U.S. FOOD & DRUG ADMINISTRATION

Oncology Center of Excellence

2018 Annual Report

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***Corrected Version (March 27, 2019)**:*
This report has been updated from a previous version as follows: On page 7, a sentence on OCE pilot programs was corrected to re lect 2018 approvals that used the RTOR and AAid pilot programs.

DIRECTOR'S MESSAGE

The FDA Oncology Center of Excellence,

authorized by the 21st Century Cures Act, was established in January 2017 to help facilitate the development and clinical review of anti-cancer therapies by uniting scientific experts across the Agency's product centers to conduct expedited review of drugs, biologics, and devices.

In the two years since its formation, the OCE has collaborated with FDA's medical product centers to expedite many important clinical reviews, including the first two chimeric antigen receptor T-cell therapies for the treatment of advanced hematologic malignancies, and the first approvals of site-agnostic indications. The OCE also created two pilot programs to improve the process of evaluating data and evidence to generate a benefit-risk assessment which informs regulatory decisions: the Real-Time Oncology Review and the Assessment Aid. Our experts have led the development of 12 guidance documents on important aspects of oncology and malignant hematology product development.

In 2018, we established a core OCE management team and continued the work begun in 2017 of building programs and launching initiatives to leverage expertise across the FDA and other Federal health agencies, as well as academia, community practitioners, and industry, to advance the development and regulation of products for people with cancer.

To be effective, we must collaborate with our stakeholders to develop discussions that will have an impact on product regulation. In the past two years, we held more than 60 symposiums bringing academics and key therapeutic leaders to the FDA. We also held two workshops for patient advocates to discuss the important role they can play in oncology product development. Often these conferences were conducted jointly with oncology professional societies, patient groups, and leading cancer centers. By emphasizing external outreach and the academic development of our staff, the OCE can create a dynamic regulatory environment responsive to rapidly emerging scientific advances.

Richard Pazdur, MD

Richard Pazdur MD

Director, Oncology Center of Excellence

ABOUT THE ONCOLOGY CENTER OF EXCELLENCE

FDA U.S. FOOD & DRUG ADMINISTRATION
ONCOLOGY CENTER OF EXCELLENCE

The FDA Oncology Center of Excellence (OCE) is the agency's first Inter-center Institute.

Under the Cures Act,
the purpose of an Inter-center Institute is to coordinate activities among FDA Centers applicable to a major disease area, including coordinating staff, streamlining review activities, promoting scientific programs, recruiting and developing staff, and facilitating collaborative relationships within the Department of Health and Human Services.

The OCE has a clear role in advancing the emerging and evolving fields of precision oncology, patient-focused drug development, immuno-oncology, pediatric oncology, the application of big data analytics, cell and gene therapies, and oncology devices and diagnostics by coordinating and enhancing the expertise that resides in the individual product centers within FDA. The OCE leverages the combined skills of regulatory scientists and reviewers with expertise in drugs, biologics, and devices (including diagnostics).

This Center of Excellence helps expedite the development of oncology and hematology medical products and supports an integrated approach for the clinical evaluation of drugs, biologics, and devices for the treatment of cancer.

Our Mission

The mission of the Oncology Center of Excellence is to achieve patient-centered regulatory decision-making through innovation and collaboration.

Our Vision

We seek to create a unified and collaborative scientific environment to advance the development and regulation of oncology products for patients with cancer.

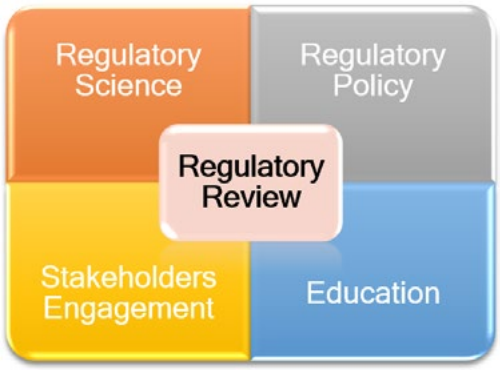
ORGANIZATIONAL STRUCTURE

Executive Committee

The OCE Executive Committee consists of the OCE Director, the Office of Medical Products and Tobacco (OMPT) Director, and the Directors of the Center for Biologics Evaluation and Research (CBER), the Center for Drug Evaluation and Research (CDER), and the Center for Devices and Radiological Health (CDRH). The Executive Committee provides oversight, and strategic and policy direction, including for operations, staffing and procedures of the OCE.

Management Committee

The OCE Management Committee supports the OCE Director in accomplishing the goals of the OCE for the coordinated clinical review of applications for medical oncology drugs, biologics, and medical devices, for improving regulatory science relevant to oncology clinical development, and for enhancing interactions with external stakeholders.



The Management Committee is comprised of the OCE Director, Deputy Directors, and Associate Directors.

The responsibility of the Management Committee includes:

- Identifying approaches to optimize efficiency of the medical oncology clinical review process, especially pertaining to cross-center, collaborative reviews.
- Organizing and prioritizing oncology-specific research and policy initiatives to minimize redundancy and optimize collaboration.

Science Council

The OCE Science Council consists of internal FDA staff who advise the OCE Director on emerging science and research relevant to oncology product development. The Council promotes communication among oncology experts in CBER, CDER, and CDRH. Most OCE Science Council members have non-clinical academic backgrounds (e.g., pharmacology, toxicology, statistics, clinical pharmacology, and product quality), complementing the clinically-focused expertise of the OCE Management Council.

The OCE Science Council has invited multiple expert scientific speakers to OCE, including the NCI Director, and is planning educational meetings for staff addressing important areas of translational research, such as microbiome and immunotherapy response and systems biology. Future directions include investigating opportunities to connect oncology researchers across FDA, such as by increasing OCE's presence at internal science events, recommending specific research projects and collaborations to OCE leadership, and providing input into an integrated OCE research agenda.

ORGANIZATIONAL STRUCTURE (Continued)

