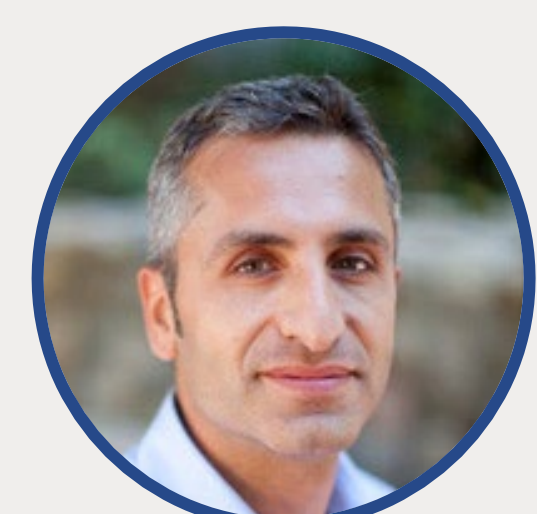




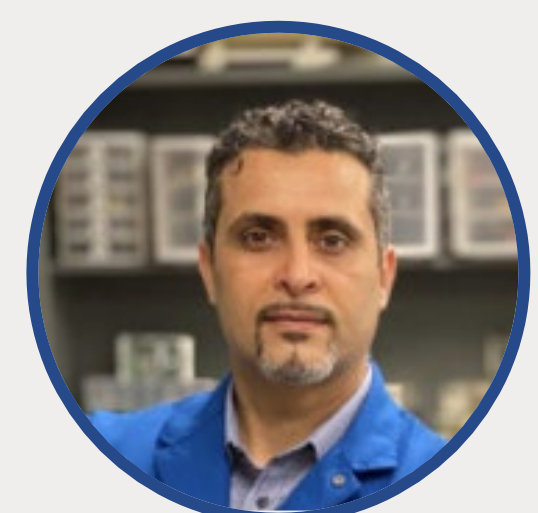
Leadership & Team



Gultekin Gulsen, PhD
Co-Director



Zhuoli Zhang, MD, PhD
Co-Director



Farouk Nouzi, PhD
Facility Manager



Lena Qin
Animal Tech

Mission

Enhance and support basic and clinical cancer researchers by providing them with the necessary expertise, imaging instrumentation, and image analysis techniques.

To fulfill this mission, IVFOI:

- provide high-quality image acquisition and data analysis services for translational clinical studies;
- establish several multi-modality imaging systems to support innovative imaging studies; and
- develop several cutting-edge technologies for quantitatively accurate high-resolution small animal imaging and translate them to clinical settings

Services

Existing systems (on Irvine campus):

- MR: 3.0 T (human & animal) | MR: 9.4 T (animal)
- Combined MRI & Optical Tomography (animal)
- Combined X-ray micro CT & Fluorescence Tomography (animal)
- Hybrid MRI & SPECT (animal)

Existing Systems (located at UCI Medical Center):

- PET/CT & PECT/CT (clinical scanners available at UCIMC)
- MR (1.5 & 3 T - clinical scanner available at UCIMC)

Systems currently under development or under acquisition:

- Micro SPECT/CT (Hitachi, animal)
- Micro PET/CT (Siemens, animal)
- MRI Sodium Imaging (brain cancer)
- Hybrid MRI/Scintimammography (breast cancer)
- Hybrid MRI/Positron Emission Mammography (PEM)
- Temperature-modulated Fluorescence Tomography (animal)
- Photo-magnetic Imaging (animal)

