

Index

Note: Page numbers followed by “f” indicate figures; “t” indicates tables and “b” refer to boxes’.

A

Acquired immunodeficiency syndrome, 95–96
 Acrylic polymers, 19–20
 Active pharmaceutical ingredients (APIs), 15–16, 125
 Additives, 24
 Aliphatic polyesters, 17–18, 17f, 18t
 Alternating magnetic field (AMF), 1–2
 Amorphous drug stabilization, 151
 drug-loaded
 dissolution and in vivo performance, 161
 physical stability, 160–161
 solvent-based loading techniques, 159
 solvent-free loading techniques, 159–160
 mesoporous materials, 153–154
 in drug delivery, 156
 monolayer *vs.* pore filling, 156–159
 structural characterization of mesoporous materials, 154–156
 Applicant and marketing authorization holder, 60
 Article 10a of Directive 2001/83/EC, 67
 Article 10b of Directive 2001/83/EEC, 68
 Article 10c of Directive 2001/83/EC, 68–69
 Article 107i of directive 2001/83/EC, 63
 Article 8(3) of Directive 2001/83/EC, 63–64
 Article 10(5) of Directive 2001/83/EC, 70–71
 Article 10 of Directive 2001/83/EC, 64–69
 Article 29 of Directive 2001/83/EC, 62

Article 30(1) of Directive 2001/83/EC, 62
 Article 30(2) of Directive 2001/83/EC, 62
 Article 31 of Directive 2001/83/EC, 62–63

B

Basket apparatus, 175–176
 Beneficial effects of drug, 168
 Bicontinuous microemulsions, 80
 Bioactive hybrid nanowires
 Bioadhesive mini-tablets, 130
 Bioadhesive vaginal mini-tablets, 130–131
 Bioavailability, 170–171, 173
 assessment protocol, 173–174
 assessments, 170–174
 of drug, 173
 Biocompatible surfactants, 110
 Bioequivalence assessments, 174–175
 Biopharmaceutical classification system (BCS), 105–107, 106f
 Biphasic mini-tablets, 131
 Bottom-up methods, 221

C

Caelyx, 208–209
 Cancer therapy, 94–95
 Capsules, mini-tablets into, 135–137
 Cationic antimicrobial peptides, 145
 Celecoxib (CXB), 146
 Cellular lysis, 4–6
 Cellulose ethers and esters, 18–19, 19f
 Chemotherapeutic agents as PIPAC, 208–209
 Cisplatin, 208
 Combination therapy, 10, 125
 Committee for Advanced Therapies (CAT), 51–52

Committee for Medicinal Products for Human Use (CHMP), 48–49
 Committee for Medicinal Products for Veterinary Use (CVMP), 49–50
 Committee for Orphan Medicinal Products (COMP), 50
 Committee on Herbal Medicinal Products (HMPC), 50–51
 Common technical document (CTD), 64, 64f
 Continuous liquid interface production (CLIP), 26–27
 Contract manufacturing organizations (CMOs), 215–217
 Convolution technique, 179
 Coordination group for mutual recognition and decentralised procedures–human (CMDh), 53
 Critical micellar concentration (CMC), 115–116
 Critical quality attributes (CQAs), 215–217
 Cubic phases, 144
 Curcumin, 96
 Customized delivery, 124–125
 Cytostatic drugs, 198

D

Deconvolution, 179
 Design of experiments (DoE), 219
 Digital light processing (DLP), 26
 Direct compression, 131
 Directorates-General (DGs), 46
 Dissolution media, 177
 3D material extrusion-fused filament fabrication, 29–31, 30f
 Doxorubicin, 208
 3D-printed pharmaceutical dosage forms, 15–16

