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Vitamin E modifies poly(D,L)lactic acid wettability and reduces bacterial adhesion

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Highly biocompatible polylactic acid (PLA)-derived polymers are used for different biomedical applications such as orthopaedic screws and drug delivery devices. Nevertheless their clinical use is limited by their proinflammatory characteristics. Vitamin E (α-tocopherol, Vit. E), a natural antioxidant and anti-inflammatory agent has been used to improve different biomaterials biostability [1], and among them also P(D,L)LA [2]. In this work, addition of Vit.E (10-40% w/v) to P(D,L)LA films obtained by solvent casting technique increased polymer surface wettability and human plasma protein adsorption, while addition of Vit.E acetate (Vit.E Ac, 10-40% w/v), the acetic ester of α-tocopherol, often used as an alternative to Vit.E itself, failed in modifying polymer wettability.

On the other hand, bacterial adhesion experiments onto control, Vit.E and Vit.E Ac enriched P(D,L)LA films showed that both presence of Vit.E and Vit.E Ac was able to reduce the adhesion of the RP62A Staphylococcus epidermidis strain [3]. In particular, in PLA + Vit. E samples the decrease in bacterial adhesion was of 56%, while, in the case of PLA + Vit. E Ac samples the decrease was of 40%.

These preliminary data suggest that Vit. E addition to PLA containing medical devices could improve their resistance to bacterial infections.

References

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