NIH NATIONAL CANCER INSTITUTE

pipeline news

February 2020

DCTD Division of Cancer Treatment and Diagnosis

STAFF HIGHLIGHT – Jeff White, MD

Jeff White, MD
Director, Office of Cancer Complementary and Alternative Medicine, DCTD, NCI

Dr. Jeff White joined the NCI's Metabolism Branch in 1990 as a medical staff fellow. In October 1998, he became the director of the newly formed Office of Cancer Complementary and Alternative Medicine (OCCAM) in the NCI Office of the Director (OD), which moved to DCTD in 2007. Dr. White describes his path from board certified medical oncologist to OCCAM director as well as several important initiatives his office oversees.

What background and interests led you to OCCAM?

I studied applied and engineering physics at Cornell University, which reflected my interest in math, but I found that it didn't capture all my interests. I spent a lot of my free time reading about medicine and health-related issues, including nutrition, and that led me to pursue a medical degree at Howard University. While in medical school, I developed an interest in cancer research and participated in a summer research program in Dr. Suresh Mohla's lab. As a result of this work, I met the Director of the Cancer Center at Howard at that time, Dr. Ken Olden, who later introduced me to Dr. Alan Rabson here at NCI. I was asked to join the Metabolism Branch (later renamed the Lymphoma Branch) in the NCI intramural program, where I focused on immunology research and clinical trials. My interest in nutrition and related topics continued during this part of my research career at NCI.

In 1992, NIH established the Office of Alternative Medicine, headed by interim director, Dr. Steve Groft. I met with Dr. Groft and eventually with Dr. Wayne Jonas, who became the office director in 1995. Because of my interest in nutrition and cancer, Dr. Jonas and I developed a role for me to serve as a part-time cancer advisor to his office. I learned about alternative medicine and cancer-related activities, including a few NCI-supported trials. I participated in this capacity until 1998 when Dr. Bob Wittes, then NCI Deputy Director of Extramural Sciences, and Dr. Rick Klausner, then NCI Director, decided NCI should have a dedicated

In this issue

person for CAM research. We discussed what NCI could do and envisioned OCCAM, which was established in 1998 as part of the NCI OD. The goals of this office were to impact both intramural and extramural researchers, so we helped NCI's Divisions, Offices, and Centers build their CAM grant portfolios and information production. In 2007, our office joined DCTD, where we now build a treatment-related portfolio and participate in trans-NCI and -NIH and international collaborations.

What are some notable OCCAM collaborative projects?

OCCAM has worked with many groups to raise awareness about the importance of CAM. In 2017, OCCAM initiated the first NIH-sponsored, comprehensive meeting on microbial-based cancer therapy, which was organized by staff in DCTD, the Division of Cancer Biology, the Division of Cancer Prevention, and the NCI Small Business Innovation Research program. Two NIH funding opportunity announcements resulted from this meeting. Last year, OCCAM also worked with the NIH National Center for Complementary and Integrative Health (NCCIH) to convene a conference on translating scientific findings about the mechanism of action of acupuncture into clinical practice, which has helped NCCIH develop their programmatic plans. OCCAM is collaborating with NCI's Center for Global Health, who is leading the May 2020 Trans-NCI-NIH Conference on International Perspectives on Integrative Medicine for Cancer Prevention and Cancer Patient Management. This meeting will focus on how physicians trained via traditional systems of medicine in India and China can work together with Western-trained physicians.

Many cancer patients use CAM therapies but often don't disclose this use to their conventional medical providers. OCCAM is collaborating with NCI's Division of Cancer Control and Population Sciences (DCCPS) to better understand the lack of patient-physician dialog on this topic and to identify strategies to improve this. Finally, we facilitate training of traditional Chinese medicine physicians from academic hospitals in China by helping them join NCI's intramural laboratories.

Can you describe some of OCCAM's research areas of interest?