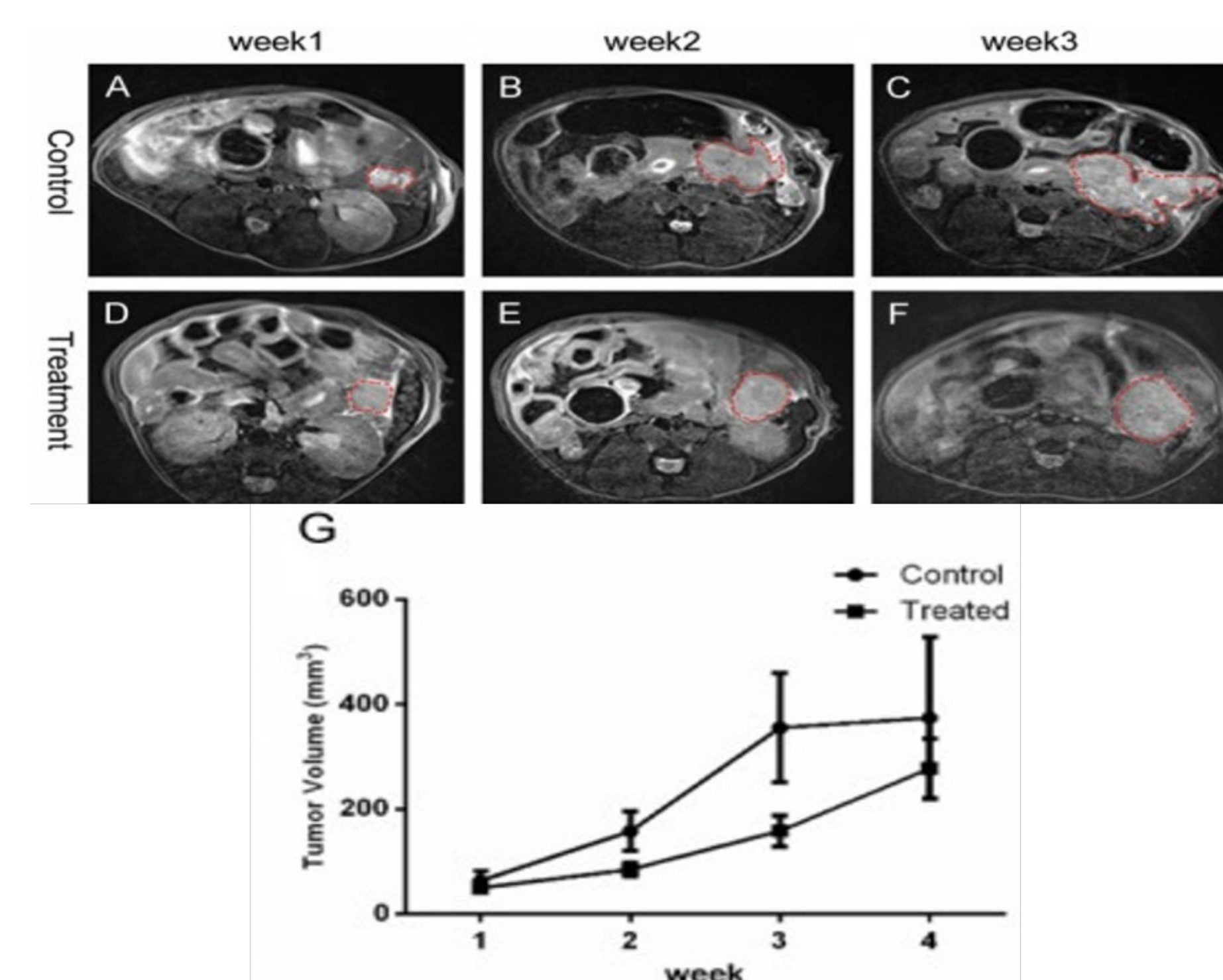


Further information regarding all offered services can be found at the website: <https://cancer.uci.edu/ivfoi>

