This year marks the 100th anniversary of the seminal publication in JAMA of a report on a successful frozen section preparation technique by Louis B. Wilson from the Mayo Clinic. Indeed, this was not the first time a frozen section was performed and documented: this had happened in Europe for decades during the 19th century on a more or less sporadic manner. It was also not the first time that a frozen section was performed in North America. In 1889, John C. Warren, a surgeon from Massachusetts General Hospital, made reference to examining skin biopsy specimens with the freezing microscope, albeit without detailing the technique. In 1895, James H. Wright, Jr, from McGill Hospital, described a technique for boiling tissues in formalin for a few minutes before freezing them. In 1891, the eminent pathologist from Johns Hopkins Hospital, William H. Welch, performed a frozen section examination of a breast lesion removed by Dr William H. Halsted. Unfortunately, by the time the microscopic diagnosis was rendered, the surgeon had made up his mind regarding the nature of the lesion and completed the operation, which is not an unheard of experience for pathologists, even in modern times. However, the technical quality of most frozen sections during these early years was clearly suboptimal by modern standards. Surgeons such as J. C. Bloodgood, although supporting the concept of the frozen section examination, admitted, in 1908, to not depending on a frozen section to guide the surgical procedure. The early and mid-1920s, however, a consensus spearheaded by surgeons such as J. C. Bloodgood and W. J. Mayo was taking shape, accepting that intraoperative frozen section diagnosis was a valuable and necessary adjunct to the conduction of surgical operations. In modern times, even though a number of special and histochromatic techniques have been proposed on a frozen section basis, most such diagnoses are still rendered on the basis of hematoxylin-eosin–stained tissues.

Although the first users of intraoperative frozen section diagnoses were largely surgeons and obstetricians, it soon became obvious that the experience and knowledge of a trained pathologist were necessities in such settings. Nowadays, a close interaction between pathologist and surgeon is required for the successful conduction of many surgical operations, and such interaction takes place on a daily basis in large and small hospitals. This aspect of the practice of pathology constitutes a veritable “in the trenches” scenario in which clear and prompt communication between surgeon and pathologist is a requisite. In this setting, no opportunity exists for extensive collegial consultation or leisurely perusal of the literature. Assets such as keen eye, deep fund of knowledge, and experience are, indeed, most valuable. However, perhaps the most valuable of such assets is a combination of common sense (the least common of senses, according to an unnamed wag), a clear understanding of the value and limitations of the frozen section, and firmness of character so as not to cave in to occasional excessive, sometimes unrealistic, expectations of the surgeon.

Frozen section examination has a number of indications, such as identification of tissue type, benign versus malignant nature of the tissue, type of malignancy, determination of surgical margins, positivity of lymph nodes, and presence of malignant implants and/or metastases in other tissues. The common denominator of this list is clear: the results will determine the further conduction of the surgical procedure. Otherwise, the setting of frozen tissue examination represents a tradeoff in terms of tissue preservation, extent of sampling, and ability to orient tissues, among other aspects, that results in a suboptimal end product. Curiosity on the part of the surgeon or the patient and need to know the results as soon as possible are definitely not indications for frozen tissue examination; modern tissue handling techniques allow for results using permanent tissue sections early the following day and, sometimes, even the same day. Additionally, contraindications to the use of frozen sections exist, such as small lesions that could be destroyed by the freezing and sectioning, leaving no tissue for a definitive diagnosis with optimally processed tissues, or a situation in which the orientation of the tissues could be distorted to the point where a proper staging of the lesion is compromised during the subsequent observation of the permanent sections. A common situation that must be avoided is the understandable propensity that a conscientious pathologist will have to help by trying to produce a diagnosis at all costs. Sometimes a definitive diagnosis is not possible and a judicious deferral should be the outcome. Sometimes, a generic diagnosis (eg, high-grade malignancy) is the preferred route, rather than trying need-
lessly to pinpoint the exact nature and/or origin of a lesion. The hollowed principle “primum non nocere” applies to the frozen tissue setting as much as to any other medical situation.

In this issue of Archives of Pathology & Laboratory Medicine, a series of review articles are offered that deal with the frozen section aspects of the main organ and systems. These articles are written by experienced pathologists, most of whom practice their specialty in institutions with a high volume of frozen section consultations, such as The Methodist Hospital and Baylor College of Medicine, both in Houston, Tex. The authors have extracted their cumulative experience and present to us, in each of the articles offered, general aspects, indications, pitfalls, and examples of the most common situations encountered in the practice of the intraoperative consultation using frozen section examination. Each article has a somewhat different flavor, because no systematic format was required from the authors, reflecting the different backgrounds of the writers and the approaches that prevail in different subspecialties. Although books and other publications on frozen section diagnosis have appeared in the past, we believe that no modern, moderately comprehensive picture of the subject has been presented recently. This series of articles attempts to fulfill this perceived need to a significant degree. Clearly, not all subspecialties are represented, and there will be room for expansion in the future. The common approach in this series of articles is to present ideas and methods that may apply to a community practice setting of a general nature, rather than within the ambit of a highly specialized laboratory dealing with a narrow spectrum of disease, such as is found in specialized pediatric, transplantation, or oncologic medical centers. Although clearly of magnificent performance in each of their subspecialties, such medical centers often resort to technology and background knowledge not available in the everyday community or general academic practice.

A parting word regarding the future of the frozen section examination is in order. Much has been said regarding the possible obsolescence of the histologic examination of tissues, as we know it today, with the advent of molecular biology technology. Indeed, such technology represents a marvelous advance that will enable physicians to diagnose and treat patients in a more focused and effective manner and, in general, take medicine to new and wonderful heights. Nonetheless, such histologic examination of tissues still will be necessary to determine that the appropriate material for morphologic and molecular diagnosis is collected. Patients still will need surgery, be it endoscopic, laparoscopic, or thoracoscopic, as the use of minimally invasive and robotic surgery expands daily. During such surgery, the assistance of a “traditional” pathologist to perform an intraoperative consultation will be needed, perhaps more than ever before.

In closing, and on a moderately optimistic note, I do not believe that the time has arrived to hang the “for sale” sign on our cryostat microtomes.

References

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