acid deficiencies 113–14
estrogen 103
ethics and nutrition studies 317
ethnology
BMI and body fat analysis 23
food patterns 291
Europe
food safety regulation 302–3
public health policies 303–4
European Food Safety Authority (EFSA) 302–3
exercise, and energy balance 43
experimental diets 314–15
Fanconi’s syndrome 199
fat-free mass (FFM), density calculations 17
fats see dietary fats; fatty acids; lipids
fatty acids
classification and terminology 87–90
dietary intake
effects on serum cholesterol 115–16, 119
imbalance of n-3 to n-6 117–18
trans fatty acids 113, 116
digestion and absorption 92–3
and colonic fermentation 83–4
metabolism
biosynthesis 105–6
desaturation 108–9
hydrogenation 109
ketogenesis and ketosis 107
oxidation 106–7
peroxidation 107–8
role of eicosanoids 109–11
nutritional and metabolic effects 112–14
deficiencies 113–14
impact of trans fats 113
storage 104–5
as body fat 104
whole body profiles 105
transport and circulation 95–8, 100–4
see also lipids
fermentation processes, colonic 82–3
ferroxidase 214
fiber
dietary 81–3
intake levels 82
field trials 318
fish
dietary fats 92, 117–18
parasites 338
poisoning 347
toxins 345–6
FIVIMS (Food Insecurity and Vulnerability Information and Mapping System) 6
flavins 155–8
flavonoids 291
flavor enhancers 348
fluoride 228–30
daily requirements and sources 230
functions 229
deficiency symptoms 229
metabolism and absorption 228–9
toxicity 229–30
folic acid 170–6
daily requirements 175
equivalents and viamers 170–1
functions 171–5
metabolism and absorption 171
tissue uptake 171
nutritional status assessment 175–6
food additives 10, 200, 346–7
regulation 299–300
Food and Agriculture Organization (FAO) 6
food classification systems 280
food composition data 262, 276–92
benefits and uses 277
criteria for inclusion 278
descriptions and classification of foods 278–9
sampling methods 279–81
data analysis methods 282–4
data quality 284
data sources 284–5
future studies 289–92
problems
bioavailability 286–7
composite recipes 287–8
food preparation effects 285–6
missing values 286
portion estimates 288
retrieval of data 288–9
food—nutrient data conversion 289
see also food labeling and profiling
food diaries 249–53
Food and Drug Administration (FDA) 279
food frequency questionnaires 256–9
food intake
assessments 272–3
of dietary adequacy 272
measures
choice of method 265–6
direct 244–60
evaluating data 271–2
indirect 239–44
sources of error 260–5
underreporting 271–2
validity and repeatability 266–71
regulation 33–5
appetite and satiety 33–4
central nervous system factors 34–5
circulatory factors 35
digestive factors 34
external signals 35
peripheral signals 35
thermic effects 38–9
food labeling and profiling 296, 297–8
food policy and regulation 293–304
base-line dietary patterns 294–5
making changes 295–6
communication and policy dissemination 296–8
nutrition claims 297
nutrition labeling 296–8
European agencies 301–4
UN and UN agencies 298–9
WHO/FAO and Codex Alimentarius 299–300
WTO sanitary measures and trade barriers 300–1
food preparation, nutrient losses 283–6
food processing, contaminants 344
food profiling 297–8
food safety 10, 324–49
assessments 273–4
concerns and contributing factors 324–7
bacterial pathogens 10, 327, 328–33
changing supply systems 324–5
chemical contaminants 340–6
emerging pathogens 326–7
food additives 346–7
food-borne illnesses 325–6
parasites 335–8
prion diseases (BSE/vCJD) 338–40
setting safe intake levels 341–2
toxins 344–6
virus contaminants 327, 334–5, 334
control programmes 348
European regulation 302–3
future studies 304, 348–9
surveillance systems 325
UN/UN agencies regulation 298–300
food sampling, for food composition tables 279–81
food supply
system changes 324–5
trade agreements and tariffs 300–1
food-borne illnesses 325
bacterial contamination 327, 328–33
economic consequences 326
emerging pathogens 326–7
parasite infections 335–8
surveillance 325
virus contamination 327, 334–5, 334
vulnerable groups 325
formiminoglutamate test (FIGLU) 175
fructooligosaccharides (FOSs) 82
fructose 75, 76–7, 79
functional foods 10, 82, 291, 296
fungicides 342–3
galactose 75–6
gene expression regulation
role of fatty acids 120
role of retinol 137
genetics, blood lipid metabolism 119–20
germanium 233–4, 236
ghrelin 35
Giardia intestinalis 339
glucose 36
absorption 75–6
metabolism 77
role of biotin 178
rate of uptake 76–7, 78
regulation 77–9
and diabetes 78
glucose-galactose malabsorption syndrome 76
glycosinolates 291
GLUT proteins 75–6
glutamate 51, 52, 56–7
glutamine 50, 51, 52, 56–7
glutathione 61
glycemic index (GI) 78–9, 186–7
glycine 51, 52, 54, 56–7
glycoalkoids 348
glycogen 77
glycolysis 77
glycosides 348
goitre 224
Graves' disease 225
growth, amino acid and protein needs 55, 62–3
gum arabic 116
hazardous substances 10
health status, and nutrition 4
heavy metals 10, 343–4
hemochromatosis 208
hepatitis E 334–5
hepatitis-A virus 327, 334
herbicides 342–3
high-density lipoproteins (HDL) 98–9
properties 98
reverse cholesterol transport 101–2, 102–3
histidine 51, 175–6
history of nutrition science 7–9
HIV/AIDS 355–7
nutrition needs 61, 357
homocysteine 53, 173–4
elevated levels 174
household surveys 243–4
expenditure data 243
food account methods 243–4
food inventory methods 244
food procurement data 244
Human Genome Project 50
human nutrition science see nutrition studies
hunger 33–4
hydrogenation processes 90, 92, 109
partial 92, 109, 113, 116
hydroxylases, and vitamin C 181–2
hypercalcemia 192
hypertension, and homocysteine levels 174
hyperthyroidism 225
hypocalcemia 195
hypokalemia 195
hypophosphatemia 199
hypothalamus 34–5
hypothesis testing 307
hypothyroidism 224, 225–6
in vitro studies 310–11
in vivo neutron activation analysis (IVNAA) 16
incidence, defined 322
industrial contaminants 343–5
industrial pollution 10
infants
energy requirements 42
and vitamin B6 165
and vitamin D 144–5
INFOODS (International Food Data System Project) (UN) 273, 279, 283–4, 290
informed consent 317
infrared interactance 25
inositol 186–7
insecticides 342–3
insulin 35
functions, lipoprotein metabolism 103, 104
intestinal flukes 336–7
iodine 223–6
daily requirements 225
food sources 225
functions 223–4
deficiency symptoms 224, 355

