Innovative Medical and Information Technologies (IMITs) Center
Integrated Medical Information Technology System (IMITS) Program
TELEPATHOLOGY PROJECT

IMITs CENTER

The success of the projects initiated by the collaborative efforts of the University of Pittsburgh Medical Center (UPMC) and the Air Force Medical Services (AFMS) galvanized the creation of the Innovative Medical and Information Technologies (IMITs) Center. The IMITs Center strives to develop, integrate, evaluate and streamline medical technologies and workflow to broadly improve medical treatment. Of particular interest are telemedicine initiatives, originally funded in 2002 by the Department of Defense (DoD) and classified as the Integrated Medical Information Technology System (**IMITS**) Program. Telemedicine uses digital data and telecommunications technology to facilitate the rapid, efficient and confidential transfer of medically relevant information. Telepathology represents a burgeoning field of telemedicine, with the potential to improve the speed and power of diagnostics in both the public and private sectors.

TELEPATHOLOGY

Telepathology (also commonly referred to as digital pathology) describes the transfer of image-rich pathology data between locations, facilitating improved diagnostic communication and providing educational and research opportunities. Telepathology can be classified as either static or dynamic. **Static telepathology** involves the digital transmission of captured pathology data. That is, screen shots or high resolution scans of entire slides, called whole slide images, are acquired at a referring site and transmitted digitally to a remotely consulting site. **Dynamic telepathology** involves a specialist at a remote site accessing and navigating slides, in real time, underneath the host site's camera-equipped microscope. Dynamic telepathology permits the consulting pathologists to "drive" the microscope - evaluating the slide at a desired pace, adjusting settings and viewing areas of the tissue at will. Both areas of telepathology allow for rapid consultation, eliminating the necessity for the physical transfer of glass slide specimens. Experts can quickly assess images and make diagnoses, improving turn-around time (TAT) and patient care.

The absence of a trained pathologist on site therefore does not preclude accurate diagnosis. With the integration of digital pathology, real time remote case review, real time image review and delayed image review can be easily conducted. Second opinions, additional subspecialty reviews, sign-out collaborations and expert reviews can be readily coordinated and carried out. This may be the only way in which some of the aforementioned imperative procedures can be accomplished, especially when considering their extreme time-sensitivity. Furthermore, case histories can be digitally preserved without risk of loss, damage or degradation of the glass slide.

BATTLEFIELD MEDICINE

The critical shortage of specialists in both the military and civilian sectors is compounded by the ever-present threat of bio-terror attacks and the instance of subtly presenting pathologies. The **IMITS Telepathology Project** sets out to alleviate these burdens by bringing together the greatest minds and the best resources in government, academia and private industry. Particular emphasis, which is highly relevant to the Air Force and other branches of the military, lies in improvement of battlefield medicine - defined as the treatment of soldiers, domestic or abroad, in combat environments.

Military combat and disaster environments (settings in which Air Force presence and service is essential) demand efficient diagnostic and treatment approaches. Increasingly frequent and severe bioterrorism threats to both domestically stationed and broadly deployed citizens

and soldiers necessitate rapid, thorough, accurate pathology strategies to prevent and contain pathogen spread and disease outbreak. By detecting and diagnosing an outbreak quickly, morbidity and mortality can be minimized. This becomes even more important as a means of meeting the shortage of medical professionals in the military.

IMITS TELEPATHOLOGY PROJECT

The **IMITS Telepathology Project** was initiated in 2002 as part of the original IMITS Program in an effort to supplement current Air Force pathology standard practice and improve the treatment of soldiers. The primary objective of the **Telepathology Project** is to implement digital and telepathology Air Force-wide: familiarizing Air Force practitioners with the technology, creating a database for education and training, and increasing the visibility and expediency of digital pathology in the military. Through the use of rapid, accurate, thorough diagnostics, this technique, complimentary to standard glass slide workflow, will improve current practice and serve as a model for large hospitals and academic institutions while delivering state of the art care to soldiers and patients.

Air Force-wide Digital Pathology

Implementation of digital pathology is challenging, as pathologists are extremely comfortable with their current practice. Although well-accepted and functional, conventional (glass slide) pathology workflow can be improved with digital technologies; this is especially true in light of increasing demands on pathologists involving reporting, TAT and patient safety. Historically, adoption of novel methods in pathology has required outside encouragement, compelling pathologists to modify their practice and adapt to the changing environment. Integration of digital pathology into current applications along with the creation of user-friendly interfaces will enhance the immediate appeal of digital pathology. These are areas in which the **Telepathology Project** is encouraging commercial development through their longstanding influential relationships with field-leading vendors.

System Deployment & Validation

In 2003 UPMC purchased the equipment necessary to set up a static image system for which the USAF also obtained network security. In the years since, DITSCAP has granted network certification. Currently the AFMS is pursuing information systems security accreditation for a robotic microscopy system and a whole slide imaging system.

Following system roll-out, the **Telepathology Project** will conduct validation (proof of concept) studies sufficient to demonstrate the utility and effectiveness of digital and telepathology implementation in USAF pathology. These studies are designed, and will be conducted and analyzed jointly by UPMC and USAF pathologists and image experts in order to assess image quality, image serving and diagnostic accuracy. The results will be utilized to evaluate opportunities for optimization of USAF pathology workflow, cost efficiency and quality assurance procedures.

Air Force Champion Promotion and Training

The training of Air Force pathology practitioners will be accomplished in a multi-step process. Advocates for digital pathology within the Air Force, including pathology fellows and residents, will be identified. These advocates, termed **Champions**, will be selected with particular emphasis on their interest in digital pathology. Champions will be trained through digital pathology courses and labs developed by a UPMC-based on needs assessment. The expertise and enthusiasm of the champions will be employed to raise awareness and understanding of digital pathology, explore and implement efforts to integrate digital pathology into USAF standard practice, identify opportunities and offices

within USAF and DoD that can support digital pathology, and analyze long-term strategic trends in the USAF that would benefit from digital pathology.

Database Development
In order to train present and future champions, as well as UPMC and Air Force pathologists and pathology students, a database of digital pathology cases is under development. This database and accompanying software provides excellent teaching modules, research fodder and diagnostic examples. The database will be used in the first phase of digital imaging introduction. The database is co-designed by UPMC and USAF pathologists and computer specialists. It will accessible via secure internet connection at all participating sites and is equipped with pre-programmed and customizable features.

Annual Telepathology Symposium
The initiation of an annual digital pathology symposium will provide an enduring forum for sharing knowledge, expertise and advice gained through experimentation and real life application. The forum, intended to engage experts, novices and vendors will not only emphasize and acknowledge **Telepathology Project** accomplishments, but it will explore and develop future goals and directions for digital pathology in the USAF.