As mentioned earlier, OCCAM is supporting two program announcements that resulted from the 2017 microbial-based cancer therapy meeting (R21 and R01). We've also collaborated with the Natural Products Branch (NPB) in DCTD's Developmental Therapeutics Program to facilitate products being brought to NCI for anti-cancer screening. For example, we helped facilitate the transfer to NCI of a unique resource developed through a cooperative agreement with Harvard University and the Hong Kong Baptist University. This project gathered more than 400 specimens from traditional Chinese medicine plants and examined them for pharmacological activity against prostate cancer. Once this project finished, a tremendous resource had been developed, but the Harvard researchers did not have capacity to maintain it, so OCCAM agreed to transfer the project to NPB. Now we have a library of extracts from these plants for researchers to request to use for their own screening purposes. This work led to another project that compared traditional vs modern extraction systems of natural

products. Drs. Min He, Tanja Grkovic, and Barry O'Keefe led this project in NPB and found that the standard modern extraction processes produced more compounds with greater anti-cancer activity, but the traditional extraction method uniquely identified some examples of anti-cancer activities.

OCCAM has also contributed to NCI's Exceptional Responders Initiative, whose goal is to understand the molecular underpinnings of patients' exceptional responses to cancer treatment. OCCAM's role is to administer a survey about patients' lifestyle changes, like diet, physical activity, and CAM use. Results of this study may help us expand our thinking around the phenomenon of exceptional responses beyond the tumor and therapy.

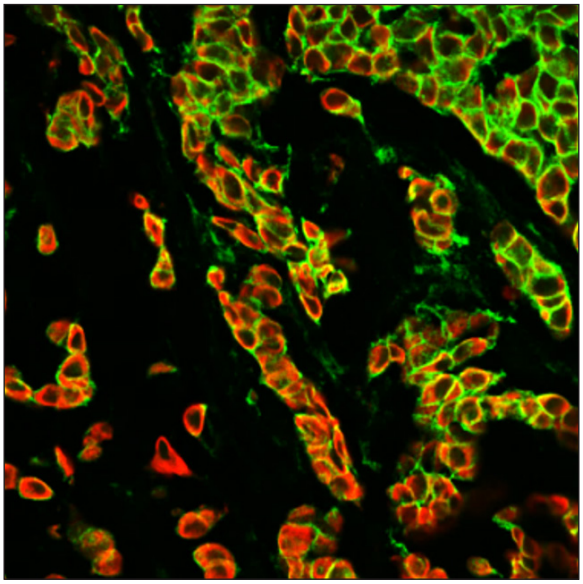
Another interesting area of cancer CAM research involves ascorbic acid - vitamin C - because it's part of an old story that is being reinvestigated. Studying the health benefits of vitamin C began with Dr. Linus Pauling and treatment for the common cold. Although there was some literature related to vitamin C for cancer treatment, early NCI-supported studies failed to demonstrate activity with the oral form. Subsequent work has demonstrated a different pharmacology for parenteral vitamin C with *in vivo* anti-cancer activity in animal models. Researchers have not established clinically significant independent anti-cancer activity for IV vitamin C, but several groups are examining this further now and in combination with other therapies.

OCCAM continues to promote research and generation of quality information on the various disciplines and modalities associated with the field of CAM as they relate to the diagnosis, prevention, and treatment of cancer.

SPOTLIGHT – DCTD Scientists Develop a Clinical Monitoring Tool for Epithelial-Mesenchymal Phenotype

Carcinomas can convert from their original epithelial cell-like phenotype to a mesenchymal-like or partial mesenchymal phenotype in a process called epithelial-mesenchymal transition (EMT). This change is thought to promote tumor invasiveness, metastasis, and resistance to chemotherapy; however, because of the difficulty in observing such changes in patients' tumors, researchers still lack comprehensive understanding of the clinical implications of this transition.

A recent publication in *Cancer Research* describes a new protein-based assay that can evaluate the epithelial-mesenchymal phenotype (i.e., how far along the process of EMT has proceeded) of each cell in a patient's tumor biopsy.



This standardized microscopic-based immunofluorescence assay of EMT phenotypic heterogeneity provided initial observations of epithelial-mesenchymal phenotype in tumors of patients undergoing cancer treatments. The results demonstrate the possibility of both improved understanding of the clinical importance of EMT and clinical monitoring of tumor adaptation to therapy. Read more about the EMT assay.

