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Pre-Analytics of Pathological Specimens in Oncology

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The Pre-analytical Phase in Surgical Pathology

Gianni Bussolati, Laura Annaratone and Francesca Maletta

Abstract

Several sequential passages are involved in the pre-analytical handling of surgical specimens from resection in the surgical theater to paraffin-embedding and storage. Each passage is highly critical and can significantly affect the preservation of morphology, antigens, and nucleic acids. Some key points in this process are still undefined and are subject to high variability among hospitals. High quality and standardization are demanded and pathologists should therefore work to comply with all novel clinical requests (such as genomic and antigenic testing for targeted molecular therapies). Under-vacuum sealing of surgical pieces can be a safe and reliable alternative to storage in large formalin-filled boxes; it prevents dehydration and favors cooling by removing air. Moreover, it implements tissue banking and preservation of nucleic acids. After transport of specimens to pathological anatomy laboratories, the next passage, fixation, has been the object of several attempt to find alternatives to formalin. However, none of the substitutes proved successful, and formalin fixation is still considered the gold standard for preservation of morphology and antigens. RNA has instead been found to be heavily affected by degradation and fragmentation in formalin-fixed tissues. Based on the hypothesis that RNA degradation would be inhibited by maintaining a low temperature, a protocol based on processing tissues with formalin at low temperature (cold fixation) was evaluated and proved useful in obtaining a reduction in RNA fragmentation. Finally, the problem of storage is discussed, in order to find ways to guarantee feasibility of molecular analyses even years after the original diagnosis.

Keywords

Ischemia · Under-vacuum · Cold fixation

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