Research Highlights

1 | Image-guided Interventional Combination Liver Cancer Immunotherapy

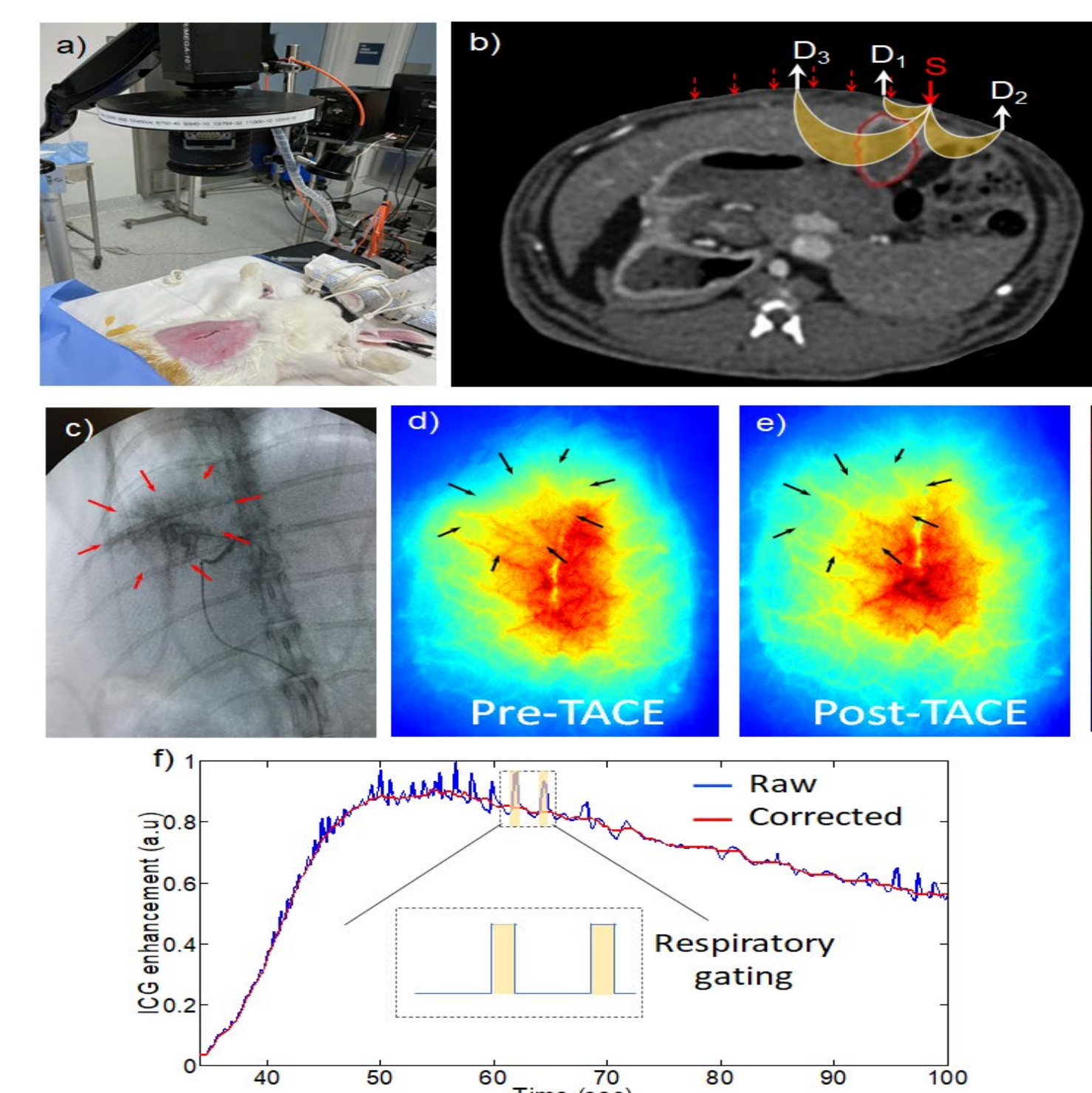
Z. Zhang (BIDD)



- The purpose of the study is to improve therapeutic response in HCC as combining FDA-approved sorafenib drug therapy with natural killer cell immunotherapy.
- In collaboration with IVFOI, an animal model of HCC was monitored using MRI scanner following different treatment strategies e.g. sorafenib, memory-like NK cell immunotherapy response and sorafenib plus NK cell immunochemotherapy.
- During the first of the studies, significantly advanced therapeutic response were observed in different HCC animal models.
- By integrating FDA approved drug and immune therapy approach, translational value of the recent study was obtained.

