The major achievement of the Papanicolaou test (Pap test) was the substantial reduction in cervical cancer incidence and mortality in the regions where it was implemented in organized population-based screening programs by the committed public health authorities. After decades of experience, however, it became obvious that the conventional Pap test suffered from an inherent low sensitivity, which prompted the development of new innovative tools to circumvent this problem; first liquid-based cytology (LBC) and computer-assisted reading, followed by HPV testing and other molecular markers. Of these new tools, different HPV tests have rapidly achieved remarkable success in cervical cancer screening due to their high sensitivity and negative predictive value. Similarly, the LBC sample collection media have proven to be powerful tools that enable the application of a wide range of techniques to investigate molecular markers in cervical carcinogenesis, including those of methylation, mutations, intracellular regulatory pathways, and lineages of cell origin. All these novel tools have not only enhanced the role of cytology as a diagnostic method, but also opened new avenues for the research of HPV-induced carcinogenesis.

In this special issue of Acta Cytologica, recent advances in several specific fields of this new and highly complex scientific scene are discussed by recognized experts. In this series of reports, the authors address many key topics in a highly coherent fashion, providing significant novel information on different aspects of gynecological cytology in the era of molecular testing. Lorincz [1] elegantly describes the merits and flaws of DNA methylation tests in clinical cytology and their usefulness in cervical cancer prevention, diagnosis and prognostic evaluation. The biological significance of the genomic diversity of cervical cancer is thoroughly described by Mendes de Oliveira and Levi [2], who provide new insights into this emerging topic. Musselwhite et al. [3] provide a comprehensive overview on the ethnic differences in cervical cancer control on the global scale. The contributions of Valentine et al. [4], and Bibbo et al. [5] offer interesting historical perspectives on diagnostic cytology before and after the introduction of HPV testing to the daily routine in two major laboratories of cytology in Europe and the USA, respectively. The innovative research data and clinical applications of p16 biomarker testing in gynecological cytopathology are discussed by Bergeron and von Knebel Doeberitz [6], two recognized experts in the field.

The editors believe that this current information should offer readers an opportunity to update their current knowledge on the novel applications of cytology in the era of molecular testing. Hopefully the readers of this special issue of Acta Cytologica will also find its contents useful in their daily practice of gynecological cytopathology.
References