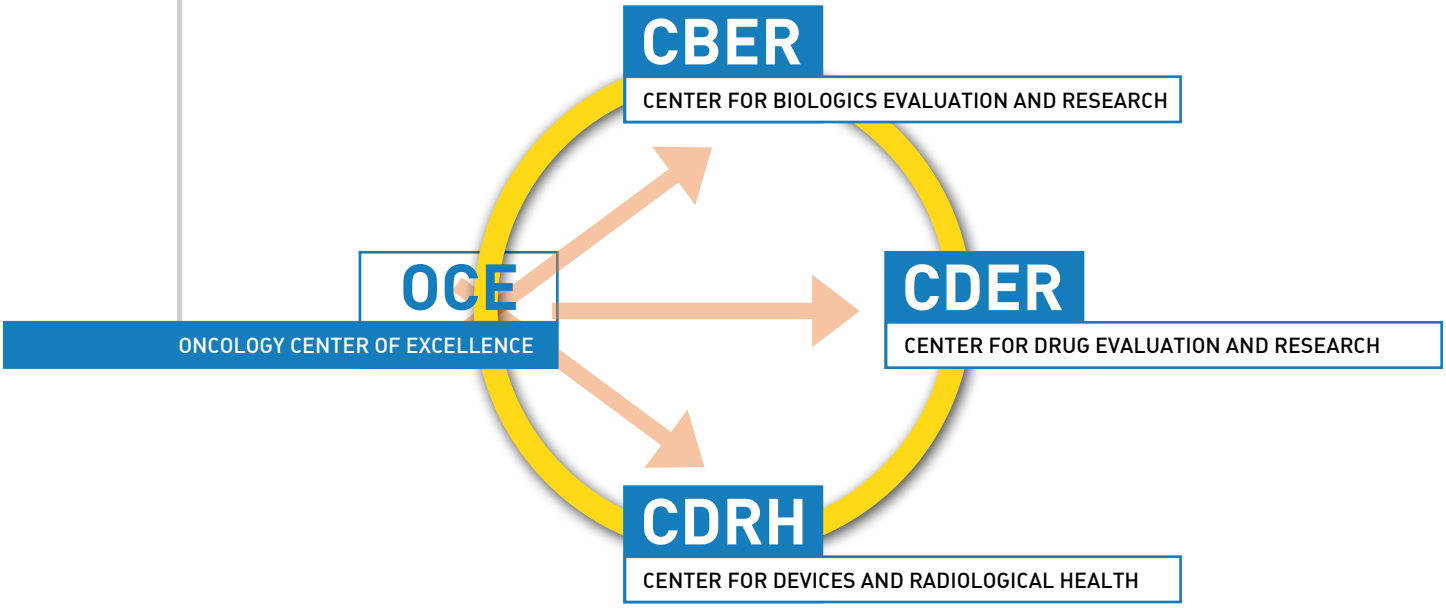
Oncology Center of Excellence Management

OCE DIRECTOR

*AD = Associate Director

- Deputy Directors
- AD Oncology Cell & Gene Therapies
- AD Oncology Medical Devices
- AD Oncology In Vitro Diagnostics
- AD Pediatric Oncology
- AD Oncology Regulatory Science & Informatics (INFORMED)
- AD Oncology Patient Outcomes
- AD Immuno-Oncology
- AD Oncology Regulatory Affairs
- AD Research Strategy & Partnerships
- AD External Outreach and Engagement
- AD Communication

The Oncology Center of Excellence fosters unified interaction between 3 FDA centers



REGULATORY REVIEW

The OCE is tasked with clinical medical oncology reviews, irrespective of whether the product is a drug, device, or biological product. The Center unites experts from CDER, CBER, and CDRH to expedite the review of drugs, biologics, and devices for the treatment of malignancies. Product sponsors submit applications to the medical product center they normally would, and those centers decide whether the product will be granted an expedited program.

For products selected, the OCE forms a Medical Oncology Review and Evaluation (MORE) team that includes a medical oncology specialist, as well as specialists from the relevant product center.

The role of the MORE team is to:

- Provide a unified clinical review to promote development of safe and effective oncology products.
- Build on existing cross-center collaboration in review of marketing applications by providing input on selected INDs undergoing expedited development, including Breakthrough Designation (BTD), Special Protocol Assessment (SPA), Fast Track (FT), Regenerative Medicine Advanced Therapy (RMAT) and Breakthrough Device Designation.
- Implement common decision-making standards for Breakthrough Therapy and Fast Track designation for all oncology therapeutic products.

The OCE may also consult the Oncologic Drugs Advisory Committee at a public meeting or may consult special government employees (e.g. patients and clinicians who have undergone conflict-of-interest screening and who can provide an opinion about the new product). When complete, the clinical review is sent to the product center, which makes the final approval determination.

REGULATORY REVIEW (Continued)

2018 Oncology Approvals

19 New Molecular Entities (NMEs) / Original BLAs

32 Efficacy Supplement - New Indications

1 Efficacy Supplement - New Patient Population

2 Efficacy Supplement - Accelerated Approval Confirmatory Study

2 Biosimilars

9 505(b)(2)s

1 PMA - New Companion Diagnostic

10 PMA - Modification Companion Diagnostic

1 PMA Approval (Combination Product)

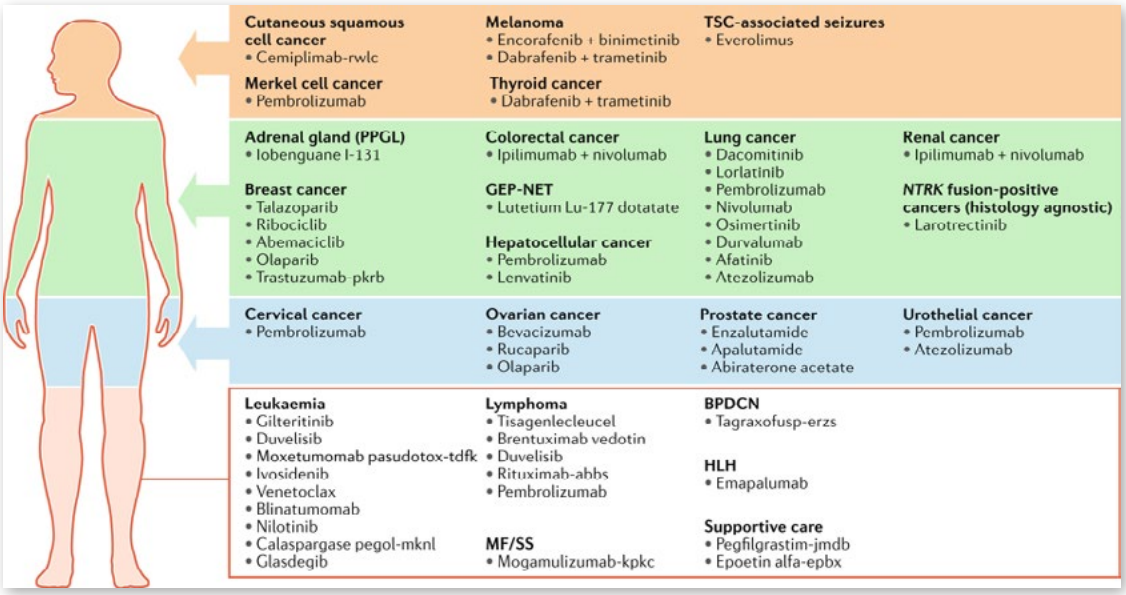
* Approval numbers reflect approvals from CBER, CDER and CDRH

2018 Submissions Reviewed under Expedited Programs*

Expedited Programs	Granted	Denied	Withdrawn
Fast Track (FT)	35	22	N/A
Breakthrough Designation (BTD)	25	16	10
Regenerative Medicine Advanced Therapy (RMAT)	2	4	0
Breakthrough Device Designation	18	5	4

REGULATORY REVIEW (Continued)

The drugs and drug combinations approved in 2018 for new oncology indications are listed below, with skin, head and neck (thyroid) and neurological indications indicated in orange; truncal cancers in green; genitourinary cancers in blue; and hematological indications in the red box.



Source: Blumenthal GM, Pazdur R. Approvals in 2018: a histology-agnostic new molecular entity, novel end points and real-time review. Nat Rev Clin Oncol. 2019 Mar;16(3):139-141.

