resolution over conventional fluorescence microscopy, optical sectioning of examined samples, 3-D images reconstruction and multi channels acquisition enabled widespred use of confocal microscopy in the cell biology imaging.

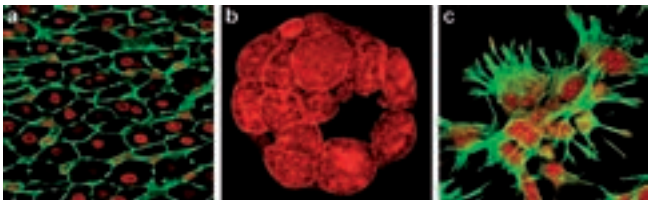

Figure 1: Confocal images of actin and microtubules cytoskeleton organisation. (a) confocal image of liver tissue section shows cortical actin organisation of rat hepatocytes (green signal) (b) actin cytoskeleton distribution in blastomeres of three days old rabbit embryo shown in red (c) cultured HEK-293 cells showing normal distribution of microtubule filaments (green signal). TO-PRO-3 iodide stained nuclei (a, c) are shown in red.

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MITOCHONDRIAL TRIGGERING OF CELL DEATH AND CONFOCAL MICROSCOPY

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The laser scanning confocal microscope detects images of multiple labelled fluorescent samples. One can follow intracellular distribution of the protein under investigation by tracing the location of fluorescently labelled protein or fluorescent antibodies directed against the protein under investigation and of marker proteins for cellular compartments. This is useful to localize the protein under investigation and even more to follow the movements of a particular protein within the living cells. Here we present an example of procaspase-9 movements during the early stages after triggering apoptosis, before its activation can be detected by other biochemical methods.

Apoptosis is a process that controls the number of cells and their quality. Procaspase-9 is the inactive form of one of the main apoptotic initiators, caspase-9. It is activated as a consequence of mitochondrial damage and can be also activated directly or indirectly by other initiator caspases. There were contrasting reports that caspase-9 is in different cellular compartments, i.e. in the cytosol, the nucleus and in the mitochondria. We have determined that procaspase-9 is located in the cytoplasm in physiological conditions in rat neurocrine cells and rat hepatocytes, by transfecting the cells with DNA encoding the fluorescent fusion protein between the caspase-9 and enhanced green fluorescent protein (EGFP) and by immunocytochemistry. However, upon the induction of apoptosis, procaspase-9 is translocated to mitochondria. This shift depends on an activated caspase, other than caspase-9. The colocalization signal of caspase-9 and of mitochondria observed under the confocal microscope does not tell us whether the caspase-9 is associated with mitochondria or it is located closely to the mitochondrial outer membrane. Through biochemical methods, like cellular fractionations, in vitro import of proteins into mitochondria, mitochondrial fractionations and protease treatments of mitochondrial membranes, we determined that procaspase-9 is attached to the outer surface of the mitochondrial outer membrane shortly after the initiation of apoptosis.

MEDCIAL IMAGE ANALYSIS

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Over the last decades, medical imaging has witnessed a diversification of image formation methods, which has led to a rich palette of modalities providing information on many aspects of human anatomy, physiology, and pathology. In order to use the vast amount of available image information efficiently, the relevant image content needs to be extracted, analyzed, and interpreted. For a human operator, it is by no means trivial to interpret the images accurately in a limited amount of time. In addition, such an interpretation is subjective and generally irreproducible. Accordingly, a number of image analysis techniques have been introduced to assist the human expert in a broad variety of tasks, such as image restoration, image segmentation, image registration, motion tracking and change detection, and measurement of anatomical and physiological parameters. Image analysis techniques, which have expanded the role of medical imaging beyond mere visualization, are nowadays used increasingly throughout the clinical track of events, not only within diagnostic settings, but also prominently in the areas of planning, performing, and evaluating surgical and radiotherapeutical procedures.

Oral presentations: abstracts – Predavanja: izvlečki

COMPARATIVE MORPHOFUNCTIONAL ORGANIZATION OF THE ENTERIC NERVOUS SYSTEM IN MAMMALS

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The gastrointestinal (GI) tract fulfils a variety of functions such as transport of luminal content, secretion, absorption of ions, water and nutrients, blood flow, defence against pathogens and elimination of waste material. The enteric division of the autonomic nervous system (i.e., the enteric nervous system (ENS), the brain in the gut, the small brain) organizes and coordinates these activities in a dynamic way through interaction with different cell systems, including the interstitial cells of Cajal, the enteric glia, the smooth musculature, and the vascular, immune and mucosal epithelial systems. The ENS is composed of enteric neurons and glial cells which arise from vagal and sacral precursors cells of the neural crest line. The ENS extends along the entire GI tract and contains an estimated 108 neurons which are situated between two major layers in two interconnected ganglionated plexuses: the myenteric plexus