

The pro-healing and anti-inflammatory potential of palmitoleic acid on diabetic wounds

P-31-012

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Chronic inflammation is a hallmark of chronic diabetes wounds, and due to increased demand, cost-effective wound-healing technologies and fundamental science mechanisms have been a focus of research. Palmitoleic acid (ω -7 monounsaturated fatty acid) is found in young people's skin and decreases with age. This fatty acid accelerates wound healing and muscular healing, previously published in Weimann E et al. (2018) PLoS One 13, 1-10; Malvestiti R et al. (2017) European Journal of Lipid Science and Technology 119, n. 8. Herein, we investigated the effects of palmitoleic acid on human and rat neutrophils. Human patients were divided into two groups: non-diabetic subjects and type 2 diabetes non-insulin-dependent subjects. The human neutrophils were collected through blood samples, plated (2.5×10^6 cells), treated with 0-200 μ M palmitoleic acid, in the presence or absence of LPS (5 μ g/mL), and incubated at 37°C for 4 and 18h. The toxicity was evaluated by MTT [3-(4,5-dimethylthiazol-2-yl)-2,5-diphenyltetrazolium bromide assay], cell membrane integrity, and DNA fragmentation. Moreover, the cytokine release from cultured diabetic neutrophils was evaluated by the ELISA technique. We also investigated the palmitoleic acid effect in 6-8 weeks old streptozotocin (STZ)-induced diabetic male rats. A sterile inflammatory air pouch in the animal dorsal was treated with palmitoleic acid (100 μ M) with the presence or absence of LPS (5 μ g/mL), where we assessed neutrophil migration and exudate formation. Our findings reveal that palmitoleic acid is not toxic to neutrophils from humans. Palmitoleic acid demonstrated inhibition of LPS-stimulated rat diabetic neutrophil migration and an exudative inflammatory response. We concluded that palmitoleic acid is a proponent in diabetic wounds due to its anti-inflammatory effects, decreasing the neutrophil inflammatory response in people with diabetes.

Financial Support: FAPESP (Process 2023/03741-3), CAPES and CNPq (Process 309644/2021-6).

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