REGULATORY INITIATIVES

Pilot Programs

In the past year, the OCE created two pilot programs to improve the process of evaluating data and evidence to generate a benefit-risk assessment that informs regulatory decisions: Real-Time Oncology Review (RTOR) and the Assessment Aid (AAid). In 2018, two products were approved using the RTOR and AAid, while two products used the RTOR alone and three used the AAid alone.

Real-Time Oncology Review

RTOR permits the FDA to access key data prior to the official submission of the application, allowing the review team to begin their review earlier and communicate with the applicant prior to the application's actual submission. Data analysts from a newly-created safety analytics team provide the primary review team with standard and customized safety analyses to expedite the review process. RTOR has enabled the OCE to approve several product applications within a few weeks of the application's complete submission.

Assessment Aid

The AAid pilot is testing a multidisciplinary review template that is divided into two parts: the applicant's position and FDA's assessment. The goal of this program is to focus the FDA's written review on critical thinking and consistency and decrease time spent on administrative tasks such as formatting.

OCE PROGRAMS

Precision Oncology

Precision oncology leads to customization of healthcare, with medical decisions, practices and products being tailored to each individual patient with cancer. In oncology drug, biologic, and device development, more precise targeting of a product to an individual's genomic, proteomic, or metabolomic make-up will likely lead to more effective and less toxic anti-cancer therapies.

Highlights of the Precision Oncology Program in 2018 include multiple workshops and presentations at international meetings focusing on next-generation sequencing, liquid biopsy, and tissue or site-agnostic drug development. In addition, several guidance documents focusing on novel trial designs such as master protocols and novel endpoints were released.

Patient-Focused Drug Development

The OCE Patient-Focused Drug Development (PFDD) program fosters collaboration between FDA Centers and external stakeholders involved in patient outcomes research in cancer populations. The overarching goal is to identify rigorous methods to assess the patient experience that will complement existing survival and tumor information to better inform a cancer therapy's effect on the patient.

In 2018, the PFDD program advanced its mission in several key areas:

- **Actively engaging with patients and advocacy groups.** The program brought early career advocates to the FDA for a workshop to engage in dialogue and learn about regulatory science and policy. Another collaboration with advocacy groups sought to better understand patients' impression of the use of patient-reported outcomes (PRO) measures in cancer trials.

- **Fostering research into measurement of the patient experience.** The program published work on several aspects of PRO analysis including missing data, effects of open label trials, and commonly used PRO tools in multiple peer-reviewed publications.

- **Generating science-based recommendations for regulatory policy.** The program hosted an annual workshop with international experts to discuss rigorous use of PRO measures in clinical trials and participated in international collaborations to standardize PRO analysis methods.

OCE PROGRAMS (Continued)

Immuno-Oncology

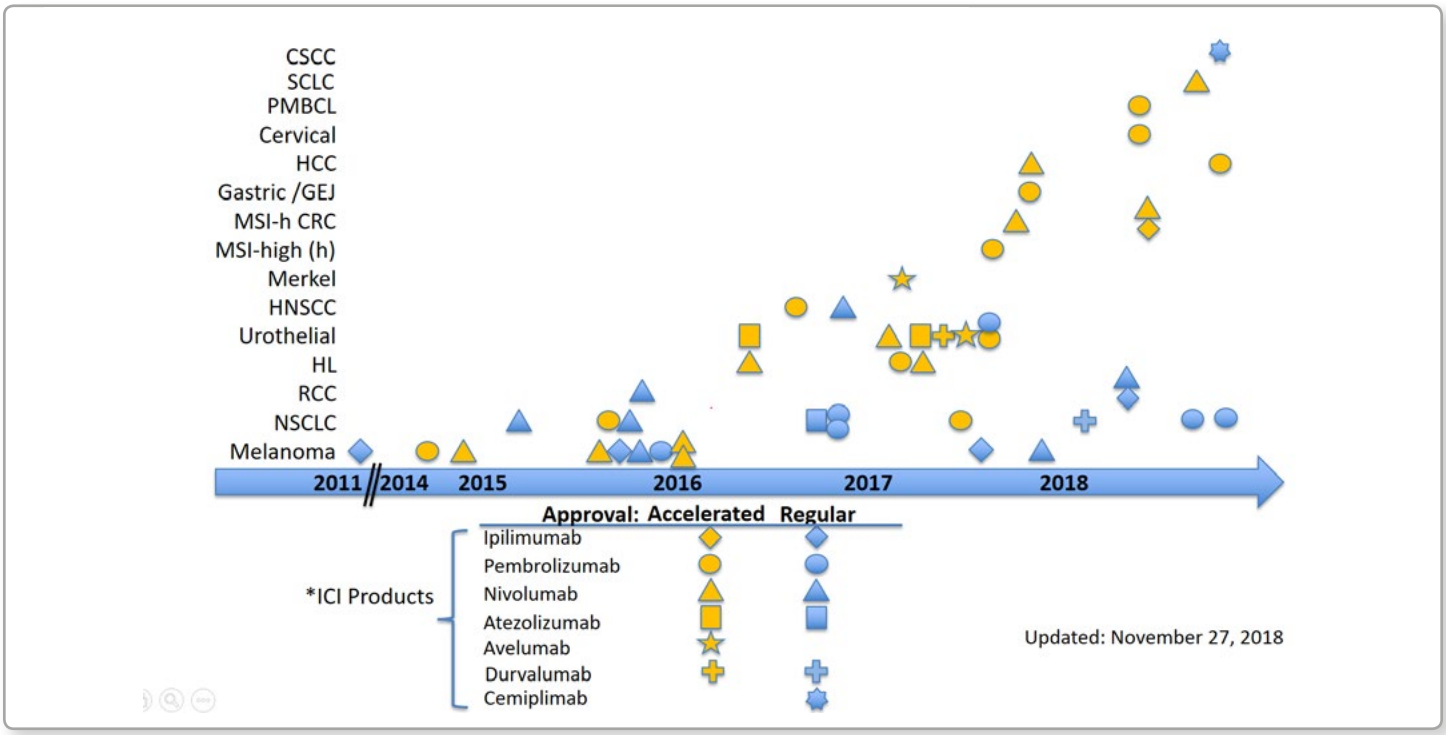
Immuno-oncology (IO) therapeutics are leading to a transformational shift in treatment paradigms for patients with cancer. The OCE Immuno-Oncology Therapeutics Program (IOTP) brings together existing expertise across the FDA and promotes development of new therapeutics that harness the immune system to engage new, more efficacious treatment paradigms for patients with cancer.

Highlights of the Immuno-Oncology Therapeutics Program in 2018 include several workshops and presentations, internally and externally, on the unique features of IO therapeutics and considerations for:

1. **Characterizing both the safety and efficacy of these products**
2. **Use of novel trial designs for evaluating potential combinatorial therapies.**

In a workshop co-sponsored with the Society for Immunotherapy of Cancer, novel endpoints and emerging technologies were evaluated to account for unique patterns of response that can occur with immunotherapeutics—patterns that may inform benefit-risk considerations in drug development programs and in the clinic. Additionally, the IOTP published work on identifying and characterizing these atypical response patterns in an extensive analysis of melanoma patients across clinical trials and on considerations for novel trial designs in seamless oncology drug development.

