Oncology approvals in 2020: a year of firsts in the midst of a pandemic

Laleh Amiri-Kordestani[1] ✉ *and Richard Pazdur*[1,2]

In 2020, despite challenges related to the COVID-19 pandemic, the US FDA approved 30 new drugs and biologic agents, 45 supplemental drug and biologic applications and 1 biosimilar application in oncology.

> the FDA made several approvals aimed at reducing the frequency of interactions between patients with cancer and their health-care providers

To limit potential exposure to SARS-CoV-2, in 2020 the FDA made several approvals aimed at reducing the frequency of interactions between patients with cancer and their health-care providers (Supplementary Table 1). These approaches included increasing dosing intervals, such as that for pembrolizumab (which was extended from 3 weeks to 6 weeks), and adopting oral or subcutaneous formulations of already approved drugs. New formulations approved in 2020 included three different intravenous dosing regimens of atezolizumab, the first oral tablet combining decitabine plus cedazuridine, a subcutaneously injectable combination of daratumumab plus hyaluronidase-fihj, and a fixed-dose combination of pertuzumab, trastuzumab and hyaluronidase–zzxf. Both subcutaneous combinations can be administered in the outpatient setting or the patient's home by health-care professionals.

In 2020, several targeted therapies were approved concurrently with companion diagnostics. These agents included osimertinib, as the first adjuvant therapy approved for patients with non-small-cell lung cancer (NSCLC) harbouring mutations in *EGFR*; capmatinib, as the first FDA-approved drug for patients with metastatic NSCLC harbouring *MET* exon 14 mutations; and pemigatinib, as the first targeted therapy for previously treated patients with advanced-stage cholangiocarcinoma harbouring *FGFR2* fusions.

Other approval 'firsts' this year included relugolix, the first oral androgen-deprivation therapy for advanced-stage prostate cancer; sacituzumab govitecan-hziy, the first antibody–drug conjugate (ADC) targeting Trop-2 for metastatic triple-negative breast cancer; mitomycin gel for low-grade upper tract urothelial cancer; selumetinib for paediatric patients with neurofibromatosis type 1 with inoperable symptomatic plexiform neurofibromas; avapritinib for metastatic gastrointestinal stromal tumours harbouring *PDGFRA* exon 18 mutations; and tazemetostat for metastatic epithelioid sarcoma. Selpercatinib was the first agent approved to treat NSCLC, medullary thyroid cancer and other thyroid cancers harbouring *RET* alterations. Finally, pembrolizumab was the first immune-checkpoint inhibitor approved for first-line treatment of patients with metastatic microsatellite instability-high or mismatch repair-deficient colorectal cancer, and brexucabtagene autoleucel became the first chimeric antigen receptor T cell therapy approved for mantle cell lymphoma.

In 2020, tucatinib, in combination with trastuzumab and capecitabine for patients with metastatic HER2-positive breast cancer (including those with brain metastases), was the first new molecular entity reviewed under the Oncology Center of Excellence (OCE) Project Orbis[1]. This project provides a framework for concurrent submission and review of oncology drugs among international partners, with the goal of providing patients faster access to drugs in countries in which substantial delays in drug application submission and review might occur[2]. The FDA is the primary coordinator for drug application selection and review in this programme, although each country remains completely independent with regard to their final regulatory decision and drug labelling. The FDA, the Australian Therapeutic Goods Administration, Health Canada, Health Sciences Authority (Singapore) and Swissmedic (Switzerland) collaborated on the application review for tucatinib. In May 2020, the FDA also welcomed the Brazilian Health Regulatory Agency (ANVISA) to join this international partnership. Over the course of 2020, Project Orbis led to 17 new molecular entity or new active substance approvals and 32 supplemental drug approvals for new indications.

In 2020, the FDA also approved two new molecular entities for multiple myeloma. Isatuximab-irfc, a CD38-directed antibody with cytolytic activity in combination with pomalidomide and dexamethasone, was approved for patients who had received ≥2 lines of therapy, including lenalidomide and a proteasome inhibitor. Belantamab mafodotin, a BCMA-directed ADC with a microtubule inhibitor payload, was approved for those who had received ≥4 lines of therapy, including an anti-CD38 monoclonal antibody, a proteasome inhibitor and an immunomodulatory agent.