in vitro studies

in vivo studies

irradiation processes

iron 205–9, 355
daily requirements 208–9
food sources 208–9
functions 206–7
deficiency symptoms 207
genetic diseases 208
interactions 209
metabolism and absorption 205–6, 207
role of vitamin C 184–5
nutritional status measures 208
toxicity 207–8
transport and tissue distribution 205–6
isoflavones 291
isoleucine 51, 52

JECA (Joint FAO/WHO Expert Committee on Food Additives) 299–300
JEMRA (Joint FAO/WHO Meeting on Microbiological Risk Assessment) 299–300

Kaplan-Meier estimates 309
Kashan-Beck disease 218–19
Kayser-Fleischer rings 215
Keshan's disease 218–19
ketogenesis 107
ketosis 107
Kruskal-Wallis test 309
kynureninase 165–6

lactation, energy requirements 43
lactose 75
intolerance 75
LanguaL 279, 280, 283–4
lead 233–4, 236
toxicity 344
lecithin 90
leucine 317
leucovorin rescue 173
leukothenes 109–11
linoleate 104, 106, 108, 109, 113, 117, 118
deficiencies 114
lipemia, postprandial 97–8
lipids 86–120
background history 86–7
classification and types 87–91
circulating 98–104
fats and oils 90
hydrogenated and conjugated fatty acid isomers 90
long-chain saturated and monounsaturated fatty acids 89
medium- and short-chain fatty acids 88
milk and plasma lipids 105
phospholipids 90–1
polyunsaturated fatty acids (PUFAs) 89
saturated fatty acids 87–8
simple lipids 87
sterols 91
unsaturated fatty acids 87–8
Index

