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This issue opens with a review on a hot topic: the use of artificial intelligence in pathology. Komura and Ishikawa (https://doi.org/10.1007/s00428-019-02594-w) discuss machine learning techniques, notably those using deep neural (convolutional) and generative adversarial networks. The authors argue that machine learning applied to histopathological images requires special approaches, because it is somewhat of a black box and most pathologists would hesitate to make a (machine generated) diagnosis without understanding on which elements the machine diagnosis is based. Many pathologists tend to be skeptical of the capacity of this technology to classify histopathological images, exactly for this reason. The authors briefly review some applications and approaches to solve existing problems.

Gerbe et al. (https://doi.org/10.1007/s00428-019-02570-4) wondered whether the differences between clinical characteristics and disease course of systemic, primary cutaneous and breast implant-associated anaplastic large cell lymphomas are related to characteristic biomarkers that might offer insight into potential differences in biology. Expression of a variety of protein markers was assessed by immunohistochemistry and chromosomal aberrations by fluorescence in situ hybridization. All three entities showed *TP53* deletion and *PDL1* gene amplification but of the studied immunohistochemical markers no differences were found in expression. As the number of cases studied (notably of the breast-implant related type) was small, these results need to be cautiously interpreted. The similarities in the patterns of biomarker expression might suggest, however, that the differences in behaviour are determined more by site specific cues in the micro-environment than by intrinsic cancer-cell specific differences.

Of significant practical importance is the study reported by Van Seijen et al. (https://doi.org/10.1007/s00428-019-02595-9) on the impact of pre-analytical factors, such as timing and duration of specimen fixation, on morphology and expression by immunohistochemistry of diagnostic and predictive biomarkers in lung cancer. The study mimicked in an experimental set-up what happens in daily practice in terms of differences in time elapsed between procurement of a tissue specimen and its entry into a fixative and duration of fixation. Outcome parameters were quality and intensity of immunostaining. It turns out that late fixation is associated with reduced intensity of immunostaining of most of the studied markers. This might influence interpretation of diagnostic (cytokeratins) and predictive (PD-L1) markers. Long fixation had no impact on the quality of immunohistochemical staining. However important these results may be, full appreciation of the importance of fixation parameters in this context requires a follow-up study on full size (rather than tissue micro-array) sections in a real time (rather than an experimental) setting, through meticulous registration of the pre-analytical phases of resection specimens in daily practice.

The paper by Liu et al. (https://doi.org/10.1007/s00428-019-02589-7) sheds light on the nature of papillary proliferations of the endometrium, uncommon lesions that have been observed concurrent with or prior to endometrial hyperplasia and carcinoma. Finding them together naturally raises the question of a possible relationship between the two. To answer this question, the authors looked in simple and complex endometrial papillary proliferations for expression of characteristic markers and gene mutations frequently occurring in endometrial carcinoma. They found complex papillary proliferations more often associated with endometrial hyperplasia and carcinoma. Molecular events were not significantly different between simple and complex papillary proliferations. Some of the molecular events (notably KRAS mutation) frequently occurring in endometrial hyperplasia and carcinoma were also found in papillary proliferations. Based upon these data the authors propose a simple to complex papillary proliferation to endometrial carcinoma sequence. As intriguing this hypothesis might be, more evidence is needed to firmly establish these enigmatic proliferations as precursors to endometrial cancer.

How histopathological characteristics, TNM stage and HPV status impact on prognosis of penile cancer is explored in the paper by Hölter et al. (https://doi.org/10.1007/s00428-019-02566-0). It comes as no surprise that warty (condyloma-

like) carcinomas have a significantly better prognosis than basaloid squamous cell carcinomas. Strikingly, HPV status had no independent impact on prognosis, presumably in view of its association with distinct histomorphology. High grade/poor differentiation, lymphovascular invasion and lymph node metastasis were significantly associated with poor survival parameters. The authors point out an important and clinically relevant contentious issue in the eighth edition of the TNM classification, which has amalgamated tumor grade and lymphovascular invasion into a single (pT1b) parameter. They argue convincingly that these two characteristics should not be combined into one single T category, which also makes conceptual sense.

The cover image is from the paper by Remo et al. (https://doi.org/10.1007/s00428-019-02554-4) and shows a characteristic scanning electron microscopical image of intercellular lamellipodia in the rhabdoid subtype of colorectal carcinoma.