SPOTLIGHT – DCTD Supports Cell Therapy Production at NCI for Multicenter Clinical Trials

DCTD is supporting the production of cell-based immunotherapies at NCI, allowing NCI to make cell therapy products available to intramural and extramural clinical trial investigators. The NCI Biopharmaceutical Development Program at Frederick National Laboratory for Cancer Research (FNLCR) is currently positioning itself to facilitate multicenter phase 1/2 cell-based immunotherapy clinical trials by:

- Providing centralized manufacturing of cell-based products in a current GMP (cGMP) facility
- Ensuring consistent and standardized manufacturing processes, increasing reproducibility
- Addressing product chain logistical issues

Protocols for this process have been developed for FNLCR to produce CAR-T cells using a closed manufacturing system. An Investigational New Drug application has been approved by the U.S. Food and Drug Administration for NCI to support a multicenter clinical trial (NCT03971799) of CD33 CAR-T cells in pediatric acute myeloid leukemia, which is now recruiting patients.

Current facility renovations will allow for lentivirus vector production to begin in spring 2020 and for new cell therapy suites to become available in 2021. Read more about DCTD's support of cell therapy production.

NEWS ABOUT DCTD PROGRAMS AND ACTIVITIES

Program Updates

The Cancer Imaging Program (CIP) Presents Scientific Sessions at RSNA

Staff from CIP and its Frederick National Laboratory for Cancer Research–supported Cancer Imaging Informatics Laboratory organized and presented several scientific sessions at the recent Radiological Society of North America's (RSNA) 2019 Annual Meeting. These sessions highlighted CIP's efforts to provide cancer imaging data sets to the research community, including through the publicly available resource, The Cancer Imaging Archive (TCIA).

Popular Sessions Repeated from Previous RSNA Meetings

- *An Introduction to Using the NIH/NCI's Cancer Imaging Archive*
  Provided hands-on opportunities for researchers to highlight new work driven by TCIA data
- *Novel Discoveries Using the NCI's Cancer Imaging Archive (TCIA) Public Data Sets*
  Provided attendees with highlights of the latest research enabled by new TCIA datasets
- *Deep Learning - An Imaging Roadmap*
  Chaired by Paula Jacobs, PhD, previous Associate Director, CIP, and provided a survey of trends in cancer imaging and artificial intelligence (AI) from academic, clinical, and industry perspectives

New Sessions in 2019

- *Imaging in Proteogenomics Research*
  Chaired by Janet Eary, MD, Associate Director, CIP, and described ongoing research and new, major NIH data programs in proteogenomics that include cancer imaging

- *Creating Publicly-accessible Radiology Imaging Resources for Machine Learning and AI*
  Provided an opportunity for leaders in the fields of radiology and AI to share their experiences developing and leveraging publicly accessible data resources for AI and showcased TCIA as a resource for imaging data that is easily accessible to AI developers

John Freymann, CIP, speaks at the "Creating Publicly-accessible Radiology Imaging Resources for Machine and Learning and AI" session.

- *Crowds Cure Cancer* kiosk
  Offered radiologists an opportunity to participate in a 'crowd-sourcing' experiment to add to the annotations of the imaging data in TCIA

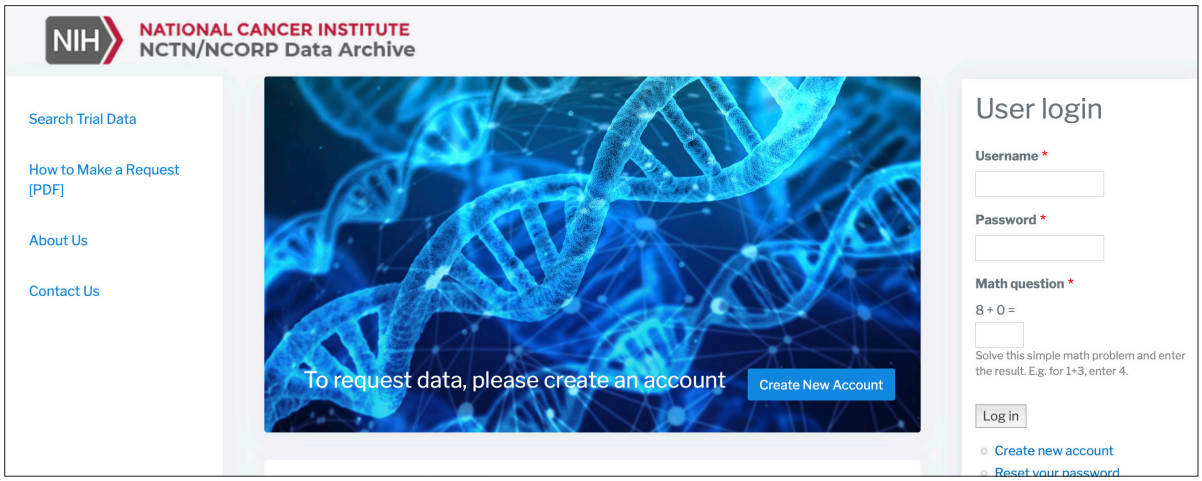
Organizers of the Crowds Cure Cancer booth.

