Jasmin Roya Djannatian

Time frame of pneumolysin-induced mitochondrial dysfunction and mitochondrial protection by lithium chloride in neuronal cells

Bacterial meningitis has a high social relevance due to poor outcome of the patients. Pneumolysin is the major toxin of *streptococcus pneumoniae* causing meningitis.

Effects of the toxin on cell shape, mitochondria and membrane permeabilization were studied by time-lapse confocal microscopy in SH-SY5Y neuroblastoma cells and primary neurons. A quick and dramatic change of the cell shape was followed by mitochondrial potential loss and final membrane permeabilization. Cy3-labelled pneumolysin clustered in the membrane and was internalized in vesicle-like structures. In neurons the mitochondrial potential drops earlier than neuritis were affected. The GSK3β inhibitor lithium chloride could prevent mitochondrial potential loss. We suppose that pneumolysin activity follows two different pathways. An intracellular signalling leads to mitochondrial damage and pore formation leads to membrane permeabilization. If LiCl avoids mitochondrial potential collapse *in vivo*, it represents a promising new therapeutical approach in meningitis preventing neuronal dysfunction and long-term neurologic sequelae.