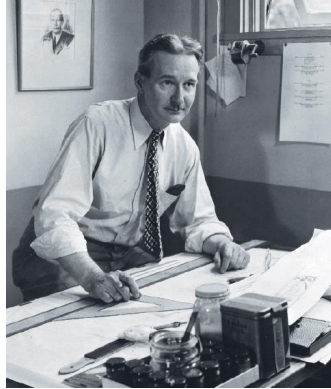


For ~40 years following WWII, the AFIP experienced tremendous growth of its personnel, missions, subspecialties and capabilities



Aerospace & Veterinary Pathology



Medical Illustration



Subspecialty-based practice and education

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As it grew, the AFIP became the world's premier pathology consultation center and was staffed by the best diagnosticians of the day



Dr. Franz Enzinger – 1961
WHO Classification of Soft Tissue Tumors



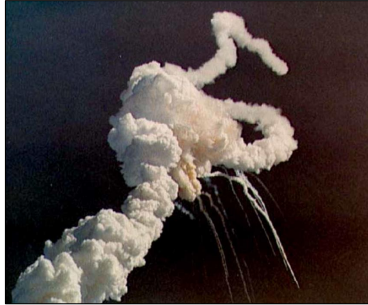
Dr. Fathollah K. Mostofi, 1972
WHO Classification of Testicular Tumors

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In the last decades of the 1900s, the AFIP established new capabilities and technologies, e.g. Armed Forces Medical Examiner System (AFMES) and Armed Forces DNA Identification Laboratory (AFDIL)



1986 – forensic investigation of the Space Shuttle Challenger disaster



1998 - mtDNA testing of remains from tomb of the unknown soldier at Arlington Cemetery

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Adoption of molecular technologies at the AFIP empowered groundbreaking studies, e.g. sequencing of the virus in autopsy tissue from the “Spanish Flu” pandemic of 1918



Soldiers with the “Spanish flu” in 1918



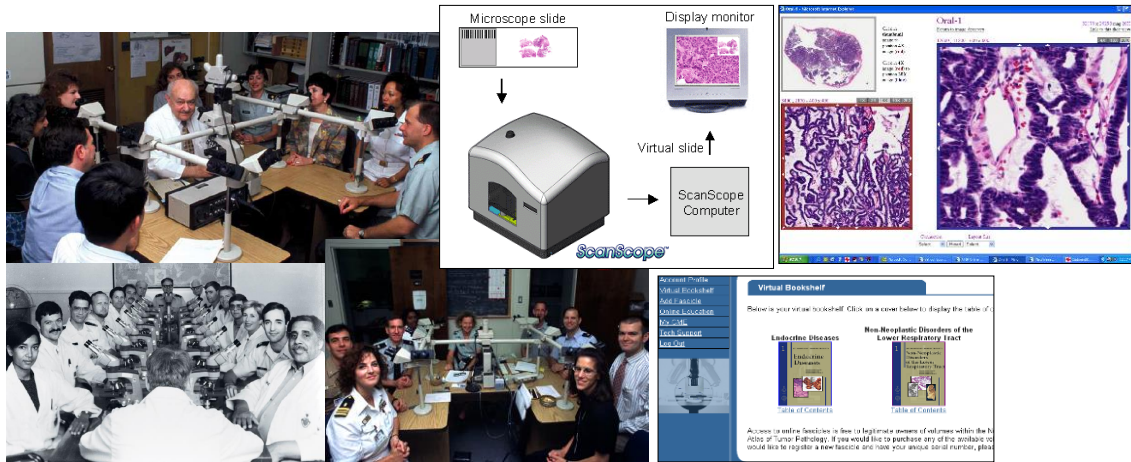
Drs. Ann Reid and Jeffery Taubenberger

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Education remained central to the institute's mission throughout its history



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The institute constantly adapted to the challenges of the day in order to serve the military, the nation and humanity

Forensic assessment of Pentagon attack on 9/11



Drs. Ann Nelson and Florabel Mullick establishing a registry perinatal HIV cases in Africa in 1988



Anthrax molecular testing in 2001

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In 2011, the AFIP was disestablished and The Joint Pathology Center (JPC) was established

- In 2005, the Base Realignment and Closure (BRAC) Commission recommended that the AFIP be disestablished.
- The historical goal of BRAC was to achieve savings by eliminating excess capacity in order to enhance military value.
- In 2008, the National Defense Authorization Act created The Joint Pathology Center to continue the AFIP's duties and to maintain and modernize the repository.