dietary intake 92
dietary sources 91–2
digestion and absorption 92–4
metabolism (long-chain fatty acids) 105–11
role of eicosanoids 109–11
solubilization 93–4
storage and deposition 96–8
body lipid pools 104–5
whole body fatty acid profiles 105
structural and cell membrane functions 90–1, 104
transport 95–8
HDL reverse cholesterol pathways 101–2, 102–3
LDL receptor pathways 100–1, 102–3
lipolysis 93
lipoprotein lipase (LPL) 98
lipoproteins 92
assembly and secretion 96–7
classification and distribution 98, 99
VLDLs 98–103
homeostasis 95, 100–3
structures and metabolism 95, 98–9
metabolic determinants 100
transfer pathways 99–100, 102–3
Listeria monocytogenes 330
lithium 233–4, 236
liver, cholesterol homeostasis 95, 100–3, 101, 102
liver flukes 336
long-chain fatty acids 89
dietary sources 92
metabolism
biosynthesis 105–6
carbon recycling 107
desaturation 108–9
hydrogenation 109
ketogenesis 107
oxidation 106–7
peroxidation 107–8
role of eicosanoids 109–11
nutritional regulation 111–12
low energy reporters (LERs) 270–1
low-density lipoproteins (LPLs) 98–103
hormonal control 103
influence of dietary fats 115–16
properties 98
receptor pathways 100–1, 102–3
lung flukes 337
lysine 52
mad cow disease 338–9
magnesium 194–7
daily requirements 196–7
food sources 197
functions 195
deficiency conditions 195–6
malaria, and riboflavin 157
malnutrition
global challenges and perspectives 5–7, 298–9, 357–9
and poverty 353–4
targets and initiatives 6, 298–300
UN/UN agency responses 298–9
manganese 226–7
Mann-Whitney U-test 309
meat
dietary fats 91–2
drug residues 343
overcooked 344
Mediterranean diet 116, 117
medium-chain fatty acids 88–9, 112
dietary sources 92
megoblastic anemia 175
memory, recall errors 263–4
menadiol 149–50
menaquinone 149–50
Menkes’ syndrome 215
mercury 344
meta-analysis 322
metabolic rates, at rest 37–8
methionine 51, 52
load test 165–6
metabolism 172, 173–4
methyl-folate trap 173–4
methylmalonic aciduria 170
microbial toxins 344–5
milk 193
sunlight exposure 155
milk lipids 105
Millenium Development Goals 6, 299, 358
minerals and trace elements 188–237
definitions 188
future study areas 232, 236–7
periodic table 189
ultratrace elements 232–6
molds and toxins 345
molybdenum 227–8
monosaccharides 75, 80
monounsaturated fatty acids (MUFAs) 89, 113, 116, 117
motor neuron disease 216
MRI techniques, body composition analysis 22
mRNA, protein synthesis 53
MUFAs see monounsaturated fatty acids (MUFAs)
mycotoxins 345
NCDs (non-communicable diseases) see nutrition-related diseases
nematodes 335–8
neurotransmitters, synthesis 51
niacin 158–62
classification and equivalents 159–60
daily requirements 162
availability 160
functions 161
deficiency conditions 161–2
metabolism and absorption 160–1
catabolism 160
urinary excretion 160–1
nutritional status assessment 162
toxicity 162
nickel 233, 235, 236
nicotinamide 159–60
nicotinic acid 159–60
night blindness 139
nitrogen
  biochemical precursors 60–1
  body requirements 60, 64
  protein synthesis 56–7
  sources 56–7
nitrogen cycles 56, 59, 59
nitrosamines 344
  and vitamin C 185
nonglycemic carbohydrates 79–84
  nonstarch polysaccharide (NSP) see dietary fiber
noroviruses 327, 334, 334
novel foods see functional foods
nutrient recommendations see dietary reference standards
nutrients
  dietary reference standards 122–31
  food composition data 262, 276–92
  labeling and profiling 296–8
  see also carbohydrates; lipids; minerals and trace elements; proteins; vitamins
nutrition claims 297
nutrition labeling 296
nutrition studies 1–10
  approaches 2
  conceptual frameworks 2–3
  development history 7–9
  disease risk associations 294
  global perspectives 5–7
  and health 4
  key study components 4–5
  reference points 293–4
research areas and challenges 9–10
research methodology 305–23
  experimental design and statistical analysis 305–10
  future studies 322–3
  use of animal models 311–14
  use in epidemiological studies 316–22
  use in human studies 314–16
  use of in vitro studies 310–11
  scientific theory vs clinical practice 7
  see also nutritional status assessments
nutrition-related diseases
  in developed countries 351–3
  in developing countries 354
