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Introduction to The 2015 World Health Organization Classification of Tumors of the Lung, Pleura, Thymus, and Heart

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World Health Organization (WHO) Classifications of Tumors have historically provided a global standard for tumor diagnosis. Familiarity with these classifications is essential for clinicians because they provide the foundation for accurate patient diagnosis and optimal medical management. In addition, the diagnostic terminology and criteria recommended by the WHO should be incorporated into study design of clinical trials and molecular studies such as The Cancer Genome Atlas (TCGA). WHO Classifications are periodically updated to incorporate important advances to make them relevant to current knowledge and clinical practice. The 2015 WHO Classification of Tumors of the Lung, Pleura, Thymus and Heart has just been published[1] and the Journal of Thoracic Oncology will be publishing a series of articles summarizing key points about the new classification outlining the major changes from the 2004 classification.[2–4]† The International Association for Research on Cancer (IARC) under the leadership of Dr. Hiroko Ohgaki coordinated this project and was the publisher of this book. IARC hosted a consensus meeting in Lyon, France, April 24–26, 2014, where all major changes in the classification from the 2004 book were discussed and approved (Figure).

The 2015 WHO Classification features the incorporation of many exciting new advances in thoracic tumor diagnosis and classification. It was formulated by a multidisciplinary group of international experts with broad international representation.

The primary changes in the lung classification, which are highlighted in the first paper in this series,[3] relate to lung cancer where over the past decade remarkable progress in genetics and therapy has had a major impact on tumor classification. These most significant changes are consequent to the 2011 IASLC/ATS/ERS Classification[5] including recommendations for routine molecular testing and use of immunohistochemistry, a new approach to small biopsies and cytology and a novel way of subtyping of surgically resected lung adenocarcinomas that has provided a powerful new tool for identifying prognostic and molecular correlations. Large scale genomic studies from the TCGA[6,7] and Clinical Lung Cancer Genome Project[8] provided a strong genetic foundation for reclassification of squamous cell carcinoma, adenocarcinoma and large cell carcinoma. These changes have major clinical relevance as histologic type and genetics are now driving personalized medicine for lung cancer patients. New concepts in adenocarcinoma classification with lepidic versus invasive patterns are also having an impact on the approach to tumor size measurement for TNM staging of small tumors ≤3cm and therefore the surgical management of patients. Support from the IASLC, through their Pathology Committee and by providing multidisciplinary input, contributed greatly to the development of this classification.[5,9]

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The article for the pleural chapter is in preparation.

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Figure. Panel of Experts at World Health Organization Consensus Meeting at International Agency for Research on Cancer, Lyon France, April, 2014. From left to right: Front row: William D. Travis, Andrew G. Nicholson, Alex Marx, Allen Burke, Elisabeth Brambilla, Elaine S. Jaffe, Hiroko Ohgaki; Robert Jakob; Second row: Andre Moreira, Masayuki Noguchi, Edwina Duhig, Sanja Dacic, Francoise Galateau-Salle, Mary Beth Beasley, Ming Sound Tsao, Yasushi Yatabe, Fabio Tavora, Fred Hirsch; Third Row: Alain Borczuk, Nicolas Girard, Philipp Ströebel, Leendert H.J. Looijenga; Cristina Basso, Yuichi Ishikawa, Giuseppe Pelosi, Alberto Marchevsky, Ignacio Wistuba, Joseph J. Maleszewski, Keith Kerr, Marc Ladanyi, Brian Rous. Photograph courtesy of IARC.

The thymic tumor classification, to be published in October,[2] makes minor changes to the 2004 thymoma classification maintaining the type A, AB, B1, B2, and B3 types. However, considerable effort was made in collaboration with the International Thymic Malignancy Interest Group (ITMIG) to incorporate a multidisciplinary approach and to make refinements to sharpen diagnostic criteria. One new aspect is to recognize histological criteria that are "obligatory/indispensible", and others that are "optional". In addition, it is recognized that mixed patterns are frequent in thymomas so a proposal is made to record these in 10% increments. It is also recognized that all thymomas have malignant potential, so these tumors should not be regarded as benign. These morphologic observations are grounded in new genetic data that provide support for the existing classification and potential for deeper insights into the molecular characteristics of these tumors.

For tumors of the pleura, the histologic classification of malignant mesothelioma remains the same as the 2004 classification. However, data have suggested that histologic subtyping of epithelioid mesothelioma may correlate with prognosis; particularly the pleomorphic subtype which appears to be is associated with poor prognosis. In addition, an expanded role for immunohistochemistry has been defined for separating mesothelioma from carcinomas of various sites. In addition, more precise criteria have been recognized for distinguishing malignant mesothelioma from reactive mesothelial proliferations. New data regarding genetics, in particular involving the BAP1 gene has led to exciting new clinical and molecular studies. Preliminary data also suggests that grading of mesotheliomas may have prognostic significance. The development of the revision of the pleural chapter was greatly facilitated by the French National Health Institute (INVS) and the French National Cancer Institute (INCA) in supporting the International Mesothelioma Panel (IMP) over the past 17 years.

Cardiac tumors are extremely rare, so there are few resources to learn about their pathology, genetics and clinical features. The manuscript on cardiac tumors, to be published in late 2015,[4] provides an invaluable review of benign tumors, tumors of uncertain biologic behavior, germ cell tumors, and malignant tumors. Germ cell tumors within the pericardium are typically childhood teratomas without metastatic potential. The most important cardiac tumors are the sarcomas. The molecular and cytogenetic characterization of cardiac sarcomas is in progress, and will likely result in significant modifications to the current classification in years to come.

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