- Nearly one dozen presentations at additional scientific sessions highlighted new research generated from data made available through TCIA

A Highlight from CIP's Quantitative Imaging Network (QIN)

Several years ago, faculty members from Hampton University (Hampton, VA) visited the NIH campus to participate in The Office of Acquisition & Logistics Management (OALM) Path to Excellence and Innovation Program for Historically Black Colleges and Universities (HBCU) to promote interactions with NIH. As a result, Hampton was invited to participate in the QIN as an Associate Member group and was subsequently awarded a $2,000,000 grant from the State of Virginia for imaging facilities to complement their proton beam therapy cancer treatment capability. Robert Nordstrom, PhD, Acting Deputy Associate Director, CIP and QIN Director was a guest of the OALM all participants meeting on February 5, 2020 where the collaboration between the QIN and Hampton University was spotlighted as a successful relationship for the advancement of cancer treatment. Vahagn Nazaryan, PhD, Executive Director, Hampton University Proton Beam Therapy Institute, Bill Thomas, Associate Vice President for Government Relations, Hampton University, and Dr. Nordstrom joined Diane Frasier, OALM Director, on stage at Natcher Auditorium to discuss the QIN-Hampton relationship. Additional funds totaling $11,000,000 are budgeted by the State of Virginia for further advancements at Hampton University resulting from this unique partnership.

NCTN/NCORP Data Archive Provides Access to Clinical Research Data Sets



The NCTN/NCORP Data Archive (the Archive) was launched in early 2017 to make cancer research data more broadly available and accessible to the cancer research community. It is a centralized, controlled-access, web-based database containing patient-level clinical data from phase III clinical trials conducted by NCI's National Clinical Trials Network (NCTN) and NCI's Community Oncology Research Program (NCORP). Groups leading these trials submit de-identified patient-level data to NCI after publication of a trial's primary or subsequent analyses. After appropriate data-quality reviews at NCI, and, when applicable, pharmaceutical collaborator review, these data are added to the Archive, which is continually being updated with clinical data obtained from completed trials.

The Archive complements other NCI data sharing activities, such as those that focus on genomic or imaging data and can be used in conjunction with data that investigators have generated from the use of specimens. Currently, available data from 53 trials represent the experience of nearly 53,000 patients. Submitted trials for which data are available include breast, gastrointestinal, hematopoietic, male reproductive system, lung, central nervous system, kidney, and many others. Interested investigators create an online account, submit a Data Request Form, and sign a Data Use Agreement. Data requests do not undergo scientific review but are assessed for completeness.

Highlights from the Cancer Imaging Archive (TCIA)

- TCIA recently launched its updated website with major enhancements to modernize the site's appearance, improve usability, and provide a new feature to visualize radiology images directly in the browser before downloading them.
- TCIA supports the Clinical Proteomic Tumor Analysis Consortium (CPTAC) with multiple data releases, including recent radiology images from 40 subjects and histopathology images from 82 subjects. Three webinars for

the CPTAC Imaging Special Interest Group (SIG) provided information on the ongoing proteogenomic analyses of the uterine, renal, and lung patient cohorts. Join the SIG, review past and future SIG presentations, and access CPTAC data.

- The AML-Cytomorphology LMU dataset enables researchers to train deep learning models for leukocyte classification. It contains 18,365 expert-labeled, single-cell images taken from peripheral blood smears of 100 patients diagnosed with acute myeloid leukemia, as well as 100 patients without signs of hematological malignancy.