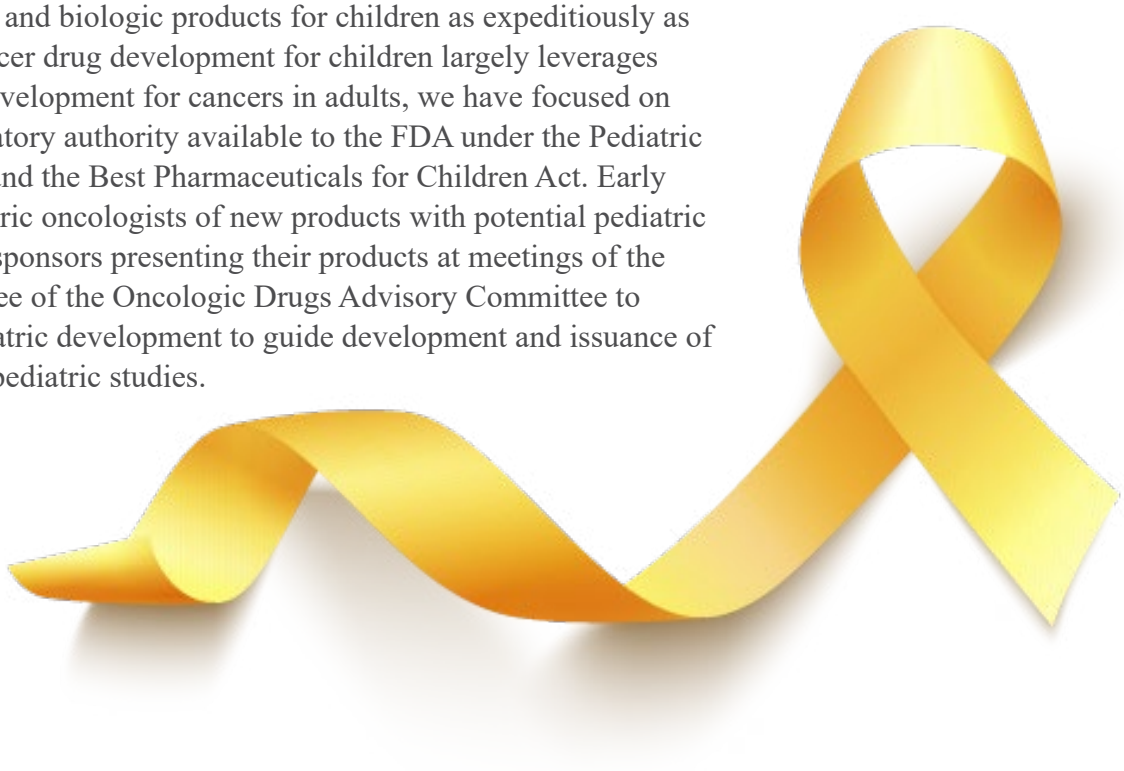
Timeline of ICI* Approvals



OCE PROGRAMS (Continued)

Pediatric Oncology

The Pediatric Oncology Program is charged with assuring access to safe and effective cancer drugs and biologic products for children as expeditiously as possible. Because cancer drug development for children largely leverages drug discovery and development for cancers in adults, we have focused on maximizing the regulatory authority available to the FDA under the Pediatric Research Equity Act and the Best Pharmaceuticals for Children Act. Early review by FDA pediatric oncologists of new products with potential pediatric applicability leads to sponsors presenting their products at meetings of the Pediatric Subcommittee of the Oncologic Drugs Advisory Committee to discuss potential pediatric development to guide development and issuance of Written Requests for pediatric studies.



Other Pediatric Oncology efforts include:

- Effective implementation of the Research Acceleration for Cure and Equity for Children Act, including the development and vetting by external stakeholders in a series of public meetings of a list of molecular targets considered substantially relevant to pediatric cancer and a non-relevant list that would warrant waivers from pediatric studies.
- Development of an Oncology Subcommittee of the FDA's Pediatric Review Committee to allow broader pediatric cancer expertise in the review of initial Pediatric Study Plans (iPSPs) and Proposed Pediatric Study Requests (PPSRs).
- Extensive communications with EMA for high level scientific exchange surrounding pediatric development plans of products of potential interest. These monthly calls may result in the issuance of Common Commentaries to be made available to sponsors.

Highlights of the Pediatric Oncology Program in 2018 include completion of the reviews of 91 iPSPs, 58 agreed iPSPs,10 PPSRs, and 17 Written Requests.

OCE PROGRAMS (Continued)

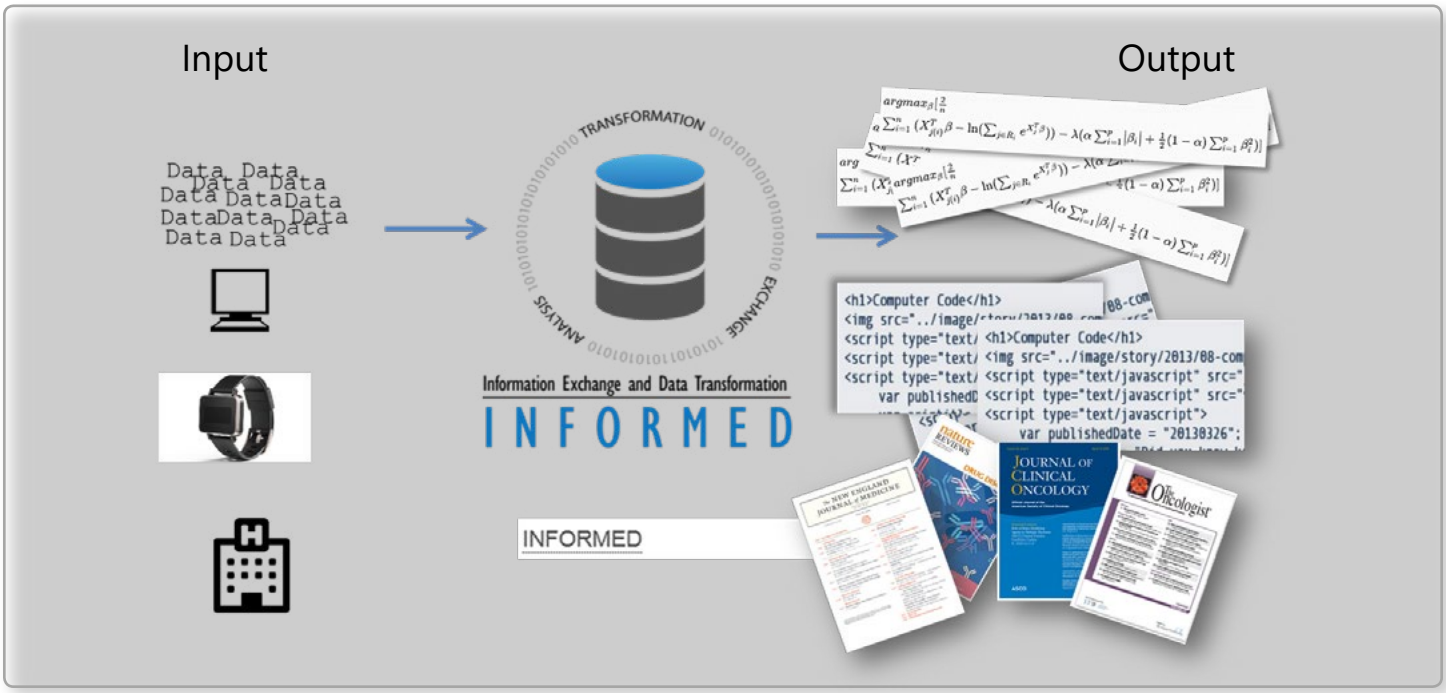
Information Exchange and Data Transformation (INFORMED)

