
Cellular and molecular basis of the host-pathogen relationships

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Research is focused on the characterization of mechanisms that participate in the transmission of infectious agents, establishment/progress of infection in the host body, pathogenesis, and the host immune response. Virology research aims at the cell defense against infections caused by small DNA viruses (polyomavirus, papillomavirus, and hepatitis B virus) and HIV virus, particularly at the processes linked with restriction of virus infection by mechanisms of innate immunity. These mechanisms are operational during the early phase of virus cell interaction, i.e., during the transport of virus particles into the cell nucleus. Also, the mechanisms of cell defense evasion by viruses are analyzed. Characterization of the microenvironment of infected cells and tumors of viral etiology and escape of these tumors from host immune reactions are also in focus. As for the most important results, epigenetic control via methylation of virus promotor has been disclosed in HIV replication. Bacteriology research is focused on pore-forming proteins that modulate immune response. Also, secondary metabolites exhibiting diverse functions are studied, e.g., their influence on cell physiology including characterization of cytoskeleton, membraneous organelles, and energy metabolism. In cooperation with the Institute of Microbiology ASCR, adenylate cyclase toxin produced by *Bordetella pertussis* and having immunomodulatory effects is intensively studied as a model protein. Also, the interaction of other pore-forming compounds with the membrane is studied, which includes colicins and natural or synthetic antibacterial molecules. Helminthology research deals mainly with avian schistosomes that may attack humans as accidental hosts and cause cercarial dermatitis. Among the main research topics, the role of parasite peptidases and other enzymes in skin and tissue invasions, cellular and humoral immune response of the host, immune evasion of parasites, and pathogenesis linked with schistosome migration in the host tissues (neuropathogenicity of *Trichobilharzia regenti*) are in focus. Characterization of important parasite proteins is facilitated by recent genomic and transcriptomic projects. As for the most important results, characterization of penetration glands and peptidases of schistosome larvae has been performed, and effector molecules of the host immune system responsible for the elimination of parasites have been disclosed.

Selected outputs

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