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Effect of Ros-scavengers on sulfur mustard caused impairment of in vitro endothelial tube formation

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Sulfur mustard (SM), an alkylating chemical warfare agent, causes tissue damage including inflammation, blister formation, and impaired wound healing. In particular, skin wounds are of great concern because the healing process of these wounds is prolonged and requires in extreme cases up to months of hospitalization. In previous studies, we demonstrated effects of chlorambucil (a nitrogen mustard derivate ans acting as a model substance for SM) on proliferation, apoptosis, and endothelial tube formation in mouse EBs. Until now, nothing was known about the effects of SM on endothelial tube formation. Therefore, we investigated the effect SM on endothelial tube formation, apoptosis, and proliferation in EBs. SM significantly decreased endothelial tube formation compared to unexposed EBs. Additionally, a significant increase of apoptosis was observed. As reactive oxygen species (ROS) are discussed to be involved in the pathophysiology of SM toxicity and recent data have revealed the predominant role of NO and ROS in both angiogenesis and vasculogenesis, we assessed the effect of the ROS-scavengers N-acetylcysteine (NAC) and alpha-linolenic acid (ALA) on EBs exposed to SM. Single application of ROS-scavengers had a positive influence on endothelial tube formation in SM exposed EBs as a short-term increase of vessel formation was shown. Long-lasting, rescuing effects could not be detected in our experiments.

As ROS-scavengers are considered as therapeutics to counteract SM toxicity, the results presented give first hints that short-term administration of antioxidants will only show minor protection. However, continuous administration might be beneficial for wound healing processes after SM exposure

Biography

Dirk Steinritz studied medicine at the University of Cologne, Germany. He has completed his MD in 2005 at the Institute of Anatomy, University of Cologne with special focus on nitric oxide and vascular smooth muscle tone. Subsequently, he started his scientific work at the Institute of Pharmacology and Toxicology of the German Army in Munich. He has published more than 20 papers in reputed journals and is serving as a reviewer for several toxicological journals

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