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Plant oils rich in medium-chain fatty acids inhibit the efficacy of antibiotics

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One of the most significant and widespread problems in infectious disease treatment is the development of resistance to chemotherapeutics. It is disturbing that bacteria resistant to important drugs appear. Typical example is methicillin resistant *Staphylococcus aureus* (MRSA) or vancomycin resistant *Enterococcus faecalis* that become common in hospitals, leading to very significant morbidity and mortality in previously curable bacterial infections. This situation is alarming and needs to be addressed. Considerable efforts are being made to discover new antibacterial agents against methicillin resistant *Staphylococcus aureus* (MRSA) strains that have developed resistance to most existing antibiotics. One of the options are medium-chained fatty acids (MCFA). Nothing is known, however, about their interactions with antibiotics in case of *S. aureus*. The objective of this diploma thesis was to evaluate the interactions between medium chain saturated fatty acids, which have antibacterial activity, and the standard antibiotic (oxacillin) against the reference strains of *Staphylococcus aureus* and one clinical isolate. The oils used were coconut (*Cocos nucifera*), palm kernel (*Elaeis guineensis*), tucuma (*Astrocaryum vulgare*) and muru-muru (*Astrocaryum murumuru*). Tested strains of *Staphylococcus aureus* were strains ATCC 29213 and ATCC 43300, which are representing methicillin

sensitive and resistant strains, and one clinical isolate (SA1) provided by the Motol University Hospital (Prague, Czech Republic). The fatty acids profile of each oil was determined by the gas chromatography. Activation of antibacterial effects of oils required lipase cleavage. Minimum inhibitory concentrations (MIC) of individual oils were determined by microdilution assay in a 96 well microtiter plate. To evaluate the combinatory effect of selected cleaved vegetable oils, the fractional inhibitory concentration (FIC) value was used. All selected cleaved oils combined with oxacillin acted antagonistically at concentration 2048 mg/L for all chosen strains (sensitive and resistant to oxacillin). Some had the same results at concentration 1024 mg/L.

Biography

Soukup J has completed his Master's Degree in Food and Nutrition at the Czech University of Life Sciences (CULS) and now continue there in his PhD studies. His Bachelor's thesis topic was "Natural compounds in foods with anticancer effects". He works as a Nutritional Consultant and Strength Coach with a specialization in Prehabilitation. Now-a-days he conducts research in the area of the oil stability during heating and storing and the formation of toxic compounds.

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