Drug pipeline: 1Q16

Laura DeFrancesco

There have been only a smattering of approvals since the start of the year. Zarxio, the first US biosimilar, was approved by the US Food and Drug Administration (FDA), and the European Medicines Agency (EMA) added to its biosimilar approvals. As *Nature Biotechnology* went to press,

Historic US regulatory approvals by drug class

Although 2015 witnessed a high number of approvals, 2016 has been slow out of the gate.

*New molecular entity (NME) class includes mainly small-molecule drugs, but also steroid, synthetic peptide, and mixed compounds, excluding non-NME and new formulation. *Partial year to March 31. Source: US Food and Drug Administration (FDA) (<http://www.fda.gov>).

Notable clinical trial results (1Q16)

Drug/company	Indication	Summary
Anamorelin/Helsinn Healthcare	Cachexia/weight loss	2/19/2016. Phase 3 randomized, double-blind placebo controlled trial of small-molecule ghrelin mimetic showed improvement in lean muscle mass in lung cancer (<i>Lancet Oncol.</i> 17 , 519–531, 2016)
Caplacizumab/Ablynx	Thrombotic thrombocytopenic purpura	2/11/2016. In phase 2 trial, bivalent humanized derivative of recombinant llama nanobody against von Willebrand factor induced faster resolution of acute episode (<i>N. Engl. J. Med.</i> 374 , 511–522, 2016)
Solithromycin/Cempra	Community-acquired pneumonia	2/5/2016. Phase 3 trial of fluoroketolide macrolide (binds three rather than two ribosomal sites) was non-inferior to moxifloxacin, indicating possible return to monotherapy (<i>Lancet Infect. Dis.</i> 4 , 421–430, 2016)
SER-109/Seres	<i>Clostridium difficile</i> -associated diarrheal infection	2/8/2016. In phase 2b, placebo-controlled single-arm trial of an encapsulated purified suspension of <i>Firmicute</i> eubacterial spores, 97% of patients had clinical cure (<i>J. Infectious Dis.</i> 2016. doi:10.1093/infdis/jiv766)
Apabetalone/Resverlogix	Dyslipidemia/hypercholesterolemia	1/25/2016. In two phase 2b randomized, double blind, placebo-controlled trials, a bromodomain inhibitor increased high-density lipoprotein and ApoA-1 and repressed cardiovascular disease pathways (<i>Atherosclerosis</i> 247 , 48–57, 2016)

Source: BioMedTracker, a service of Sagient Research (<http://www.biomedtracker.com/>)

Notable upcoming regulatory decisions

Drug/company	Indication	Drug information
Etanercept/Sandoz-Novartis	Psoriasis, rheumatoid arthritis, ankylosing spondylitis, psoriatic arthritis	5/19/2016. FDA PDUFA date for biosimilar of Amgen's Enbrel
CSL627/CSL	Hemophilia A	5/13/2016. FDA PDUFA date for single-chain human recombinant factor VIII
Venetoclax/AbbVie	Chronic lymphocytic leukemia	6/20/2016. FDA PDUFA date for small-molecule BCL-2 inhibitor acting as selective inhibitor BCL-2
Lyxumia (lixisenatide)/Sanofi	Diabetes mellitus type II	5/24/2016. FDA advisory panel for exen-4(1–39) modified with six lysine residues at C-terminus that confer resistance to dipeptidyl peptidase IV, extending half-life
Biosimilar infliximab/Sandoz	Psoriatic arthritis, ankylosing spondylitis, ulcerative colitis, Crohn's disease, psoriasis, rheumatoid arthritis	6/30/2016. EMA decision for biosimilar of Janssen Biotech's Remicade (chimeric IgG1kappa mAb against TNF alpha)

Source: BioMedTracker, a service of Sagient Research (<http://www.biomedtracker.com/>)

FDA was considering accelerated approval for Sarepta's eteplirsen for muscular dystrophy. Earlier, the US agency turned down PTC Therapeutics' Translarna (ataluren) and Biomarin's Kyndrisa (drisapersen) for the same indication, whereas the EMA gave the former conditional approval.

