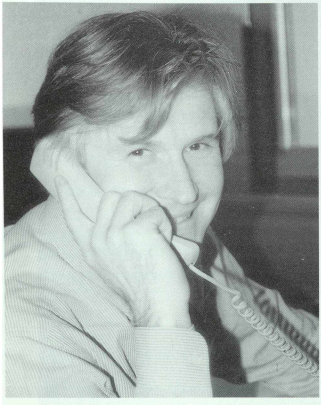
Cell and Microbiology

Alexander von GABAIN
o.Univ.Prof., Dr. (Heidelberg, Germany 1978)



Research

Our section is subdivided into three independent groups, concerned with the interface between microbes and mammalian defense cells: We study the growth, activation and differentiation of macrophages and the adjustment of bacteria to stress and environmental changes. All projects study systems where rapid changes in gene expression are instrumental. We also analyze bacteria- and virus-mediated aberrations of the immune system.

A von Gabain
RNA decay in bacterial and mammalian cells

The stabilities of different mRNA species in a given cell span a wide range and RNA decay is an important element in the regulation of gene expression. Particularly micro-organisms modulate the level RNA turnover in response to different environments which may be brought about by changes in growth conditions or invasion of eukaryotic tissues. Ribonuclease RNase E is one of the enzymes performing the rate-limiting steps of mRNA degradation in bacteria. We have now detected an endonucleolytic activity in human cells which processes E. coli RNAs with the same specificity as RNase E from *E. coli*.

Recently we have identified an RNA binding complex in *E. coli* that provides physical protection against RNA degradation by endoribonucleases. To our surprise this complex contains GroEL as an indispensable constituent. This protein, which has well known functions as a chaperonin in protein folding, appears to be the first ´RNA chaperon .

T Decker
How macrophages develop into mature cells that function in the immune system

Macrophages perform a variety of functions in the regulation of an immune response. Moreover, they contribute to the body's natural immunity through their ability to phagocytose and destroy infectious micro-organisms. Macrophages develop from immature bone marrow cells through a complex series of precursor stages.

We are studying the molecular signals telling macrophages to develop into mature cells in response to hormone-like substances that bind to the cell surface. Our particular focus is on those signals that reprogram gene expression, so that the newly expressed genetic information enables a macrophage precursor cell to become a functionally mature and differentiated cell.

M Baccarini
Molecular mechanism underlying growth and differentiation in macrophages

Macrophages represent an excellent model system for studying cell growth and differentiation because of their ability to proliferate or differentiate

in response to various stimuli. As in other experimental systems, cytosolic kinases of the MAP-Kinase type participate in these biological processes. The activation of these kinases in macrophages, however, depends on a pathway distinct from previously described ones.

We have identified new intermediates in this alternative pathway, and are in the process of clarifying its further steps. Our work underscores the diversity and combinatorial nature of signal transduction in mammalian cells, in which analogous signalling intermediates can be rearranged to form different pathways.

Teaching

Members of the section teach molecular microbiology, cell biology and immunology, from introductory to highly advanced courses. Laboratory courses deal with microbes and their enviroment, immune cell biology.and protein-nucleic acids interactions and protein modifications.

International Cooperations

Alexander von Gabain is adjunct professor of the Karolinska Institute in Stockholm. All three senior group leaders maintain active collaboration with groups in Europe and the USA.

Selected References

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