Editorial

Molecular and Genetic Pathology

Modern pathology has aptly embraced novel concepts for the measurement of pertinent markers for disease diagnosis. The morphological diagnosis is frequently complemented and improved by quantitative and qualitative DNA-analysis (DNA-ploidy measurements, in situ hybridization, detection of gene mutations), and protein expression analysis by means of immunohistochemistry, which, in some instances, is a reflection of genetic changes as well.

Cancer is a genetic disease. This of course holds true not only for the familial cancer syndromes, but extends to the majority of sporadic cancers where acquired genetic aberrations cause disease. These aberrations are reflected on the chromosomal and gene level, and their detection in patient specimens for an improvement of diagnosis, prognosis, and for the individualization of therapy warrants exploration. The combination and complementation of morphology with genetics is therefore not only a major step towards a better understanding of human disease but it also holds great promise for increased objectivity in diagnosis and prognosis.

The techniques which will contribute to merging morphology and genetics include in situ hybridization (in particular to interphase cells), comparative genomic hybridization, expression profiling using array technologies, high throughput screening approaches such as tissue arrays, and phenotype/genotype correlations on the DNA, RNA, or protein level, and new technologies that assist in the above. The predictability of the course of disease and the evaluation of individual risk factors based on genetic polymorphisms is an emerging field.

The section of Molecular and Genetic Pathology seeks to incorporate these research areas in order to contribute to a better understanding of the natural history of human disease, to improve diagnosis and prognostication, and to provide a lively medium for translational research.

It is clear that genetic and molecular pathology directly interfaces with and benefits from development in new media and technologies, yet another section of this redesigned journal. It is also clear that we do not overlook the value of a necessary standard of diagnostic pathology, which certainly relies heavily on diagnostic cytometry and histometry with its unique potential to visualize and quantitate changes in the tissue context.

Diagnostic Cytometry and Histometry

Certain progress in diagnostic pathology is only possible by quantification of several parameters with diagnostic or prognostic relevance. The measurement of proliferative activity (e.g., by immuno-, histo-, or cytochemical staining) should be complemented by TV-image analysis of its distribution in a given specimen. The standard of subjective evaluation of morphological criteria must be complemented by objective measurements of morphological and biological parameters to establish a valid diagnosis. The morphological diagnosis of malignant cells can be complemented with genetic markers, which require quantification. Furthermore, we must accept that certain parameters can only be obtained by quantitative measurements and not by subjective evaluation. The concept of malignancy-associated changes (MACs) of chromatin patterns in early carcinogenesis demonstrates this fact.

The section of Diagnostic Cytometry and Histometry of Analytical Cellular Pathology is dedicated to quantitative methods in diagnostic pathology as outlined above. As such the journal has the following aims:

- publication of articles conveying the usefulness of quantitative methods for diagnostic and prognostic purposes in cyto- and histopathology,
- providing useful and necessary information for the practical application of flow- and image-cytometry and histometry in diagnostic pathology,
- reporting recent technological developments, including software and mechanical tools, useful for cytometry (flow- and image-) and histometry,
- contributing to the standardization of quantitative methods in diagnostic pathology,
- explaining the biological and theoretical basis of cytometric and histometric methods,
- reporting patients for whom cytometric (flow- and image-) or histometric methods yielded diagnostically relevant results (case reports).
New media and technologies

Technological innovations have frequently, and unpredictably, led to advances in science and medicine and biological problems have resulted in the development of novel technologies and experimental concepts. The inception of the confocal laser scanning microscope for light optical sectioning and the application of comparative genomic hybridization for the detection of chromosomal imbalances in tumor genomes are examples.

Few areas reveal this synergistic relationship between new technology and biological knowledge more clearly than modern pathology.

Novel imaging technologies allow one to generate structure/function relationships and to query whether such relationships have impact on disease course. Long established paradigms, such as the relevance of cytogenetic abnormalities as a determining marker of cancer cells spur the development of unconventional imaging tools for biological questions. For instance, spectral imaging using a Sagnac interferometer allows for color karyotyping human and mouse chromosomes (SKY), therefore greatly facilitating comprehensive chromosome analyses. It is therefore likely to predict that imaging will play an increasingly important role in pathology. Consequently, large amounts of data require analysis, archiving, and interpretation. The need for data acquisition, analysis and storage will force continuous improvements in computer hard- and software development as well as efficient methods of exchanging information by real time on- and off-line technology. A case in point is the new EUROQUANT server, a quality control tool for improving diagnostic DNA-image cytometry. Telecommunication and teleconferencing are fast growing fields, which will connect scientists and clinicians and will impact on patient care.

The section on new media and technologies focuses on these developments and aims to integrate the other sections of Analytical Cellular Pathology.

We hope that the change of the Journal’s editorial board, the creation of section editors and the new focus on molecular and genetic pathology will have a stimulating effect on the further development of the Journal. In this context it is a natural opportunity to address our warm thanks to the founding Editor-in-Chief, Gerard Brugal, and the outgoing Editorial Board for their efforts in the last ten years to establish Analytical Cellular Pathology as an international significant journal. We are confident that the change of the team will keep and further improve the role of Analytical Cellular Pathology as a leading journal in its field, and that the fruitful co-operation with IOS Press will continue and be helpful in further development the Journal.

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Note: The valuable help of Michael B. Ghadimi is gratefully acknowledged.