  etiology 46
  health implications 103, 351–3
  role of physical activity 46–7
  observational studies 319–20
  oils 90
  oleate 104, 108, 113, 118
  oligosaccharides 75, 80, 82
  omega fatty acids see polyunsaturated fatty acids (PUFAs)
  ORAC database 291
  oral contraceptives, and vitamin B6 166–7
  ornithine 53–4
  osteomalacia 144–5
  oxidation processes, fatty acids 106–7
  oysters, pathogens 333
PAHs 344
Paleolithic diets 114
palmitate 104, 108
pancreas, blood glucose regulation 77–8
pantothenic acid 178–80
  non-nutritional uses 180
parasites 335–8
parathyroid hormone 144
  partially hydrogenated fatty acids 92, 109, 113, 116
  patulin 345
PCBs (polychlorinated biphenyls) 343
PDCAAS (protein digestability-corrected amino acid score) 69–70
pectin 116
pellagra 161–2
Pendred’s syndrome 225
periodic table 189
pernicious anemia 168, 169
peroxidation (auto-oxidation) 107–8
  pesticide residues 342–3
  pesticides 10
phenylalanine 51, 52
phospholipids 90–1, 104
phosphorus 197–200
  food sources 193–200
  genetic diseases 199
  homeostasis and absorption 197–8
  interactions 200
  nutritional status assessments 200
  tissue distribution 197–8
  toxicity 199
phyloquinone 149–50
phytate 346
phytostrogens 187
phytoceuticals 187
phytosterols 95
  food sources 92
plant proteins 70–1
plant sterols 91, 116, 291
plant toxins 346
plasma lipids
  overview 105, 118
  see also cholesterol; triacylglycerols (TAGs)
polioviruses 334
pollutants see chemicals affecting foods
polyhalogenated hydrocarbons (PHHs) 343–4
polysaccharides 75, 80
polyunsaturated fatty acids (PUFAs) 89
  basic functions 104
  deficiencies 113–14
  desaturation 108–9
  dietary intake 113
    impact on serum cholesterol 115–16, 119
    imbalances of n-3 to n-6 114, 117–18
    n-3 deficiencies 113–14
    nutrient—gene interactions 119–20
  hydrogenation 109
  nutritional and metabolic effects 113–14
    clinical importance 114
    nutritional regulation 111–12
    oxidation and peroxidation 107–8
  storage 104, 105
  pooled analysis 322
  pork, pathogens and parasites 333, 338
  portion size estimates 263, 288
  potassium 202–5
  body composition measures 19
    daily requirements 204–5
  food sources 204–5
    functions 203–4
    deficiency symptoms 204
    homeostasis and absorption 203
    interactions 205
    toxicity 204
    transport and tissue distribution 203
  poverty and malnutrition 353–4
  power calculations 307–8
  pregnancy
    and anticoagulants 151–2
    energy requirements 43
    and folate 174
  prion diseases 338–40
  processed foods, partial hydrogenation processes 92
  propionate 83–4
  prostaglandins 109–11
  proteins 49–72
    background and discovery 50–1
    biochemical roles 51
    amino acid functions 50
    biochemical structures 49
    biochemical synthesis and degradation 58–62
  body requirements 58–63, 64–5
    by age and physiological groups 58, 64–5
    dietary recommendations 63–5
    during illness and trauma 72
    estimation 63–5
    influencing factors 58, 71–2
    growth needs 55, 62–3
    metabolic needs 58–64
    over supply 61–2
  classification of amino acids 54–8
  deficiencies 355
  food sources 70–1
    and digestibility 68–9
    and nutritional quality 69–70
    worldwide availability 71, 355
  future considerations 72
  protozoa 338, 339
  public health nutrition 9–10
  role of nutritionists 7
  PUFAs see polyunsaturated fatty acids (PUFAs)
  puffer fish 347
  pyridoxines 162–4
  pyruvate 77
  quality of diets 272
  quasi-experiments 318
  questionnaires 256–9
  recipes, food composition calculations 287–8
  recommendations and standards see dietary reference standards
  records of food intake 248–53
  reference values for nutrients see dietary reference standards
  regional food differences 281–2
  reliability of data 306
  research methodology
    animal models 311–14
    in vitro studies 310–11
    statistical analysis 305–10
  residues 342–4
  resistant starch 81
  response bias 260–2
  resting metabolic rate (RMR) 37–8
  retinol 134, 135, 137
    see also vitamin A
  retinol binding protein (RBP) 137
  riboflavin see vitamin B2 (riboflavin)
rickets 144–5, 192
  rotaviruses 334
  rubidium 233, 235, 236
