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Invited Lectures

(I-0 — I-53)

I-1

New perspectives in neurosciences

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Intensive research activities within the past 200 years have revealed that the central nervous system (CNS) is a heterogeneous, heteromorphic, multidimensional and multifunctional compound organ system. Scientists working in Comparative Anatomy and Embryology determined that the transformative adaptive evolution of the CNS occurred over an extensive time period of 500 million years and continues to unfold and progress. The phylogenic, ontogenic, histogenic, angiogenic, endocrinogenic and immunogenic defined compartments of the CNS present a unique macro- and microarchitecture along the spinal cord, brain stem, diencephalon and telencephalon with archipallial, paleopallial and neopallial intertwining architecture. The continuing upswing in scientific technology is providing medicine and surgery with tools of immense value; the availability of achromatic microscope, free from spherical aberration, invented by J.J. LISTER, 1830, in the United Kingdom, later the formulation of the equation "Angular Aperture" by Ernst ABBE, in 1880, Zeiss Company, Jena, Germany, followed by the Electron Microscope in 1933, Scanning Tunneling Microscope in 1981 and Positron Microscope in 1987. Scientists in biology and neurobiology have thus been compelled and stimulated to initiate profound studies on morphology and function of all organs and their cells. Scientists in molecular biology and genetics were ultimately able to reveal a fascinating inter- and intracellular microarchitecture such as receptors, microtubules, mitochondria and synapses. Scientists in physics and chemistry finally succeeded to bypass Abbes optical limitation of 0.2 micrometers and the nanoscope was born. This latter achievement opens a new era in biology and pathology, allowing the study in-vivo of ultrastructures. The visualization of living ultra-micro-structures is a great accomplishment, a culmination of centuries of scientific endeavors. In contrast, the phylogenic aspects of vascular, neoplastic, degenerative, toxic and viral diseases of the CNS had hitherto found only marginal attention. The clinical, neuroradiological and neuropathological observations on a large number of patients with neurovascular and neoplastic lesions, degenerative diseases and viral infections alerted us to specific predilection sites of these diseases, which affect certain compartments of the CNS, in relation to their phylogenic, ontogenic, histogenetic and angiogenic order. The adjacent compartments remain unaffected. The conduct of these lesions teaches us new aspects in neuropathology. These observations will be presented and discussed.

I-2

Ultrastructural neuropathology in transgenic models of Alzheimer's disease

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Transgenic animal models that replicate the symptoms, the lesions or the possible causes of human disease are prolific tools, aiding attempts to understand the cause, and to alleviate the destruction of Alzheimer's Disease. Numerous mouse transgenic lines have now succeeded in partially reproducing its lesions: the diffuse extracellular deposits of Aβ peptide, the neuritic plaques,