Featured CTEP Trials

- Comparing Photo Therapy to Proton Therapy to Treat Patients with Lung Cancer
- Firstline Pembrolizumab Alone or in Combination with Pemetrexed and Carboplatin in Induction/Maintenance or Postprogression in Treating Patients with Stage IV Non-squamous Non-small Cell Lung Cancer
- Cabozantinib S-malate in Treating Patients with Neuroendocrine Tumors Previously Treated with Everolimus That Are Locally Advanced, Metastatic, or Cannot Be Removed by Surgery

Publications and Outreach

Publications

Konstantinopoulos PA, Norquist B, Lacchetti C, et al. Germline and Somatic Tumor Testing in Epithelial Ovarian Cancer: ASCO Guideline. *J Clin Oncol*. 2020 Jan 27. Epub ahead of print.

O'Reilly EM, Lee JW, Zalupski M, et al. Randomized, Multicenter, Phase II Trial of Gemcitabine and Cisplatin with or without Veliparib in Patients with Pancreas Adenocarcinoma and a Germline BRCA/PALB2 Mutation. *J Clin Oncol*. 2020 Jan 24. Epub ahead of print.

Kolb EA, Houghton PJ, Kurmasheva RT, et al. Preclinical Evaluation of the Combination of AZD1775 and Irinotecan against Selected Pediatric Solid Tumors: A Pediatric Preclinical Testing Consortium Report. *Pediatr Blood Cancer*. 2020 Jan 23. Epub ahead of print.

Patel SP, Othus M, Chae YK, et al. A Phase II Basket Trial of Dual Anti-CTLA-4 and Anti-PD-1 Blockade in Rare Tumors (DART SWOG 1609) in Patients with Non-Pancreatic Neuroendocrine Tumors. *Clin Cancer Res*. 2020 Jan 22. Epub ahead of print.

Navas T, Kinders RJ, Lawrence SM, et al. Clinical Evolution of Epithelial-Mesenchymal Transition in Human Carcinomas. *Cancer Res*. 2020 Jan 15;80(2):304-318.

Allison KH, Hammond MEH, Dowsett M, et al. Estrogen and Progesterone Receptor Testing in Breast Cancer: ASCO/CAP Guideline Update. *J Clin Oncol*. 2020 Jan 13. Epub ahead of print.

Flaherty KT, Gray R, Chen A, et al. The Molecular Analysis for Therapy Choice (NCI-MATCH) Trial: Lessons for Genomic Trial Design. *J Natl Cancer Inst*. 2020 Jan 10. Epub ahead of print.

Johnson DB, Zhao F, Noel MS, et al. Trametinib Activity in Patients with Solid Tumors and Lymphomas Harboring BRAF Non-V600 Mutations or Fusions: Results from NCI-MATCH (EAY131). *Clin Cancer Res*. 2020 Jan 10. Epub ahead of print.

Zeidner JF, Knaus HA, Zeidan AM, et al. Immunomodulation with Pomalidomide at Early Lymphocyte Recovery after Induction Chemotherapy in Newly Diagnosed AML and High-risk MDS. *Leukemia*. 2020 Jan 3. Epub ahead of print.

Sorkin BC, Kuszak AJ, Bloss G, et al. Improving Natural Product Research Translation: From Source to Clinical Trial. *FASEB J*. 2020 Jan;34(1):41-65.

Freidlin B, Allegra CJ, and Korn EL. Moving Molecular Profiling to Routine Clinical Practice: A Way Forward? *J Natl Cancer Inst*. 2019 Dec 23. Epub ahead of print.

Tatum JL, Kalen JD, Jacobs PM, et al. A Spontaneously Metastatic Model of Bladder Cancer: Imaging Characterization. *J Transl Med*. 2019 Dec 19;17(1):425.

Lee JM, Minasian L, and Kohn EC. New Strategies in Ovarian Cancer Treatment. *Cancer*. 2019 Dec 15;125 Suppl 24:4623-4629.