Launched in collaboration with the U.S. Department of Health and Human Services' Innovation, Design, Entrepreneurship and Action (IDEA) Lab, Information Exchange and Data Transformation (INFORMED) is an incubator for collaborative oncology regulatory science research. Drawing from the expertise of a diverse group of oncologists, data scientists, statisticians, and entrepreneurs-in-residence, INFORMED is expanding organizational and technical infrastructure for big data analytics and examining modern approaches in evidence generation to support regulatory decisions. Special emphasis is placed on systems thinking in oncology regulatory science research to facilitate development and adoption of new solutions for improving efficiency, reliability, and productivity in a broad range of workflows related to oncology drug development.

The research portfolio of INFORMED includes investigations into the use of real world data for clinical evidence generation and prospective pragmatic clinical trials, testing the utility of biosensors and the internet of things to quantify intrinsic and extrinsic (e.g., environmental) factors influencing the patient's experience, identifying opportunities for machine learning and artificial intelligence, and exploring the utility of open-access platforms and emerging technologies such as blockchain to enable secure exchange of health data at scale.

In 2018, INFORMED launched a premarket safety modernization pilot, developing a digital framework currently being implemented agency-wide. In addition, INFORMED initiated a data science fellowship program in collaboration with the National Cancer Institute and a postdoctoral fellowship program in artificial intelligence and machine learning with Harvard-MIT.

Information Exchange and Data Transmission



OCE PROGRAMS (Continued)

Oncology Devices and Diagnostics

Oncology devices and diagnostics are reviewed and regulated by the Center for Devices and Radiological Health in partnership with OCE. CDRH's Personalized Medicine team and OCE's Precision Oncology team are working closely to ensure that we have consistent and appropriate policies with regards to personalized medicine, including companion and complementary diagnostics. Next Generation Sequencing (NGS) tests are capable of rapidly identifying or "sequencing" large sections of a person's genome and are important advances in the clinical applications of precision medicine.

In 2018, CDRH and OCE worked together to approve 11 companion diagnostic products including a new test for patients with acute myeloid leukemia (AML). This IDH1 genetic test helps physicians decide who should receive a new targeted therapy that can lead to cancer remission in some cases.

- **Diagnostic** - *in vitro* diagnostic device or an imaging tool that provides essential information to the clinician.
- **Therapeutic** - Includes devices often used in combination with chemotherapy.
- **Palliative** – relief of symptoms and improvement in quality of life.

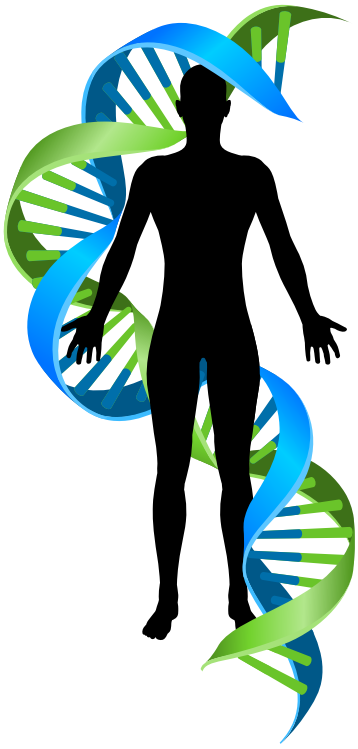
For a complete list of FDA cleared or approved companion diagnostic devices please see:
List of Cleared or Approved Companion Diagnostic Devices (In Vitro and Imaging Tools)
https://www.fda.gov/MedicalDevices/ProductsandMedicalProcedures/InVitroDiagnostics/ucm301431.htm

In addition to the companion diagnostic products, FDA authorized an NGS-based test for minimal residual disease (MRD) in patients with acute lymphoblastic leukemia (ALL) or multiple myeloma. The assay was used to assess MRD at various disease burden thresholds to show that the MRD level correlated with event-free survival. For patients with multiple myeloma, the assay demonstrated similar associations with progression-free survival and disease-free survival.

CDRH and OCE worked together to clear devices for imaging and treating tumors. CDRH cleared new low-dose computed tomography (CT) devices for lung cancer that allow visualization of tumors while minimizing radiation exposure to patients. New robotic devices such as the ExactVu, Xario200G, and UroNAV were cleared for image-guided interventional procedures like biopsy and tumor ablation. Radiation oncology devices are used to treat cancer with doses of radiation. One such device, the Gammapod, was cleared as a radionuclide radiation therapy system specifically designed for use in treating breast cancer.

OCE PROGRAMS (Continued)

Oncology Cell and Gene Therapy



The program provides clinical evaluations under FDA expedited programs for cellular and gene therapies for cancer, such as:

- T-cells modified with chimeric antigen receptors (CAR-Ts) or with T-cell receptors with redirected specificity (TCR-Ts), and developed using technologies including gene-editing, e.g., clustered regularly interspaced short palindromic repeats (CRISPR) or transcription activator-like effector nucleases (TALEN)
- Novel strategies in hematopoietic stem cell transplantation (HSCT)
- Dendritic cells
- Adoptive T-cell therapies
- Tumor neoantigen-based personalized medicine (vaccine or cell therapy)
- Natural killer cells
- Oncolytic bacteria and viruses
- Therapeutic cancer vaccines
- Therapies that modulate the microbiome
- Combinations of these therapeutics with hematopoietic stem cell transplantation, checkpoint inhibitors, chemotherapies, radiation and other agents.

The Oncology Cell and Gene Therapy program emphasizes emerging oncology science to achieve excellence in medical product regulation.

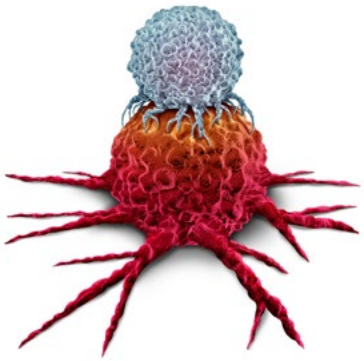


Illustration of a CAR-T Cell attacking a cancer cell

Using this scientific base, the program collaborates with academia, industry, patient advocacy groups, professional societies, and other international regulators to advance the OCE mission to accelerate the development and streamline the evaluation process of safe and effective products for patients.

Recent FDA approvals for the CAR-T therapies exemplify such leverages of the combined skills of the FDA clinical oncology review staff. CBER's Office of Tissues and Advanced Therapies, as part of an OCE MORE team, worked with OCE to complete the clinical review for, and recommended approval of, tisagenlecleucel (KYMRIAH) and axicabtagene ciloleucel (YESCARTA), respectively.