Notable regulatory approvals (1Q16)^a

Drug/company	Indication	Drug information
Idelvion (albutrepenonacog alfa)/CSL	Hemophilia B	3/4/2016. FDA approved first fusion of recombinant coagulation factor IX with albumin with extended half-life
Anthem (oblitoximab)/Elysus Therapeutics	Anthrax infection (inhalation)	3/18/2016. FDA approved deimmunized (T cell epitope depleted) humanized chimeric IgG1 mAb against <i>Bacillus anthracis</i> protective antigen
Taltz (ixekizumab)/Eli Lilly	Psoriasis	3/22/2016. FDA approved humanized IgG4 mAb against IL-17 receptor A
Cinqair (reslizumab)/Teva	Asthma	3/23/2016. FDA approved humanized IgG4 mAb targeting IL-5
Briviact (brivaracetam)/UCB	Partial seizures	2/18/2016. FDA approved small-molecule antagonist of SV2A synaptic vesicle protein and sodium channels
Defitelio (defibrotide)/Jazz Pharmaceuticals	Sinusoidal obstruction syndrome	3/20/2016. FDA approved sodium salt of mixed single-stranded DNA oligos derived from porcine mucosa that modulate prostacyclin, prostaglandin E2, thrombomodulin and tissue plasminogen activator, thrombin, tissue factor, and endothelin
Etanercept/Samsung	Rheumatoid arthritis, ankylosing spondylitis, psoriasis, psoriatic arthritis	1/18/2016. EMA approved biosimilar for Amgen's Enbrel (fusion of Fc portion of IgG with tumor necrosis factor alpha receptor)
Zarxio (filgrastim)/Sandoz	Neutropenia/leukopenia	3/16/2016. FDA approved first biosimilar for Amgen's Neupogen (recombinant human granulocyte colony stimulating factor)

^aA list of breakthrough drugs is provided in **Supplementary Table 1**. Source: BioMedTracker, a service of Sagient Research (<http://www.biomedtracker.com/>)

Notable setbacks (Q1 2016)

Drug/company	Indication	Summary
Kyndrisa (drisapersen)/BioMarin	Muscular dystrophy	1/14/2016. FDA issued complete response letter due to lack of efficacy for 2'-O-methyl phosphorothioate antisense oligo that skips exon 51 of dystrophin gene
Translarna (ataluren)/PTC Therapeutics	Muscular dystrophy	2/22/2016. FDA issued failure to file letter due to lack of efficacy for small molecule that allows ribosomes to read through stop codons
Pacritinib/CTI Biopharma	Myelofibrosis	2/10/2016. The company withdrew its NDA for ATP-mimetic inhibitor of JAK2 and Fli3 after the FDA put the phase 3 trial on clinical hold due to patient deaths
TNX-201/Tonix	Migraine and other headaches	2/16/2016. Phase 2 trial suspended of mucate salt of dexisometheptene ((R)-isometheptene, (R)-IMH) agonist of imidazoline receptor due to failure to meet primary endpoint
Surotomylin/Merck (Cubist)	<i>Clostridium difficile</i> -associated diarrheal infection	2/26/2016. Phase 3 suspended for this lipopeptide antibiotic due to unfavorable efficacy data
Rintega (rindopepimut)/CellDex	Brain cancer	3/7/2016. Phase 3 trial suspended of vaccine with peptide from a tumor-specific splice variant (EGFRvIII) of the epidermal growth factor receptor, due to lack of survival benefit
Remune/Response BioPharma	AIDS	2/13/2016. FDA issued a complete response letter for irradiated HIV strain HZ321 (expressing clade A env and clade G Gag) vaccine
MCNA/Telesta	Bladder cancer (refractory to Bacillus Calmette-Guerin therapy)	2/2/2016. FDA issued a complete response letter requiring additional phase 3 data for this <i>Mycobacterium phlei</i> cell wall-ribonucleic acid mixture obtained by high-pressure bacterial homogenization and centrifugation

mAb, monoclonal antibody; EMA, European Medicines Agency. NDA, New drug application. Source: BioMedTracker, a service of Sagient Research (<http://www.biomedtracker.com/>).

Note: Any Supplementary Information and Source Data files are available in the online version of the paper (doi:10.1038/nbt.3571).

Laura DeFrancesco is Senior Editor at *Nature Biotechnology*.