2 | Development of an optical molecular imaging system for TACE

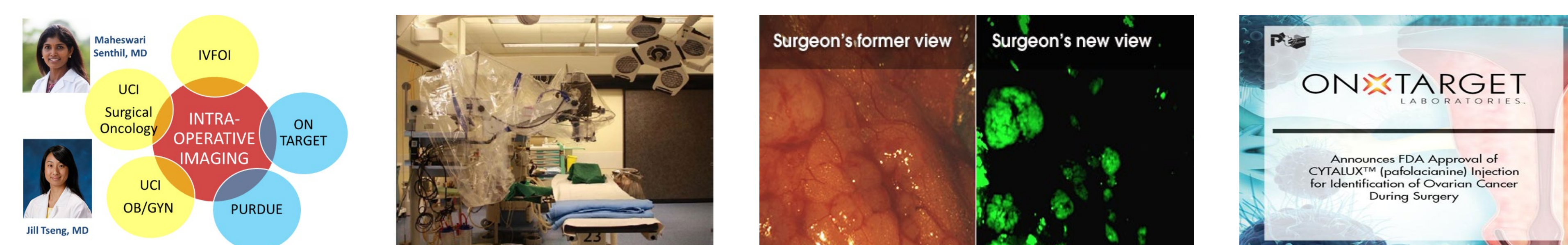
G. Gulsen (BIDD), N. Abi-Jaoudeh (BIDD)



50% of patients with HCC will be treated with trans-arterial chemoembolization using Lipiodol conventional TACE (cTACE). Complete lipiodol coverage of the tumor is associated with improved outcomes. This project is geared towards developing and optical molecular imaging system to evaluate the effect of. Figure shows the preliminary results obtained on a rabbit bearing VX2 tumor undergoing the TACE procedure. Dynamic Florescence Images were acquired before and after the TACE with the injection of Indo-cyanine Green (ICG)).

a) Experimental setup. b) CT axial slice showing the positioning of the source points (S) and representative three detector pixels (D1-3) positioned at different distances from the source, which allows probing different depths. The sensitivity of the optical measurement is presented using the banana shapes that allow separation between superficial and deep tissue. c) X-ray fluoroscopy image showing the position of the tumor (red arrows). The planar DynFI image at the maximum enhancement: c) Pre-TACE and d) Post-TACE. e) Representative kinetics profile: raw (blue) and the corrected (red) using a respiratory gating