OCE PROGRAMS (Continued)

Oncology Regulatory Affairs

The focus of Oncology Regulatory Affairs is to develop and implement procedures that affect the regulatory review of oncology products across centers; interact with colleagues in CDRH, CDER, and CBER to allow for a more coordinated review of products undergoing review by OCE; facilitate OCE policy development; and provide a forum to exchange ideas and streamline regulatory review processes.

Oncology Regulatory Affairs is also an integral part of developing processes and implementing programs for the OCE such as the RTOR, Assessment Aid, Oncology Pediatric Subcomittee, premarket safety modernization pilot, guidance development, "Project: Renewal", "Project: Facilitate" and providing regulatory advice to review divisions and sponsors.

Some of these forums include:

- **OCE Division Directors weekly meeting:** The goal of these meetings is to update OCE management on upcoming regulatory decisions or guidance and policy issues.
- **OCE Rounds:** The goal of these meetings is to provide an open forum to discuss newly received NME's, original BLAs, BTDs, RMATs, and notable supplements to elicit feedback from other disciplines such as biostatistics, clinical pharmacology, and product quality. These meetings are organized by the oncology program.
- **OCE Regulatory Rounds:** The goal of these meetings is to update oncology regulatory project managers on new OCE initiatives and promote cross-center information exchange and collaboration.

OCE Rounds: Oncology Center of Excellence employees gather weekly to collaborate on current topics between CBER, CDER, and CDRH.

GUIDANCES

The OCE has participated in the development of 11 oncology-specific guidances in 2018

Clinical Trial Endpoints for the Approval of Cancer Drugs and Biologics - *Final Guidance, December 2018*
Developing and Labeling In vitro Companion Diagnostic Devices for a Specific Group or Class of Oncology Therapeutic Products - *Draft Guidance, December 2018*
Nonmetastatic, Castration-Resistant Prostate Cancer: Considerations for Metastasis-Free Survival Endpoint in Clinical Trials - *Draft Guidance, November 2018*
Hematologic Malignancies: Regulatory Considerations for Use of Minimal Residual Disease in Development of Drug and Biological Products for Treatment Guidance for Industry - *Draft Guidance, October 2018*
Master Protocols: Efficient Clinical Trial Design Strategies to Expedite Development of Oncology Drugs and Biologics Guidance for Industry - *Draft Guidance, September 2018*
Hematologic Malignancy and Oncologic Disease: Considerations for Use of Placebos and Blinding in Randomized Controlled Clinical Trials for Drug Product Development Guidance for Industry - *Draft Guidance, August 2018*
Expansion Cohorts: Use in First-In-Human Clinical Trials to Expedite Development of Oncology Drugs and Biologics Guidance for Industry - *Draft Guidance, August 2018*
Oncology Therapeutic Radiopharmaceuticals: Nonclinical Studies and Labeling Recommendations Guidance for Industry - *Draft Guidance, June 2018*
Considerations for the Inclusion of Adolescent Patients in Adult Oncology Clinical Trials - *Draft Guidance, June 2018*
Investigational In Vitro Diagnostics in Oncology Trials: Streamlined Submission Process for Study Risk Determination Guidance for Industry - *Draft Guidance, April 2018*
Bacillus Calmette-Guérin-Unresponsive Nonmuscle Invasive Bladder Cancer: Developing Drugs and Biologics for Treatment Guidance for Industry - *Draft Guidance, February 2018*

ENGAGEMENT/OUTREACH

OCE provides a platform for internal and external engagement to facilitate reciprocal exchange of science and ideas.

2018 WORKSHOPS

In 2018, OCE held 19 workshops and 16 educational symposia:

Weighing the Evidence: Variant Classification and Interpretation in Precision Oncology	*January 29, 2018*
FDA-ISoP Public Workshop: Model Informed Drug Development (MIDD) for Oncology Products	*February 19, 2018*
Oncology Clinical Trials in the Presence of Non-Proportional Hazards	*February 5, 2018*
FDA-AACR-ASTRO Clinical Development of Drug-Radiotherapy Combinations	*February 22-23, 2018*
IASLC-FDA Lung Cancer Neoadjuvant Meeting 2018	*March 1-2, 2018*
Oncology Center of Excellence Listening Session	*March 15, 2018*
Accelerating Anticancer Agent Development and Validation Workshop 2018	*May 2-4, 2018*
FDA-AACR-SGO Workshop on Drug Development in Gynecologic Malignancies	*June 14, 2018*
FDA-ASCO Workshop: 2018 Clinical Outcome Assessments in Cancer Clinical Trials	*June 22, 2018*
FDA Public Workshop: Development of Treatments for Localized Prostate Cancer	*July 11, 2018*
FDA-PDS Symposium	*August 8, 2018*
FDA-AACR Workshop: Non-Clinical Models for Safety Assessment of Immuno-Oncology Products	*September 6, 2018*
FDA-HESI Public Workshop: Preclinical and Translational Safety Assessment of CD3 Bispecifics	*October 1-2, 2018*
FDA-ASH Public Workshop: Sickle Cell Disease Clinical Endpoints	*October 17-18, 2018*
FDA Public Workshop: Clinical Trials to Optimize Outcomes in Early Breast Cancer	*October 29, 2018*
FDA-SITC Public Workshop: Immune-modified Response Criteria in Cancer Immunotherapy Clinical Trials	*November 8, 2018*
ASCO Leadership Development Program	*November 16, 2018*
FDA Public Workshop: Partners in Progress 2018 - Cancer Patient Advocates and FDA	*November 27, 2018*
FDA Public Workshop: Product Development in Hemophilia	*December 6, 2018*

OCE and OHOP staff members presenting during various public workshops in 2018.

Networking lunch for cancer patient advocates and OCE oncologists at the Partners in Progress Cancer Patient Advocates and FDA workshop.

ENGAGEMENT/OUTREACH (Continued)

FDA-ASCO Fellows Day

The purpose of these highly interactive meetings is to introduce fellows to principles of clinical trial design, oncology drug regulatory science, and disease-specific drug development under the mentorship of FDA medical officers.

2018 Fellows

The OCE and the American Society of Clinical Oncology (ASCO) partner to offer recurring one-day workshops for physicians in hematology/oncology fellowship training programs.

Two workshops are offered bi-annually in the fall and winter on the FDA White Oak Campus in Silver Spring, MD. Beginning in 2019, a third workshop in Chicago to coincide with the ASCO Annual Meeting has been added to address growing demand. The workshops are open to fellows who have completed at least one year of fellowship training with preference given to those in their final year of training.

More than 300 fellows from 80 institutions in 31 states have participated in Fellows Day workshops since OHOP began the workshops in 2014.

OCE Director, Dr. Richard Pazdur, taking a selfie with ASCO fellows and OHOP medical oncologists.

ENGAGEMENT/OUTREACH (Continued)

OCE Summer Scholars Program

The Summer Scholars Program is designed to acclimate students to the entire spectrum of oncology drug development. High school students and recent graduates are provided with an introduction to career opportunities in government, regulatory medicine, and cancer advocacy.

