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The effect of the prebiotic n-butyrate on inflammatory responses in a hepatocyte-Kupffer cell co-culture model

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Liver has a central role in the pathogenesis of inflammatory processes induced by the lipopolysaccharides (LPS) originated from Gram-negative bacteria. Nevertheless, Kupffer cells are mostly involved in the production of various inflammatory cytokines. The ratio of Kupffer cells in the liver can be affected by different (acute, chronic) inflammatory processes. The goal of this study was to develop a primary monolayer co-culture model containing hepatocytes and Kupffer cells in various determined ratios, reflecting the physiological and inflamed conditions. Further it was aimed to investigate the anti-inflammatory effect of the prebiotic short chain fatty acid n-butyrate as well. After exsanguination and collagenase digestion of porcine liver, hepatocytes and Kupffer cells were separated from the isolated cell suspension by differential centrifugation. The distinguished cell types were seeded in two different ratios on 6-well cell culture dishes, the adjusted proportion was later confirmed by immunocytochemistry. The influence of different Kupffer cell ratios and the effect of n-butyrate treatment on the LPS provoked cytokine (IL-6, IL-8) production as a marker of inflammatory response was investigated. Obtained results highlight the potential anti-inflammatory effect of n-butyrate and the future applicability of a highly advanced hepatocyte-Kupffer cell primary co-culture model in in vitro inflammatory studies.

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