- 3D-printed pharmaceutical dosage forms (*Continued*)
 active pharmaceutical ingredients (APIs), 15–16
 3D material extrusion-fused filament fabrication, 29–31, 30f
 3DP technology, 24–31
 Drug assessment, drug product *vs.*, 181–182
 Drug concentration, 159
 Drug development, 78
 Drug dissolution
 apparatuses and experimental conditions, 189–190
 testing, 175–178, 190–191
 Drug-loaded mesoporous materials
 dissolution and *in vivo* performance, 161
 physical stability, 160–161
 Drug product
 development, 15–16
 testing, 175
vs. drug assessment, 181–182
 Drug therapy of peritoneal metastasis, 198–199
 Drug uptake
 into peritoneal nodes, 200
 physical interventions to increase, 203
 Dry granulation, 131–132
- E**
 Electrostatic precipitation devices, 206–207
 Electrostatic precipitation
 pressurized intraperitoneal aerosol chemotherapy (ePIPAC), 206–207, 207b
 Elimination rate constant, 170
 Enhanced Mechanical Calibration, 187
 Ethosomes, 89
 Eudragit polymers, 19–20
 EudraLex, 56
 EU regulatory affairs, 45–46
 legal framework for licensing medicines, 53–74
 application types, 63–69
 data exclusivity and market protection, 69–71
 Directive 2001/83/EC, 54–55
 EudraLex, 56
 extensions, 74
- marketing authorization procedures, 60–61
 pediatric requirements for medicinal products, 61–62
 Regulation (EC) No. 726/2004, 55
 union referrals, 62–63
 variations and extensions, 71–73
 Volume 2A, 56–60
 legal framework, hierarchy, and committees, 46–53
 consumers, health, agriculture and food executive agency, 46
 coordination groups, 53
 departments and agencies, 46
 European commission, 46
 European medicines agency, 47–52
 European Union, 46
 health and food safety department, 47
 European commission, 46
 European medicines agency, 47–52
 European Medicines Agency (EMA), 218–219
 “European reference medicinal product”, 65–66
 European Union, 46
- F**
 “First-pass” effect, 173
 Flow-through apparatus, 176
 Food and Drug Administration (FDA)-approved nanopharmaceuticals, 105, 106f
 Freeze drying, 223
 Fused deposition modeling (FDM) printing process, 15–16
 Fused filament fabrication (FFF), 29
- G**
 Gastroretentive mini-tablets, 129
 Global marketing authorization, 57–58, 70–71
 Good Manufacturing Practices (GMP) compliance, 224–226
 Granulation, 223
- H**
 High-pressure homogenization, 220
 Hot melt extrusion (HME), 132
 formulation, 16
 Human immunodeficiency virus, 95–96
 “Human pharmacology”, 78
- Hyaluronidases, 203
 Hyperthermia, 1
 Hyperthermic intraperitoneal chemotherapy (HIPEC), 199
- I**
 Ideal intraperitoneal drug delivery system, 204, 204t
 Independent national procedures, 61
 In-process controls (IPCs), 217–218
 In silico modeling, 210
 Interstitial intratumoral fluid pressure, 198
 Intraperitoneal chemotherapy, 200–202, 202t
 limitations of, 199, 199t
 tissue drug uptake during, 200, 200t
 Intraperitoneal drug delivery, 197–198
 chemotherapeutic agents as PIPAC, 208–209
 drug therapy of peritoneal metastasis, 198–199
 drug uptake into peritoneal nodes, 200
 electrostatic precipitation
 pressurized intraperitoneal aerosol chemotherapy (ePIPAC), 206–207, 207b
 ideal intraperitoneal drug delivery system, 204
 interstitial intratumoral fluid pressure, 198
 intraperitoneal chemotherapy, 200–202, 202t
 limitations of intraperitoneal chemotherapy, 199, 199t
 peritoneal aerosol medicine, 204–205
 pharmacological interventions to increase drug uptake, 202–203
 physical interventions to increase drug uptake, 203
 PIPAC with systemic hemotherapy, 209–210
 poor vascularization of peritoneum, 198
 preclinical studies, 209
 pressurized intraperitoneal aerosol chemotherapy, 205–206
 role of formulation, 203
 in silico modeling, 210
 computational modeling for, 187
 Irinotecan, 209

L

Licensing medicines, legal framework for, 53–74
 Liposome-based products, 90t–93t
 Liposomes, 87
 Liquid crystalline drug delivery systems, 141–144
 applications of, 145–147
 characterization of, 144–145
 preparation of, 144
 Low-molecular-weight compounds, 201
 Lyotropic liquid crystalline systems, 143, 143t

M

Magnetic nanoparticles, 2–3
 Magnetic segmented nanowires, 2
 Marketing authorizations, 56, 58–59
 Medicinal product, 59
 Melfil, 22
 Mesophases, 141–142
 Mesoporous materials, 153–154
 in drug delivery, 156
 Micro- and nanodrug delivery systems, 77–78
 micro- and nanoparticles in drug delivery
 nonvesicular drug delivery systems, 80–87
 vesicular drug delivery systems, 87–94
 nanotechnology-based products, 96–99
 outline of drug development, 78
 Microemulsion-based products, 81t–82t
 Microemulsions, 80
 Micropharmaceutical drug delivery systems, 215, 216t–217t
 Microsphere-based products, 88t–89t
 Milling, 220
 Mini-tablets
 into capsules, 135–137
 coating of, 133
 fluidized-bed coating of, 133–134
 marketed, 126
 novel coating technology for, 134–135
 packaging of, 135
 pan coating of, 134
 into sachets, unit-dose packing of, 137–138
 types of, 128–131
 Mutual recognition procedure, 61

N

Nab-paclitaxel, 208
 Nanoemulsions, 80
 Nanomedicine applications, 215
 Nanomicelles, 115–117
 Nanoparticulate treatments for oral delivery, 103–104
 challenges, 118–120
 nanomicelles, 115–117
 nanosuspensions, 117–118
 polymeric nanoparticles (PNs), 114–115
 solid lipid nanoparticles, 110–114
 nanotechnology in oral solid dosage forms, 104–109
 Nanoprecipitation, 221
 Nanostructured lipidic carriers (NLCs), 84–85
 Nanosuspensions, 117–118
 Nanotechnology-based products, 96–99
 Nanotechnology in oral solid dosage forms, 104–109
 bioavailability enhancement, 105–107
 improved physiological stability, 109
 targeting specific regions of physiology, 108–109
 NanoVelcro, 6–7
 Nanowires, 2
 National authorization, 56–57
 Neovascularization, 201
 Niosomes, 94
 Nonvesicular drug delivery systems, 80–87
 Novel polymers in market, 22–24
 Noyes–Whitney equation, 105–107
 Nutraceuticals delivery, 96