2018 OCE Summer Scholars

The six-week program offers students exposure to the drug development pathway, including: basic science research, clinical trials and regulatory review and approval.

In 2018, 20 students were accepted into the program. As part of the program, the students had the opportunity to visit institutions such as the National Institutes of Health, the National Cancer Institute, ASCO, Howard University Hospital Cancer Center, Kids V Cancer Advocacy Group, LUNGevity, the National Museum of Health and Medicine, and MedImmune/Astra Zeneca.

OCE Summer Scholars on a lab visit at FDA's White Oak Campus

ENGAGEMENT/OUTREACH (Continued)

OCE Scientific Liaison Program

Rapid advances in cancer biology and therapeutics necessitate that FDA maintain an active presence in the scientific community. The OCE scientific liaison program consists of over 20 FDA clinicians and scientists responsible for maintaining a high level of expertise and engagement in multiple disease and research disciplines.

Scientific Liaisons engage outside of FDA across focus areas including prostate cancer, breast cancer, community oncology, health disparities and geriatric oncology as proactive contributors to their field.

The engagement serves to both keep OCE abreast of emerging outside opportunities and challenges across fields and provides a platform to inform important drug development stakeholders of FDA regulations and current thinking.

OCE Disease Focus Program

To foster cross-center discussion of the latest scientific and clinical issues in different cancer types, OCE formed disease focus programs.

These groups meet monthly to quarterly, and several workshops, research projects, and symposia were organized based on discussions within the disease-specific focus groups.

There are 10 cross-center disease focus groups as of 2018:

- Gynecology
- Breast Cancer
- Genitourinary Malignancies
- Thoracic/Head and Neck Cancer
- Gastrointestinal Cancer
- Melanoma/Cutaneous Cancer
- Central Nervous System Cancer
- Sarcoma
- Acute Leukemia/Myelodysplastic Syndrome
- Chronic Leukemia and Lymphoma

Clinical Oncology for the Non-Oncologist

Successful review of cancer therapies requires a multi-disciplinary team of clinical and non-clinical scientists. The OCE provides an educational series for FDA non-oncologists on the natural history and treatment of various cancers, and how this knowledge informs clinical trial design and endpoints.

In 2018, OCE held 5 sessions where experts presented on:

- Acute Lymphocytic Leukemia (ALL), Acute Myeloid Leukemia (AML), and emerging therapies
- Hepatocellular carcinoma (HCC)
- Cutaneous Melanoma
- Brain Tumors for Beginners
- Pancreatic Cancer

ENGAGEMENT/OUTREACH (Continued)

Conversations on Cancer

Making Cancer Personal at the FDA

The OCE provides a forum to discuss specific cancer topics, including personal stories from employees, a discussion of disease management by our oncology experts, and recent advances in the field.

In 2018, OCE held 2 sessions:

- Impact of Cancer on Patients and Caregivers
- "War on Cancer": Progress and Challenges

FDA staff members along with Nadezda Radoja, Neil Ogden and Howard Balick, and Victoria Gudeman of Montgomery Hospice spoke about the impact of cancer on patients and caregivers.

OCE Conversations on Cancer: Impact of Cancer on Patients and Caregiveers - March 28, 2018

OCE Conversations on Cancer: War on Cancer: Progress and Challenges - September 27, 2018

Dr. Richard Pazdur, Director of the OCE speaks about the progress and challenges in the "War on Cancer" over the nearly 50 years since the National Cancer Act of 1971.

ENGAGEMENT/OUTREACH (Continued)

International Engagement

In early July 2018, OCE Director, Dr. Richard Pazdur, OCE Acting Associate Director for Cell and Gene Therapy, Dr. Ke Liu, and Acting Assistant Commissioner for International programs, Dr. Leigh Verbois, traveled to China to meet with regulatory counterparts, academics, nongovernmental organizations, and industry to deepen cooperation between our two countries in treating cancer.

During our visits to Beijing, Zhengzhou, Suzhou, and Shanghai, we described FDA's initiatives in expediting the development of oncology products, conveyed the FDA's experience in accelerating the process of bringing innovative therapies to market while maintaining high standards of safety and efficacy. We learned more about the landscape of cancer, clinical trials, oncology drug development, and recent reforms initiated by China to accelerate drug development and create a more predictable approval process for patients to gain access to most advanced cancer therapies in China. Enhancing collaborations with stakeholders in China may offer tremendous potential to provide access to innovative products and improve patient outcomes not only in the United States.

At the Shanghai American Center, Dr. Pazdur met with health reporters to discuss the benefits of greater collaboration and cooperation to improve the care of cancer patients.

Oncology International Hexalateral Cluster Calls

OCE holds monthly Oncology International Cluster meetings. These monthly telecons between FDA and 5 other international regulatory agencies allow for exchange of information and collaboration on specific topics related to applications under review.

- **EMA** = European Medicines Agency (European Union member states)
- **FDA** = Food & Drug Administration (U.S.)
- **HC** = Health Canada (Canada)
- **PMDA** = Pharmaceuticals & Medical Devices Agency (Japan)
- **Swissmedic** (Switzerland)
- **TGA** = Therapeutic Goods Administration (Australia)

COMMUNICATIONS

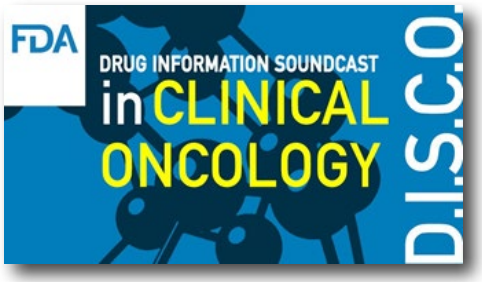
The OCE works with communications offices across the FDA to ensure appropriate external and internal communications regarding the Center's programs and activities. The OCE also works with external stakeholders at professional societies and patient advocacy organizations to develop informative articles, interviews, and other materials for health professionals and patient advocates. In addition, the OCE's communications program provides editorial support for medical reviewers in writing and submitting articles to scientific journals (see Publications section).

OCE's communication outlets include:

OCE Oncology/Hematology Approval Announcements web page and listserv: The OCE posted 63 approval announcements in 2018. These short articles are also sent via a free FDA listserv to over 90,000 email subscribers.

@FDAOncology on Twitter: The OCE Twitter account, begun in early 2017, had nearly 10,000 followers at the end of 2018.

Scientific Journals: In 2018, OCE and affiliated oncology/hematology staff in other FDA centers published approximately 84 articles in scientific journals.



FDA Drug Information Soundcast in Clinical Oncology (D.I.S.C.O.) Produced 9 podcasts in 2018 on drug approvals.

The Week in Oncology: A weekly internal email for OCE staff and affiliates across the FDA.