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Agenda

1. History of military pathology, including the AFIP
2. Present status of the Institute: The Joint Pathology Center
3. Future Directions

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Like the AFIP, the JPC's mission is to support secondary pathology consultations, education and research and to maintain and modernize the repository

- Currently, the JPC serves only federal pathologists, so civilian consultations are no longer provided.
- Several divisions of the AFIP became separate institutions (e.g. AFMES, AFDIL, National Museum of Health and Medicine)



The Joint Pathology Center main building, Silver Spring, MD

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To support consultations, education and research, the JPC currently has 30 pathologist in 19 subspecialties

- | | |
|----------------------------|-------------------------------|
| • Breast | • Head and Neck |
| • Cardiovascular | • Infectious Disease |
| • Cytopathology | • Molecular |
| • Dermatopathology | • Neuropathology & Ophthalmic |
| • Endocrine | • Orthopedic |
| • Environmental | • Pediatric |
| • Gastrointestinal/Hepatic | • Pulmonary & Mediastinal |
| • Genitourinary | • Nephropathology |
| • Gynecologic pathology | • Soft Tissue |
| • Hematopathology | |

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The JPC also has a veterinary pathology division to serve DoD-affiliated animals



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For over a century, the institute kept the cases it received, which grew to become the world's largest repository of slides and paraffin embedded tissues.

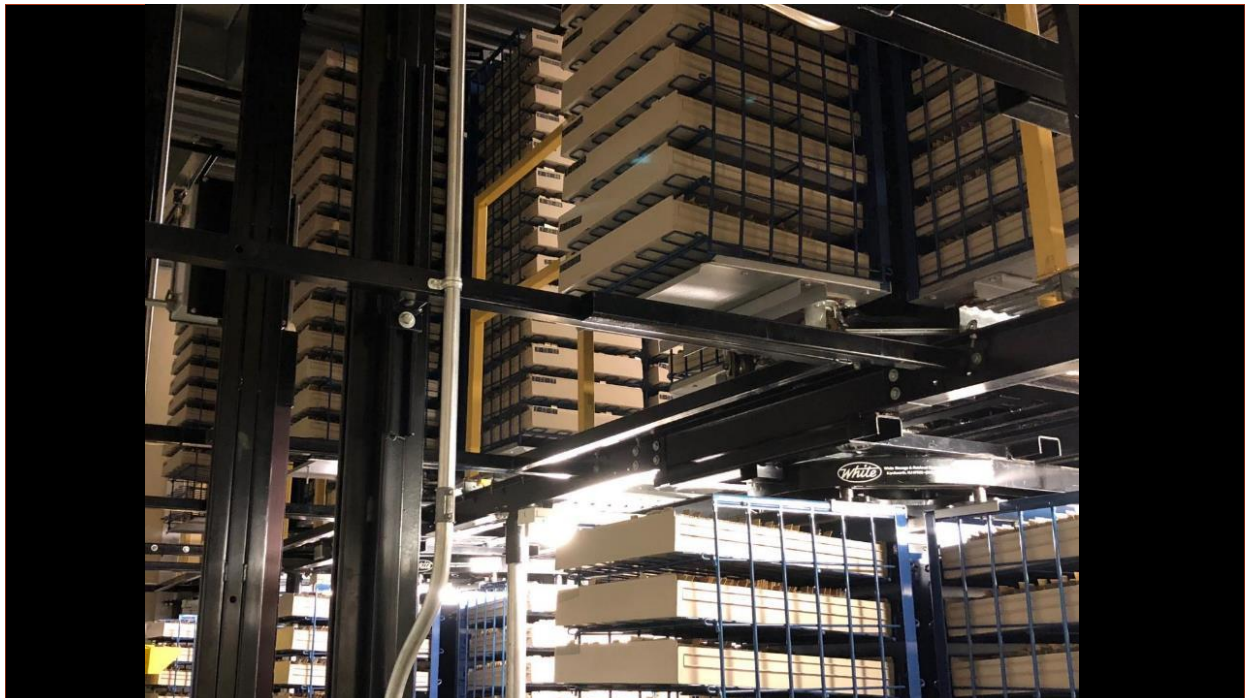
- Established 1917
- 55M slides, 31M tissue blocks
- Large collections of common and uncommon diseases
- Many new diseases were discovered at the institute