O

Ocular mini-tablets, 130
 Omega-3-fatty acids, 96
 Oral delivery, nanoparticulate treatments for, 103–104
 challenges, 118–120
 formulation perspectives, 109
 Oral dispersible tablets (ODTs), 129
 Orally disintegrating mini-tablets (ODMTs), 126
 Oral solid dosage forms, nanotechnology in, 104–109
 bioavailability enhancement, 105–107

improved physiological stability, 109
 targeting specific regions of physiology, 108–109
 Ordered micelles, 142
 Oxaliplatin, 208

P

Paclitaxel, 209
 Paddle apparatus, 175
 Paediatric Committee (PDCO), 52
 Parenteral formulations, 222–223
 Pediatric investigation plans (PIPs), 52
 Pediatric mini-tablets, 128–129
 Pegylated liposomal doxorubicin (PLD), 208–209
 Pellet formulations, 136, 136t
 Peritoneal aerosol medicine, 204–205
 Peritoneal metastasis, drug therapy of, 198–199
 Peritoneal nodes, drug uptake into, 200
 Peritoneum, 198
 Pharmaceutical drug delivery systems
 GMP compliance, 224–226
 micropharmaceutical drug delivery systems, 215, 216t–217t
 nanomanufacturing, 215
 scalability, 219–221
 bottom-up methods, 221
 top-down methods, 220–221
 sustainability, 221–224
 downstreaming for parenteral formulations, 222–223
 downstreaming for solid dosage formulations, 223–224
 Pharmacovigilance risk assessment committee (PRAC), 49
 pH-responsive mini-tablets, 131
 Poly(caprolactone) (PCL), 18
 Polyether ether ketone (PEEK), 22–24
 Poly-ether imide (PEI), 22–24
 Polymeric microparticles, 86–87
 Polymeric nanoparticles, 85–86
 Polymer nanoparticle drugs, 116t
 Polymethacrylates, 19–20
 Poly(DL-lactide-co-glycolide) (PLGA) nanoparticles, 109
 Polyvinyl alcohol (PVA) polymers, 20–21
 Pore filling, monolayer *versus*, 156–159

Powder bed fusion processes,
27–28
 powder binding technology, 28
 selective laser sintering process/
 laser sintering process, 27–28
Pressurized intraperitoneal aerosol
 chemotherapy (PIPAC),
 205–206
Pseudomyxoma peritonei
 (PMP), 198
Purification, 222

Q

Quality assessment, 181–187

R

Reference medicinal product, 64–65
Roller compactor/chilsonator,
 131–132

S

Salting out method, 221
Scalability, 219–221
 bottom-up methods, 221
 top-down methods, 220–221
Semiconductor nanowires, 7–8
siDNA, 209
Silicon nanowire-based electrical
 cell, 7
Silicon nanowire biosensors, 7
siRNA, 209
Smart mini-tablet dispenser system,
 127f
Solid dosage formulations, 130
 downstreaming for, 223–224
Solid lipid nanoparticles (SLNs),
 83–84, 109–114, 116t

 hot/cold homogenization, 112
 hot melt extrusion, 111
 microemulsion, 113
 production, 113f
 solvent emulsification/evaporation,
 111–112, 112f
 supercritical fluid, 113–114
Solution/liquid/solid method, 4
Solvent-based loading techniques, 159
Solvent-free loading techniques,
 159–160
Spray drying, 224
Stereolithography apparatus, 25–26
Sterilization, 223
Streptococcus mutans, 145
Supercritical fluid technology, 221
Surface-modified nanoparticles,
 108–109
Sustainability, 221–224
 downstreaming for
 parenteral formulations,
 222–223
 solid dosage formulations,
 223–224
Systemic circulation, 168–169
Systemic hemotherapy, PIPAC with,
 209–210

T

Therapeutic aerosols, 204
Thermoplastic polymers, 19
Thermoplastic polyurethanes
 (TPUs), 22
Thermotropic liquid crystalline
 drugs, 142, 142f–143f

Tissue drug uptake during
 intraperitoneal chemotherapy,
 200, 200t

Top-down methods, 220–221

Traditional dead-end filtration
 methods, 222

Transfersomes, 87

U

Ultrasound-powered nanowire
 motors, 9

Union authorizations, 57

Union referrals, 62–63

V

Vat photopolymerization, 25
 continuous liquid interface
 production (CLIP), 26–27
 digital light processing (DLP), 26
 stereolithography apparatus, 25–26
Vesicular drug delivery systems,
 87–94

Vinyl polymers, 20, 23f, 23t–24t
 additives, 24
 3DP technology, 24–31
 novel polymers in market, 22–24
Vitamin B₁₂, 168

W

Wet granulation, 132
Wet milling process, 108f
Würster coating, 133–134

Z

Zoning process, 37