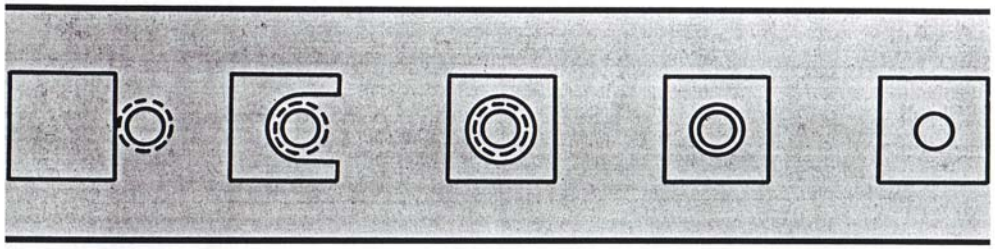
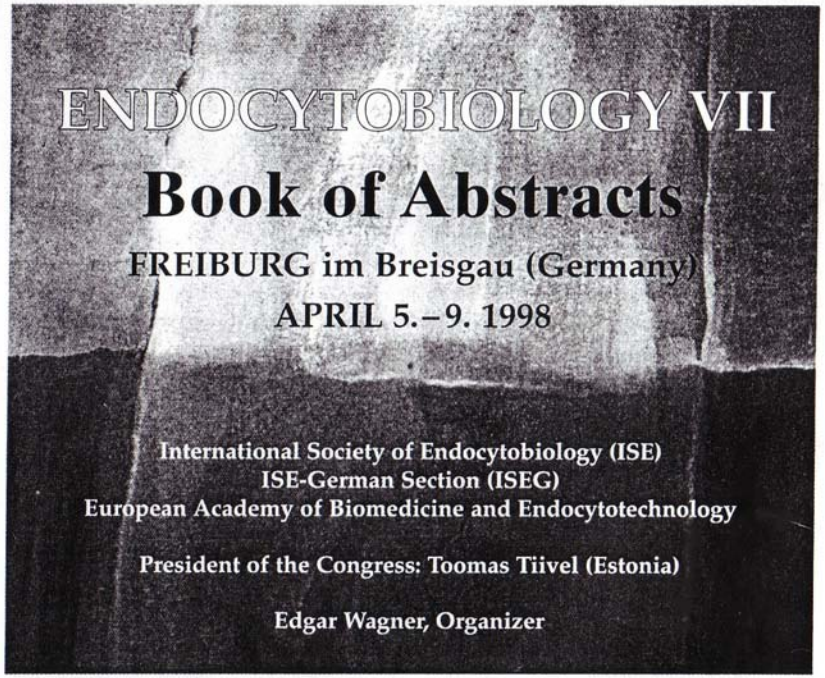
ENDOCYTOBIOSIS and CELL RESEARCH





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MORPHOLOGICAL ADAPTATION OF VITAL HUMAN CELLS TO DIFFERENT PH-VALUES

RANDOLL U. G.[1,2] , HENNIG F.[1]

[1] Department of Traumatology, University of Erlangen/Nuremberg, Krankenhausstrasse 12, D-91054 Erlangen, Germany

[2] Clinic Dr. Jungbeck GmbH, Gabriel-v.-Seidl-Straße 77, D-82031 Munich/Grünwald, Germany

Each cell of a human body gains its vitality by its characteristic environment. This cell milieu (cell-matrix) is partly discernible through biochemical and biophysical parameters that are all dependent from oscillations in the sense of periodic functional processes.The macromolecules that constitute the extracellular matrix are mainly produced locally by the cells in the matrix: Gycosaminogycans and Proteoglycans form a highly hydrated gel-like „ground-substance" in which fibrous proteins are embedded. A rapid diffusion of nutrients, metabolites and hormones between the blood and the tissue cells is mainly guaranteed by the aqueous phase of the polysaccharide gel. The cell-matrix on the other hand is dependent from the regulation-capacity of the blood-buffer-system and all the organs buffering (detoxifying) the blood (e.g. lung, kidney, skin, liver, colon). Most proteins operate optimally at particular pH: Lysosomal enzymes function best at the low pH (~ 5), whereas cytosolic enzymes function best at the close to neutral pH (~ 7,2) [1].

Different unstained tissue probes were chemically and physically stimulated under the control of high resolution on-line videomicroscopic documentation. The different stimuli change the pH of the cellular environment and demonstrate reproducible adaptations like threshold effects in form of reversible and non-reversible changes of intercellular and intracellular morphology. They can be regarded as consequences of phasic transition due to processes of adaptation to a chronically altered milieu or function, the ultimate result of which is the loss of temporal-rhythmic organization, i.e. chaotic mutation of cellular dynamics.

The experiments give an explanation on the cellular level for the clinical observations that tissue degeneration, cellular degeneration, differentiation and dedifferentiation are dependent from pH and give new insights for treatments in biomedicine [2].

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