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Identification of novel anti-inflammatory herbal extracts

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Acute and especially chronic inflammation underlies the development and progression of most severe diseases, such as inflammatory bowel disease (IBD), allergic asthma/chronic obstructive pulmonary disease (COPD), and organ fibrosis that lead to dysfunction and death. Regardless of the origin, inflammatory processes on the molecular level can be described as a cyclic events, involving innate immune activation, e.g. via Toll-like receptors (e.g. the TLR4-complex) and reactive oxygen species (ROS), and adaptive immunity directed to target tissue. Activation of TLR4 triggers secretion of pro-inflammatory cytokines and chemokines, which further activate these immune responses. To date, no effective orally active TLR4 antagonists are available for experimental or clinical application. The aim of our study was to identify anti-inflammatory herbal drugs and their active compounds that are stable in the gastrointestinal tract and preferably possess antagonistic TLR4 activity, or interfere with downstream inflammatory signaling pathways. To this aim, we screened more than 100 plant ethanolic extracts in TLR4-transfected reporter cells challenged with lipopolysaccharide (LPS) to identify their anti-inflammatory activity. 28 promising extracts were additionally confirmed in LPS-stimulated THP-1 monocytes for their dose-dependent anti-inflammatory activity. To detect TLR4 antagonistic activity or interference with the downstream inflammatory cascade, these extracts were also tested in TLR2- and TLR4-transfected HEK cell lines, which permit pathway differentiation, since both receptors share similar downstream signaling upon stimulation. Promising anti-inflammatory herbal extracts were fractionated by high-performance liquid chromatography-diode array detector (HPLC-DAD) technology and specific compounds in the active fractions were identified. Pure compounds were tested for TLR4 antagonistic activity in the cell culture systems which were described above. Selectively identified active compounds will be discussed.

Biography

Anne Schink earned her Master's degree in Toxicology in 2012 from the Technical University, Kaiserslautern, Germany. Her thesis title was "Biomarkers to characterize and monitor skeletal muscle toxicity in the rat". Afterwards, she held a position as Consultant at the a-tune software AG, Darmstadt, Germany. In August 2015, she enrolled herself into PhD and is now actively included in the research work at the Max Planck Institute for Chemistry, Mainz, Germany and the Institute of Translational Immunology, University Medicine, Mainz, Germany. Her research focus is on the identification of anti-inflammatory herbal extracts and their active compounds, which can alleviate different chronic diseases.

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