  salivary glands 75
  Salmonella 332
  salt intake trends 203
    see also sodium and chloride
  sample size calculations 308
  sampling bias 260
  satiety 34
  saturated fatty acids 89
    dietary sources 92
    nutritional and metabolic effects 112, 118
    and LDL cholesterol 119
  public health policies 296
  see also long-chain fatty acids
  SCFAs see short-chain fatty acids
  Schilling test 170
  scurvy 182–3
  seafood pathogens 332, 347
    toxins 345–6
  seed oils 91
  selenium 217–23
    daily requirements 220–1
    food sources 220–1
    functions 218
    deficiency conditions 218–20
    genetic diseases 220
    interactions 221–3
    metabolism and absorption 217–18
    nutritional status measures 220
    toxicity 220
    transport and tissue distribution 217–18
  selenoproteins 218, 219
  serine 51, 52
  sex hormones, functions, lipoprotein metabolism 103
  short-chain fatty acids (SCFAs) 83–4, 88
  absorption 83–4
  roles 83
silicon 233, 235, 236
Siri’s formula 16–17, 17
skeletal mass, measures 24
skinfold thickness measures 23–4
sodium and chloride 200–2
daily requirements 202
functions 201
deficiency symptoms 201
genetic diseases 202
homeostasis and absorption 200–1
intake trends 205
interactions 202
nutritional status assessments 202
in processed foods 205
intake trends 205
interactions 202
nutritional status assessments 202
in processed foods 205
toxin 10
soy beans 187
spina bifida 174
squalene 187
standards see Codex Alimentarius Commission (CAC); dietary reference standards
Staphylococcus aureus 329
starch
digestion 75, 80
resistant 81
starches, modified 82
starches, modified 82
statistical analysis 305–10
stearate 104, 108
stone-age diets 114
strontium 146
studies on food intake see nutritional status assessments
sucrase-isomaltase deficiency 75
sugar alcohols 80
surveillance systems 325
t-tests 309
tag names 283–4
TAGs see triacylglycerols
tannins 346
tapeworms 338
taurine 53, 187
teeth
dental caries 85–6
and fluoride 229–30
terpenes 187
testosterone 103
thiamin see vitamin B1 (thiamin)
threonine 52
thymidylate synthetase 172–3
thymidylate synthetase 172–3
thyroid hormones, and vitamin D 144
thyrotoxicosis 225
tin 233, 235, 236
total body electrical conductivity (TOBEC) 26
total body potassium (TBK) 19
total body water (TBW) 18–19
toxins 10, 344–6
bacterial 345
fungal 345
microbial 344–5
naturally occurring 346–7
seafood 345–6
Toxoplasma gondii 339
trace elements see minerals and trace elements
trade agreements and tariffs 300–1
traffic light system food profiling 297–8
trans fatty acids 107–8, 113, 116
transmissible spongiform encephalopathy (TSE) 338–40
triacylglycerols (TAGs) 90
dietary sources 91–2
functions 104
lipoprotein assembly 96–7
impact of n-3 PUFAs 119
postprandial lipemia 97–8
re-esterification 96
regulation of cholesterol deposition 103–4
impact of n-3 PUFAs 119
synthesis 104
trichinosis 338
triglycerides, dietary sources 91
tryptophan 51, 52, 159–62
load test 165
tyrosinate 214
tyrosine 51, 52
ubiquinone 187
ultrasound measurements 25
UNICEF (UN Children's Emergency Fund) 6, 299
United Nations (UN)
food and nutrition regulation 298–9
global challenges 358–9
nutrient recommendations 124–5
University Food and Nutrition Program INFOODS 273, 279
unsaturated fatty acids 87–8
partial hydrogenation 92
types 88–9
urea cycle enzymes 61
urea production 61–2
urinary nitrogen measures 268–9
validity
defined 305
of diet measures 267–71
valine 51, 52
vanadium 233, 235, 236
verotoxigenic Escherichia coli (VTEC) 331
very low-density lipoproteins (VLDL) 98–9
hormonal control 103
veterinary drug residues 343
Vibrio cholerae 332
Vibrio parahaemolyticus 332
Vibrio vulnificus 333
viruses and foods 327, 334–5, 334
astroviruses 334
emerging pathogens 325–6
hepatitis-A 327
noroviruses 327, 334
rotaviruses 334
vision
role of vitamin A 137, 138
and night blindness 139
vitamins 132–87
functions 132–3
deficiency conditions 132–3
future study areas 185–7
vitamin A 133–41
classification and units 134–5
daily reference levels 139
drug/nutrient interactions 141
    functions 137–9
    deficiency conditions 139
metabolism and storage 135
status assessments 139–40
teratogenicity 140–1
toxicity 140