The OCE issued nine new draft guidances in 2020, providing recommendations to drug developers on topics including greater inclusion of older adults in clinical trials

[1]*Office of Oncologic Diseases, Center for Drug Evaluation and Research, US Food and Drug Administration, Silver Spring, MD, USA.*

[2]*Oncology Center of Excellence, US Food and Drug Administration, Silver Spring, MD, USA.*

✉*e-mail: Laleh.AmiriKordestani@fda.hhs.gov*

https://doi.org/10.1038/s41571-021-00477-1

> Despite the global COVID-19 pandemic, 2020 was an active year for the OCE

and considerations for therapeutic development in acute myeloid leukemia, central nervous system malignancies, bladder and renal cell carcinoma, and premenopausal breast cancer — all areas with unmet needs[3]. In addition, nine final guidances were issued in 2020, including a set of recommendations to encourage broadening clinical trial eligibility criteria to patients with brain metastases, organ dysfunction, prior malignancies, HIV, or hepatitis B or C that were drafted in 2019 (REF.[3]).

In 2020, the OCE initiated Project Patient Voice, a web-based source of public information describing patient-reported outcomes (PROs) from oncology trials of marketed treatments[4]. Although the FDA analyses PRO-related data during the drug approval process, this information is rarely included in product labels and has, therefore, been largely inaccessible to the public. The OCE also started Project Equity[5] and Project Silver[6], initiatives that aim to increase enrolment of patients from minority and geriatric populations, respectively, in oncology clinical trials to improve the generation of evidence related to these patients. Lastly, Project Post COVIDity was launched to collect real-world data to provide more evidence-based information on and thus better characterize the outcomes of patients with cancer who develop COVID-19, as these patients might be excluded from cancer clinical trials.

Despite the global COVID-19 pandemic, 2020 was an active year for the OCE. In 2021, the OCE is engaging in Project 2025, an effort to envision the next 5 years in oncology drug development and leverage our resources and talents to improve collaboration with stakeholders to move the field forward as quickly as possible.

1. U.S. Food and Drug Administration. FDA News Release: FDA approves first new drug under international collaboration, a treatment option for patients with HER2-positive metastatic breast cancer. *fda.gov* https://www.fda.gov/news-events/press-announcements/fda-approves-first-new-drug-under-international-collaboration-treatment-option-patients-her2 (2020).
2. de Claro, R. A. et al. Project Orbis: Global Collaborative Review Program. *Clin. Cancer Res.* **26**, 6412–6416 (2020).
3. U.S. Food and Drug Administration. Oncology center of excellence guidance documents. *fda.gov* https://www.fda.gov/about-fda/oncology-center-excellence/oncology-center-excellence-guidance-documents (2020).
4. U.S. Food and Drug Administration. Project patient voice. *fda.gov* https://www.fda.gov/about-fda/oncology-center-excellence/project-patient-voice (2020).
5. Cavallo J. Efforts to broaden eligibility criteria for clinical trials seek to include more racial and ethnic minority patients: a conversation with Lola A. Fashoyin-Aje, MD, MPH. *The ASCO Post* https://ascopost.com/issues/september-25-2020/efforts-to-broaden-eligibility-criteria-for-clinical-trials-seek-to-include-more-racial-and-ethnic-minority-patients/ (2020).
6. Kanesvaran, R., Mohile, S., Soto-Perez-de-Celis, E. & Singh, H. The globalization of geriatric oncology: from data to practice. *Am. Soc. Clin. Oncol. Educ. Book* **40**, 1–9 (2020).

Acknowledgements
The authors would like to thank Kirsten B. Goldberg for her assistance with writing this manuscript.

Competing interests
The authors declare no competing interests.

Supplementary information
The online version contains supplementary material available at https://doi.org/10.1038/s41571-021-00477-1.

RELATED LINKS
US Food and Drug Administration Drugs@FDA: https://www.accessdata.fda.gov/scripts/cder/daf/
US Food and Drug Administration Hematology-Oncology Approvals & Safety Notifications: https://www.fda.gov/OncApprovals
US Food and Drug Administration Oncology Center of Excellence: https://www.fda.gov/OCE
US Food and Drug Administration Project Orbis: https://www.fda.gov/about-fda/oncology-center-excellence/project-orbis