Gripp KW, Schill L, Schoyer L, et al. The Sixth International RASopathies Symposium: Precision Medicine-From Promise to Practice. *Am J Med Genet A*. 2019 Dec 11. Epub ahead of print.

Mulshine JL, Ujhazy P, Antman M, et al. From Clinical Specimens to Human Cancer Preclinical Models – A Journey: The NCI-cell Line Database – 25 Years Later. *J Cell Biochem*. 2019 Dec 5. Epub ahead of print.

Clara JA, Monge C, Yang Y, et al. Targeting Signaling Pathways and the Immune Microenvironment of Cancer Stem Cells – A Clinical Update. *Nat Rev Clin Oncol*. 2019 Dec 2. Epub ahead of print.

Basu A, Warzel D, Eftekhari A, et al. Call for Data Standardization: Lessons Learned and Recommendations in an Imaging Study. *JCO Clin Cancer Inform*. 2019 Nov;3:1-11.

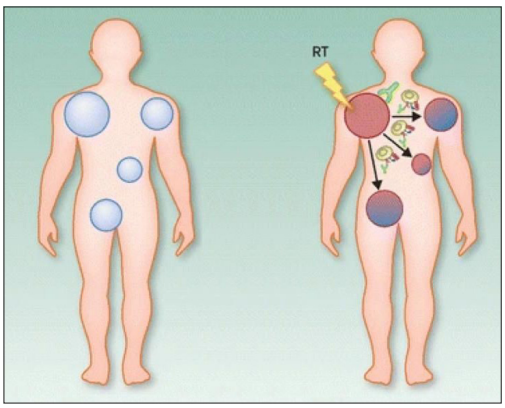
Selumetinib in Paediatric Patients with BRAF-aberrant or Neurofibromatosis Type 1-associated Recurrent, Refractory, or Progressive Low-grade Glioma: A Multicentre, Phase 2 Trial, which was published online in *Lancet Oncol* in May 2019, was Included in Clinical Cancer Advances 2020: Annual Report on Progress against Cancer from the American Society of Clinical Oncology.

NCI Cancer Currents Blog Posts

Is Proton Therapy Safer than Traditional Radiation?; Jeffrey Buchsbaum, MD, PhD, Radiation Research Program; February 11, 2020.

Surgery for Recurrent Ovarian Cancer Does Not Improve Survival; Elise Kohn, MD, Cancer Therapy Evaluation Program; December 10, 2019.

Off Target: Investigating the Abscopal Effect as a Treatment for Cancer; Mansoor Ahmed, PhD, Radiation Research Program; January 28, 2020.



Targeted Drug Trio Improves Survival in Colorectal Cancer with BRAF Mutations; Carmen Allegra, MD, Cancer Therapy Evaluation Program; November 13, 2019.

Interviews and Press

America Is about to Get a Powerful Tool in the War against Cancer; Jeff Buchsbaum, MD, PhD, Radiation Research Program; CNBC; January 18, 2020.

Immunotherapy Drug Improves Outcomes for Some Children with Relapsed Leukemia; NCI Press Release; December 10, 2019.

Multitumor "Exceptional Responder" Program in Australia Seeks to Gain Clinical Context; Percy Ivy, MD, Cancer Therapy Evaluation Program; November 12, 2019.

New DCTD Funding Opportunity and Funding Information

TITLE	ANNOUNCEMENT NUMBER	OPENING DATE	EXPIRATION DATE	ACTIVITY CODE
Radiobiology of High Linear Energy Transfer (High LET) Exposure in Cancer Treatment (Clinical Trial Not Allowed)	RFA-CA-20-032	February 19, 2020	March 20, 2020	R01
Innovative Molecular and Cellular Analysis Technologies for Basic and Clinical Cancer Research (Clinical Trials Not Allowed)	RFA-CA-20-017	January 21, 2020	September 30, 2020	R21
*Notice of Correction and Clarification to PAR-18-947 Integrating Biospecimen Science approaches into Clinical Assay Development	NOT-CA-20-029	October 28, 2018	July 12, 2021	U01

*Expanded to include tissue swabs, tissue secretions, pleural and esophageal aspirates, feces, or bodily fluids like sweat, urine, CSF, breast milk and saliva (previously limited to small biopsies and blood for liquid biopsies)