

Diagnostic Programs

Yale Pathology Labs are part of the Department of Pathology at the Yale School of Medicine. At Yale Pathology Labs, science and medicine converge as the latest research is transferred directly to the patient. We offer state-of-the-art diagnostic services in Cytopathology, Surgical Pathology, and Autopsy, supported by a variety of specialty laboratories: Cytoprep, Electron Microscopy, Histology, Immunohistochemistry, and Molecular Diagnostics.

Led by anatomical pathologists specialized in **Cytopathology** as well as in different domains of surgical pathology, our team of certified cytotechnologists analyze over 100,000 specimens a year and conduct a wide array of tests, including the following: early detection of cervical cancer, squamous cell carcinoma, endometrial adenocarcinoma, ovarian adenocarcinoma, HPV testing, bronchial lavages (pneumocystis carinii, aspergillus), fine needle aspirations (lung, liver, thyroid, pancreas), body fluid cytology (pleural, peritoneal, pericardial), mesothelioma, metastatic adenocarcinoma, and circulating tumor cells.

Our board-certified pathologists are experts in most subspecialty areas and offer complete services for all **Surgical Pathology**

needs. Their consultative reports are issued only after the clinical and radiological data have been integrated with the morphological findings and the tissue specimen has been analyzed using the most modern technologies. The clinical programs encompassed by Surgical Pathology include the following: Bone and Soft-Tissue Pathology, Breast Pathology, Dermatopathology, Endocrine, Head & Neck Pathology, Gastrointestinal Pathology, Genitourinary Pathology, Gynecologic Pathology, Hematopathology, Neuropathology, Ophthalmologic Pathology, Oral and Maxillofacial, Pediatric Pathology, Renal Pathology, and Thoracic Pathology.

Autopsy Pathology continues to contribute to medical practice and patient care by constantly honing and refining our understanding of the late stages of disease and assessing the efficacy of both diagnostics and therapeutic interventions. Causes of reproductive failure and inherited diseases responsible for life-threatening congenital defects are studied by our specialized neonatologists and pediatric pathologists. Our expertise and state-of-the-art facilities do not only bring the obvious benefits to health care and education, but also help individual families by providing information (for example, about inherited predisposi-

tions, or about potential for contagion by infectious agents) that is useful to the surviving members of the family, and by providing objective answers to any questions they may have. The Autopsy Service will perform for-fee postmortem examinations on patients treated outside the Yale Medical Center.

The Department of **Laboratory Medicine** collaborates with Yale Pathology Labs to provide a complete and extensive test menu for our clients. Besides routine tests, specialized consultation and tests include, but are not limited to, therapeutic drug monitoring, flow cytometry, special coagulation testing for bleeding disorders and hypercoagulable states, and advanced infectious disease testing including rapid virology diagnostics.

The DNA revolution in biology and the completion of the human genome sequence have propelled **Molecular Diagnostics** to the front lines of clinical care. Yale Pathology Labs were among the first to adopt these technologies and have developed an efficient laboratory devoted exclusively to state-of-the-art applications that can in many instances provide clear and objective answers to difficult diagnostic or prognostic dilemmas.

Personalized Medicine in Cancer Care

The delivery of cancer care is becoming ever more complex, involving multiple disciplines for the diagnosis and the treatment of patients. In response, Yale Pathology Labs and the Yale Cancer Center have developed multidisciplinary clinical programs to care for patients diagnosed with different types of cancer. These clinical programs allow physicians and specialists at Yale Cancer Center to focus their skills on each specific type of cancer, enabling them to provide superior care to our patients through a patient-friendly system of care led by a patient care coordinator. The internationally and nationally recognized faculty within the programs provide unparalleled cancer expertise and are leaders in both the treatment of cancers and the development of innovative treatment strategies.

While some diseases are treated in the absence of a tissue diagnosis, it is accurate to say that no cancer therapy is ever administered without a pathological diagnosis. In most instances, subtle-

ties of the pathological interpretation modulate the combination of therapies best suited for a patient, and these subtleties are discussed in the multidisciplinary, patient-focused working groups known as "tumor boards." The expansion of the Yale Cancer Center and the recent opening of the Smilow Cancer Hospital, greatly increase our pathologists' capacity to work in a tightly integrated multidisciplinary mode.

With the recent progress in the understanding of cancer biology, the creation of new technologies, and the development of targeted therapies, comes the opportunity for pathology to contribute to personalized, efficient, and precise cancer medicine. It is no longer sufficient to characterize a tumor only by its appearance and the degree of resemblance to the tissue of origin. Patients with many common tumors (e.g., breast, lung, colon) benefit from an in-depth analysis of their tumors at the molecular level, enabling the therapist to select specific drugs and to pre-

dict, or follow, the response with enhanced accuracy. Yale Pathology Labs excel in these molecular diagnostic areas.

The Tumor Profiling Laboratory provides high-throughput testing of tumors for mutations that predict likely responsiveness or resistance to targeted therapeutic agents. For this testing, DNA is extracted from formalin-fixed, paraffin-embedded tissues and subjected to highly parallel, real-time PCR to detect specific DNA alterations (single nucleotide substitutions and small deletions and insertions) in a variety of different genes. A profile of the mutations is assembled for each tumor tested, indicating those drugs that may or may not be effective in treating a patient's tumor. Tumors of any type may be analyzed in this manner. The set of genes and intragenic DNA sites examined for mutations is continuously expanded as new predictive mutations are described both for approved drugs and for those in experimental trials.

