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Optical Surgical Navigation Workshop Highlights Advancements Targeted at Improving Surgical Outcomes

Held in Conjunction with World Molecular Imaging Congress 2014 in Seoul, Korea

CULVER CITY, Calif., October 14, 2014 – The world’s leading basic-scientists and surgeon-scientists recently convened at the Optical Surgical Navigation Workshop, held in conjunction with the 7th annual meeting of the World Molecular Imaging Society in Seoul, Korea. Co-organized by Professors Hyun Koo Kim of Korea University Guro Hospital, a lung cancer surgeon-scientist, James Basilion of Case Western Reserve University in Cleveland, Ohio and Michael Tweedle of Ohio State University, the workshop covered emerging molecular applications and intraoperative optical surgical navigation designed to significantly improve surgical outcomes.

Surgeons traditionally guide their hands with their eyes and sense of touch (palpation). Imaging has long guided the surgeon’s strategy, like using the results of PET and MRI scans taken days prior to the actual operation. However, optical imaging is rapidly emerging as a very powerful intraoperative tool to mark and visualize tissues, cells, and biochemical events in real time guiding the surgeon in radical resection to achieve optimal clinical results through the application of laser light, CCD cameras, light emitting chemical agents, and ultraminiaturized microscopes. Used in real time in the operating room, these technologies are collectively dubbed intraoperative imaging and surgical navigation.

“We are seeing an incredible emergence of tools for image-guided surgeries that will improve tumor resection and preserve normal tissues. These technologies range from wide-field imaging tools that can visualize the entire surgical area, to hand-held microscopes that enable removal of residual cancer cells after most of the cancer has been resected. These approaches hold tremendous promise for breast preserving surgeries and precise resection of brain cancer, and many other diseases. There has been a concomitant surge in new microscope technologies for studying the inner workings of cells and these advances have been rewarded with recent Nobel Prizes in chemistry. The new elegant imaging tools that use light to study biology and reveal patterns of disease are revolutionizing our understanding of how our cells, tissues, organs, and bodies work in real time and over a range of scales from subcellular to entire organisms,” said Christopher H. Contag, director, Stanford Center for Photomedicine and co-director, Molecular Imaging Program at Stanford (MIPS).

Highlights of the Optical Surgical Navigation Workshop include:

- **Use of Optical Probes for Infectious Disease Imaging:** Imaging scientists are working to implement real-time imaging with targeted fluorescent agents that sniff out cancer cells like molecular bloodhounds, then respond to applied laser light by fluorescing at a wavelength detectable by filtered CCD camera systems that can process the data and overlay the signal from the cancer- or bacteria-bound molecules onto the surgeons vision field. “You can make that signal any color you want to contrast it with the color of natural tissue” said Perkin Elmer’s Kevin P. Francis, Ph.D., who focused his lecture on infection imaging with the company’s new multichannel veterinary operating room camera that can detect several simultaneous agents emitting different wavelengths.
- **Imaging Surgically Removed Tissue in Real-Time:** Rather than waiting a week for a pathology report, researchers are investigating the ability to image surgically removed tissue in real time with a topically applied cancer cell stain to immediately inform the surgeon’s actions. “We are hopeful that our technology can reduce the ~25% re-surgery rate in breast cancers,” noted James Basilion, Ph.D., who is developing the technology in collaboration with Go van Dam, MD, PhD, of the University of Groningen in The Netherlands.

- **Translational Intraoperative Optical Surgical Navigation** is on the verge of executing a multitude of clinical studies conducted in Europe (using mainly antibodies and nanobodies) and several institutions in the United States. It is anticipated that within the next five years, Phase II studies will deliver the necessary data for larger multicenter studies on image-guided surgery in breast, head-and neck and colorectal cancer. Highly novel targeted nanoparticles were discussed together with the use of currently approved imaging agents to identify surgical margins in brain tumors (5-ALA) and sentinel lymph nodes (ICG) for in both lung and breast surgeries. “We also had significant presentations describing new tools for in vivo microscopic assessment of tumor margins and other biology,” said Michael Tweedle, Ph.D., whose presentation focused on overcoming the challenges researchers face in financing and lifting their discoveries through regulatory and reimbursement bureaucracies.
- **Optical Surgical Navigation:** A number of presentations and workshop discussion groups touched on the utility of molecular imaging, including optical imaging, to manage surgical intervention for infections and its emergence as a growing emphasis for intraoperative imaging (not just about cancer). Researchers from Korea demonstrated the cutting edge in the use of ICG and 5-ALA for optical surgical navigation in humans.

Designed to cover molecular applications and instrumentation used in intraoperative optical surgical navigation and to include topics such as: clinical application, safety and efficiency, workflow, regulatory, clinical trial end points, pharmaceuticals and tissue dyes, the Optical Surgical Navigation Workshop concluded by Dr. Tweedle summarizing the likely regulatory hurdles and common sense decisions that need to be made to get these optical imaging agents through the system and into clinical practice.

ABOUT WORLD MOLECULAR IMAGING SOCIETY

The WMIS is dedicated to developing and promoting translational research through multimodal molecular imaging. The education and abstract-driven WMIC annual meeting is held in conjunction with European Society for Molecular Imaging (ESMI) and Federation of Asian Societies for Molecular Imaging (FASMI). WMIC provides a unique platform for scientists and clinicians with very diverse backgrounds to interact, present, and follow cutting-edge advances in molecular imaging. Industry exhibits at the congress include the latest advances in preclinical and clinical imaging applications creating a complete molecular imaging educational technology showcase. For more information: www.wmis.org

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