Mammals are essentially born germ-free but the epithelial surfaces are promptly colonized by astounding numbers of bacteria soon after birth. The most extensive microbial community is harboured by the distal intestine. The gut microbiota outnumbers ~10 times the total number of our somatic and germ cells. The hostmicrobiota relationship has evolved to become mutually beneficial. Studies in germfree mice have shown that gut microbiota is essential for the proper development of the immune system. The pivotal role of the innate immune system in the complex and dynamic host-microbiota interactions has become increasingly evident.

The principal aims of the present study were: firstly, to determine whether LPS-rich sterile diet can promote maturation of the immune system in germ-free mice, secondly, to elucidate whether gut microbiota and LPS-rich sterile diet influence the LPS susceptibility, and finally, to investigate a role of the adaptive immunity in endotoxin shock.

Our data clearly show that both live gut microbiota and LPS-rich sterile diet increase susceptibility to endotoxin shock. Further, we demonstrate that immunodeficient SCID mice, which lack mature B and T cells, are more sensitive to endotoxin shock than immunocompetent Balb/c mice. In addition, we show that not only live gut microbiota but also LPS-rich sterile diet stimulates the development, expansion and function of the immune system. Our results are consistent with, and further expand the “hygiene hypothesis” by confirming that not only live organisms but also sterile microbiota-derived antigens drive the maturation of the immune system. Finally, we would like to emphasize that the quality of diet should be regularly tested, especially in all gnotobiotic models, as the LPS content of the diet may significantly alter the outcomes of experiments.