Evaluation of photoinactivation potential in eradication of *Streptococcus agalactiae* in the urogenital tract

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Streptococcus agalactiae is the most common representative of Group B Streptococcus, which are responsible of life-threatening bacterial infections in newborns and infants such as sepsis, pneumonia or meningitis. It colonizes gastrointestinal and urogenital tract in over 30% of healthy population.

Its transmission to newborns occurs prior or during the delivery, therefore about 40–60% of newborns will be colonized by this pathogen and 1-3% of them will develop streptococcal infection. Currently prevention is based primarily on the use of intravenous beta-lactam antibiotics. This procedure leads to disruption of the human microbiota and induces the formation of drug-resistant strains of bacteria. Its efficacy also requires performance at least four hours before the delivery, what is not always possible. The alternative approach may be antimicrobial photodynamic inactivation. It induces damage to the microbial cells by generating reactive oxygen species induced by the excitation of photosensitizing molecules with visible light of an appropriate wavelength. It's efficacy in bacterial eradication

and the elimination of the infection is confirmed in several *in vitro* and *in vivo* studies. Its important advantages are also lack of the development of resistance mechanisms to microbial photoinactivation and a high level of safety against eukaryotic cells.

The first key step of this work is evaluation of the bactericidal activity of photodynamic inactivation using different photosensitizing molecules against different serotypes of *Streptococcus agalactiae.* It will be performed for planktonic as well as for the biofilm cultures. The second step would be phototreatment of *S. agalactiae* with cyclic multiple lethal and sub-lethal doses of photoinactivation to determine probability of the resistance acquisition. Next step would be evaluation of photo- and cytotoxicity of the developed treatment against normal human vaginal flora and against human dermal keratinocytes. One before last step will be assessment of the mutagenicity of phototreatment. It will be performed in prokaryotic and eukaryotic model. Final step would be verification of the obtained results *in vivo* in mouse vagina environment.

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