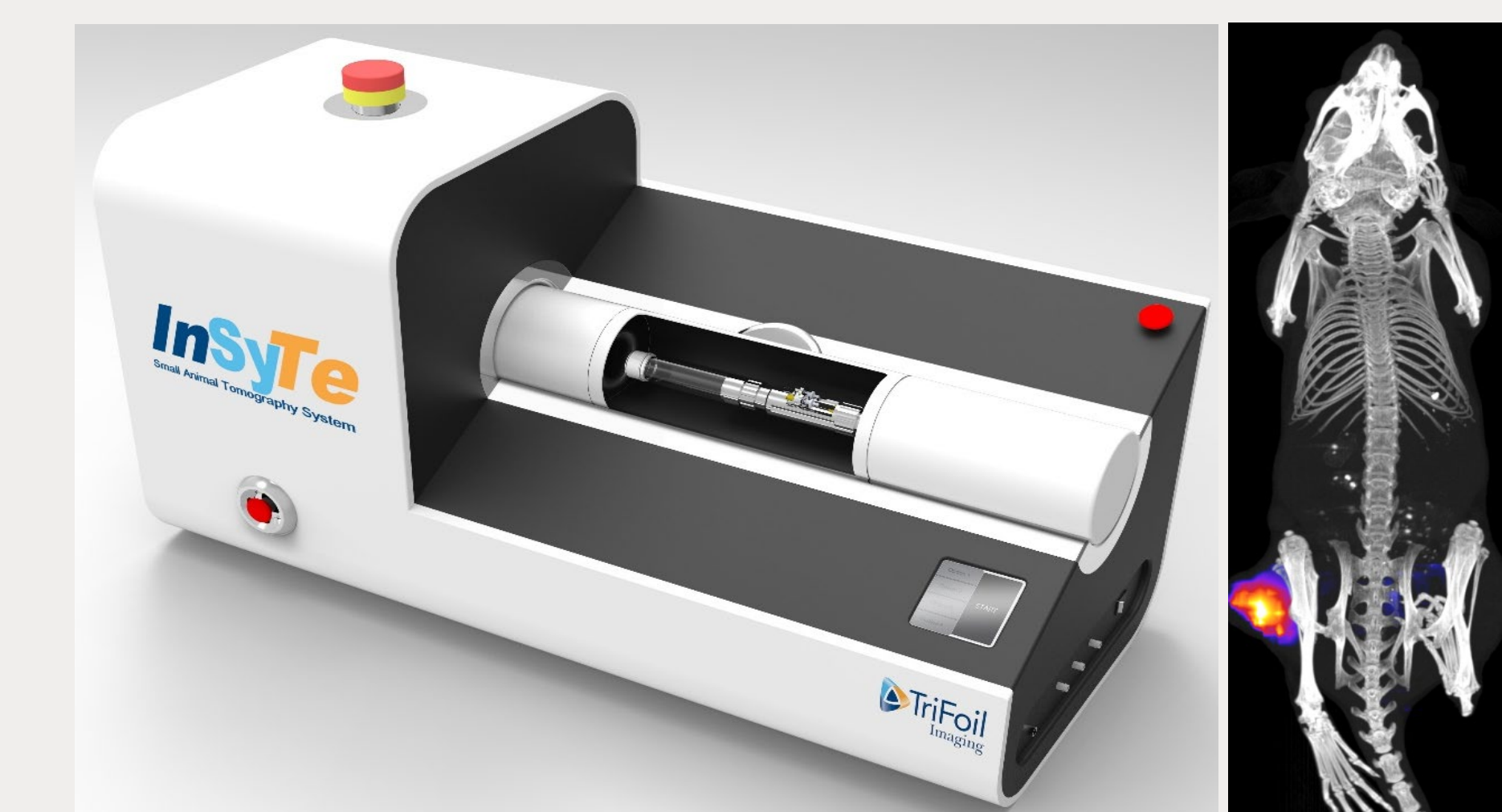
3 | Folate Targeting Optical Probes for Fluorescence Imaging Guided Ovarian Cancer Debunking Surgery: Cytalux



- Folate Receptor is highly expressed in ovarian cancer. A fluorescent folate analog (Cytalux) binds to the receptor with high affinity (1nM).
- Cytalux fluorescence can be excited by near-infrared light during surgery to identify and illuminate ovarian cancer lesions
- IVFOI played a key role in making UCI a site for Phase II and III clinical trials of Cytalux for ovarian cancer surgery
- FDA Approval of this first-of-kind novel optical molecular probe was announced Nov. 29, 2021
- IVFOI is now helping Dr. Senthil to apply Fluorescence Intraoperative Imaging with Cytalux for Colon Cancer Surgery
- IVFOI is now working with PI Dr. Phil Low (faculty member of Purdue University (NCI) Center for Cancer Research) to develop a swept-wavelength laser based intra-operative surgery camera

Key Equipment & Technologies

Our LA based industrial collaborator, TriFoil, Inc, installed one of their commercial X-ray CT/Fluorescence Tomography machine into IVFOI, which is now open to any cancer member user **for free**.



The TriFoil imaging platform and an example 3D fluorescence image of a 4T1 tumor bearing mice



Our 3T and 9.4T MRIs can provide unprecedented anatomic and functional MR images for preclinical and clinical research studies. Please do not hesitate to contact us for **free pilot study** imaging opportunities.

Future Plans

- We are helping our industry collaborator Endocyclic Therapeutics, an Orange-County based company by MR Imaging of Endometriosis for their novel therapeutic agent ENDO-210.
- We established a service contract with San Diego-based industrial collaborator ClearPoint, Inc. to test their MR guided therapy platform in our 3T MRI system.
- We are expanding our service area by helping/encouraging CFCCC members to utilize Artificial Intelligence (AI) in their research by collaborating with the UCI Center for Artificial Intelligence in Diagnostic Medicine (CAIDM).
- Our 3- year STTR grant (\$1.5 M) with TriFoil Inc. (PI Gulsen), to improve their photodiode-based Fluorescence Tomography imaging system by adding an integrated CCD camera is being funded by NIH.