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### Optimization of metronidazole loaded NLC for sustained antimicrobial effect in the local treatment of periodontitis

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**Introduction:** Periodontitis is a severe oral disease that affects the lives of millions around the world. The cause of this condition is the formation of the chronic inflammation of the teeth and the surrounding tissues caused by the overgrowing presence of various periodontopathogen microbials. Without proper treatment this condition can lead to permanent damages such as the loss of teeth, the necrosis of the surrounding bone tissue and even various systemic disorders.

**The aim** of this research is to sustain and control the local antimicrobial effect of metronidazole by encapsulating it to nanostructured lipid carriers (NLC).

**Materials and methods:** For the liquid lipid component of the NLC-s various essential oils were tested, those that have antimicrobial and antioxidant activity which can complement the effect of metronidazole. Preliminary tests were conducted to find the suitable essential oil, solid lipid and surfactant and the range of their concentrations within they can form a stable NLC system. A 2<sup>3</sup> full factorial design was used in order to optimize the formulation of the NLC. In the factorial design total lipid content, solid lipid content and surfactant concentration were changed as independent variables. Particle size, polydispersity index, zeta potential and encapsulation efficiency were measured for every sample as dependent variables. These parameters were measured right after preparation and 4 weeks later as well, to serve as a stability test.

**Results:** According to the results of the factorial design, the total lipid content has the strongest effect on the NLC's properties, besides the surfactant concentration also had some impact on it.

**Conclusion:** After all it can be said, that with the help of the factorial design an optimized composition for metronidazole loaded NLC-s was successfully made. Incorporating metronidazole in NLC systems can elongate its antimicrobial effect, which can be a desirable feature in the local treatment of periodontitis.

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