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The repository continues to support multiple registries that track the health of active duty service members and veterans

- Pulmonary and Environmental Registry
- Operation Iraqi Freedom, Operation Enduring Freedom, Operation New Dawn Registries
- Agent Orange/Vietnam Service Registry
- Former Prisoner of War Registry

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We believe the JPC repository is an unrivaled source of high quality data for machine learning

- Rare and challenging cases from across the world
- Racially diverse
- Wide range of pre-analytical factors
- Could potentially be linked with other sources of data within the DoD and the VA.

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On 5Mar2020, the Defense Innovation Board voted unanimously to recommend the JPC digitally transform its repository – 6 recommendations

1. Pilot on slide scanning – 1-2M million slides in 1 year
2. Pilot on linkage to medical records – connecting slide data to electronic health record data
3. Pilot on molecular annotation – to add molecular data to slides to enhance AI
4. Process improvement plan – to help ensure quality and efficiency of scanning
5. Partnership plan – defining desired partnerships and partnership structures
6. Fully digitized and accessible repository



Defense Innovation Board

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With the DoD's support, the JPC has begun a phased digital transformation initiative

- Phase I – End to end scanning process (Minimal Viable Product)
- Phase II – Scanning at scale, data integration, data governance
- Phase III – Partnerships to develop machine learning prototypes



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The JPC has already used some of its data to develop prototype artificial intelligence algorithms.

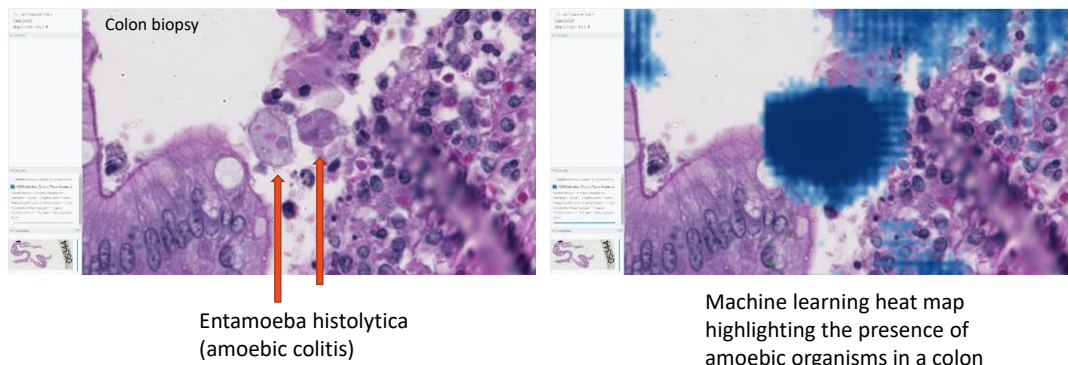
- The JPC has a large collection of infectious disease cases.
- >10,000 cases were used as a training set for an infectious disease algorithm



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Bottom Line

- The U.S. Military has countless historic contributions to modern pathology.
- As of 2011, the Armed Forces Institute of Pathology (AFIP) became The Joint Pathology Center (JPC), which serves patients from federal healthcare facilities.
- The JPC has the world's largest repository of slides and paraffin embedded tissues, which is being digitally transformed in support of research to develop machine learning algorithms.

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THANK YOU!

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