AWARDS

In 2018, the following awards were recieved by FDA staff members in the fields of Oncology and Hematology:

Richard Pazdur, MD Director, OCE	**Reagan-Udall Foundation 2018 Leadership Honoree:** For contributions and service to regulatory science and public health.
Gideon Blumenthal, MD Deputy Director, OCE	**American Society of Clinical Oncology (ASCO) 2018 Public Service Award:** For legislative, political action or community activities that have an impact on public awareness about cancer.
Gregory Reaman, MD, FASCO Associate Director for Pediatric Oncology, OCE	**American Society of Clinical Oncology (ASCO) 2018 Pediatric Oncology Award**: For contributing outstanding scientific work of major importance to the field of pediatric oncology.
Sean Khozin, MD, MPH Associate Director for Oncology Regulatory Science & Informatics (INFORMED), OCE	**2017 Charles A. Sanders Life Sciences Award:** For outstanding efforts for research innovation and collaboration.
Ann Farrell, MD Director, Division of Hematology and Oncology, OHOP/CDER	**American Society of Hematology (ASH) 2018 Outstanding Service Award:** For effective leadership behind the scenes in areas relevant to the mission of the Society, for her dedication to increasing the visibility of issues affecting hematology within the FDA.

LOOKING FORWARD: 2019

At the Oncology Center of Excellence,
2019 will be marked by exciting scientific and regulatory outreach and engagement.

Project: Renewal

Project Renewal is a public health initiative being piloted by the Oncology Center of Excellence that aims to update the safety and efficacy information for oncology product labeling. Aligned with FDA's mission to promote and protect public health, Project Renewal will review labeling for longstanding, anti-cancer products and will revise the label with current scientific evidence to inform healthcare providers. Project Renewal is an opportunity to assist FDA reviewers in continuously updating labeling as a living document through a set of repeatable processes rooted in clinical and regulatory science. This initiative will also create an enhanced ongoing educational program that gives oncology fellows an opportunity to learn about FDA requirements and regulatory science during the labeling review process.

Potential labeling changes supported by published literature and other data sources may include:

- Revising the label to the contemporary Physicians Labeling Rule format
- Safety updates
- Dose and administration changes
- Additional indications in common use supported by substantial evidence
- Removal of indications which are no longer relevant to current oncology practice in the U.S.
- Any other changes deemed necessary to produce labeling that permits the safe and effective use of the drug

Project: Facilitate

The OCE is leading a pilot project that aims to help patients with cancer gain easier access to unapproved therapies through the FDA's existing Expanded Access Program (also known as compassionate use). Project: Facilitate proposes to establish a call center that would field telephone calls from physicians to assist them in filling out a single-patient IND request form, and guide them through the process to request a single-patient IND for an investigational therapy.

The call center would facilitate and streamline these requests and provide follow up to gather data on patient requests, manufacturer decisions to provide product and patient outcomes.

Project: Facilitate is in early development and the OCE is planning a public meeting about the initiative and the launch of a pilot version in 2019.

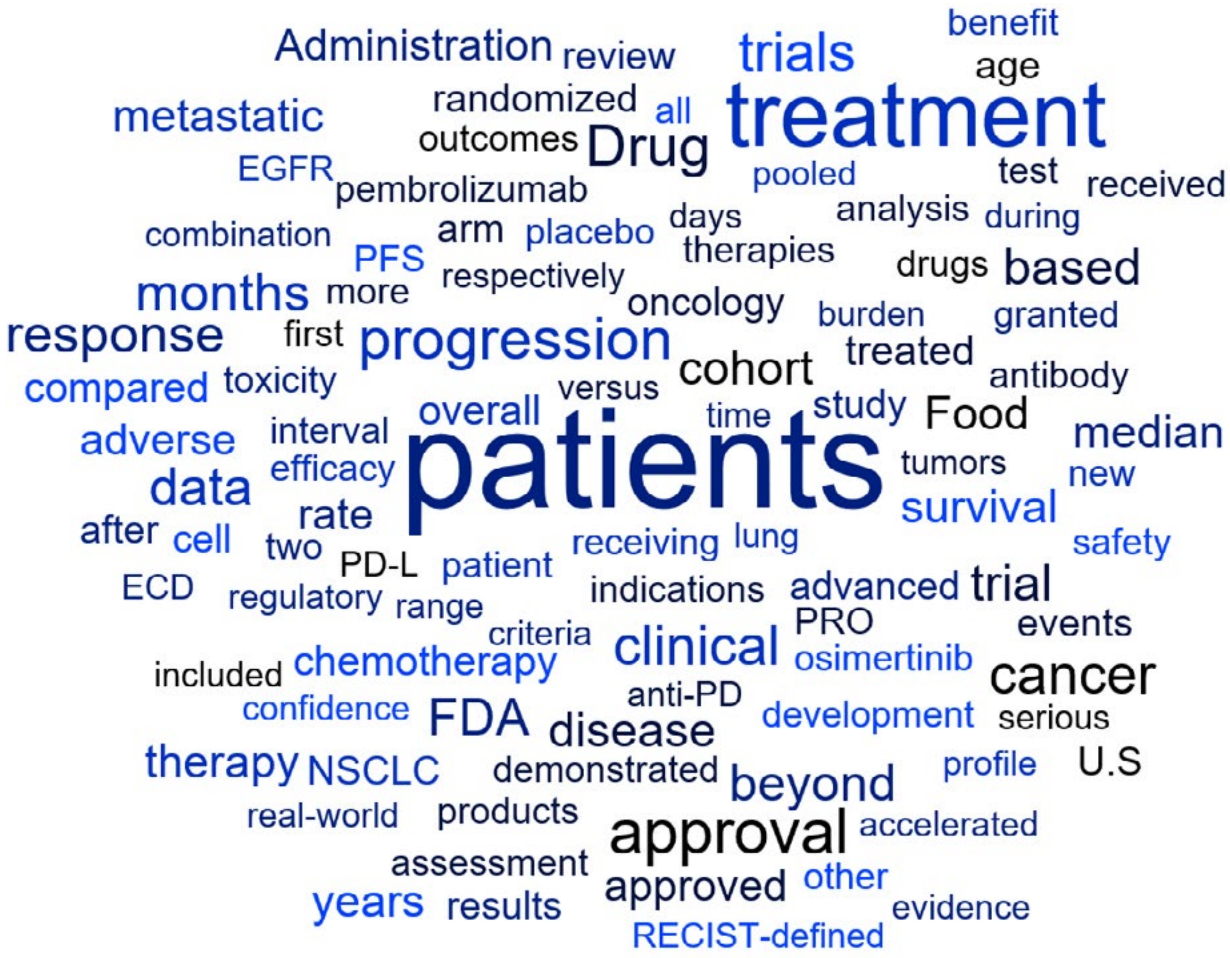
LOOKING FORWARD: 2019 (Continued)

Coordination of Safety Activities

A newly-created OCE Safety Team will provide for consistent review, management, and communication of safety signals across development programs and throughout the pre- and postmarket life-cycle of a drug. Data analysts will assist reviewers with regulatory and research initiatives using new analytic tools to maximize the efficiency of review of safety data from the IND stage, through application review, and after approval.

PUBLICATIONS

The OCE collaborated with other FDA staff as well as academic experts, patient advocates, professional societies, and industry stakeholders in writing 84 articles published in peer-reviewed medical journals in 2018. The word cloud (below) from these publications demonstrates that patients are the primary focus of our efforts.



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