vitamin B1 (thiamin) 152–5
daily requirements 154
    functions 153
    deficiency conditions 153–4
metabolism and absorption 153
status assessment 154–5

vitamin B2 (riboflavin) 155–8
daily requirements 157–8
    functions 156–7
    deficiency conditions 157
metabolism and absorption 155–6
homeostasis 156
and oxidative stress 157
nutrient/drug interactions 158
nutritional status assessments 158
photolytic destruction 155

vitamin B6 162–7
    classification and vitamers 162–3
daily requirements 164–5
    functions 164
    deficiency conditions 164
    non-nutritional uses 166–7
metabolism and absorption 163–4
nutritional status assessments 165–6
toxicity 167

vitamin B12 167–70
daily requirements 169
    functions 169
    deficiency conditions 169
metabolism and absorption 168–9
    and folate 174
nutritional status assessment 170
structure and vitamers 167–8

vitamin C 180–5
    classification and structures 180–1
daily requirements 183–4
benefits of high doses 184–5
functions 181–2
    deficiency conditions 182–3
    pro-and anti-oxidant roles 182
metabolism and absorption 181
nutritional status assessments 184
pharmacological uses 185
toxicity 185

vitamin D 141–6
    classification and units 141
daily recommendations 145
drug/nutrient interactions 145–6
    functions 144
    deficiency conditions 144–5
metabolism and absorption 141
to calcitriol 143
metabolites 143
regulation 143–4
synthesis (skin) 141–3
toxicity 145

vitamin E 146–9
classification and units 146
daily requirements 148
    high intake levels 149
functions 146–8
    deficiency conditions 148
metabolism and absorption 146
nutrient interactions 149
nutritional status assessment 148–9

vitamin K 149–52
dietary sources 149–50
functions 150–1
    deficiency conditions 152
metabolism and synthesis 149–50
toxicity and interactions 152

vitamin Q 187

waist-to-hip ratios 25
warfarin, contraindications, pregnancy 151–2
weight/height indices 22–3
Wernicke-Korsakoff syndrome 154
WHO (World Health Organization) 123–4
    food and nutrition regulation 298–300
nutrient intake goals (disease prevention) 352
WHO/FAO (World Health Organization/Food and Agriculture Organization) 6, 124, 299–300
Codex Alimentarius Commission (CAC) 299–300
Wilson’s disease 215
WTO (World Trade Organization), trade agreements and tariffs 301–2

X-linked hypophosphatemia 199
xerophthalmia 139

Yersinia enterocolitica 333

Zellweger’s syndrome 114
zinc 209–12
    daily requirements 211–12
food sources 211–12
functions 210
    deficiency symptoms 210–11, 355
    genetic diseases 211
interactions 212
metabolism and absorption 209–10
nutritional status measures 211
toxicity 211
transport and tissue distribution 209–10