P-317 (sup) - CHITOSAN AND CODFISH HYDROXYAPATITE FORMULATION TO BE USED AS COATING MATERIAL TO CIRCUMVENT PERIPROSTHETIC JOINT INFECTIONS

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Periprosthetic joint infection (PJI) is a common complication after orthopedic surgery and increasing as the number of primary arthroplasties is also growing. Consequently, there is a great need for an effective strategy that can simultaneously eradicate infection and promote new bone formation.
Chitosan is a potential valuable biomaterial for biomedical applications with special interest for this application due to its antimicrobial [1] and osteogenic properties [2].
Hydroxyapatite (HAp) can be extracted from natural sources such as fish bones, which are byproducts of fish industry [4]. Recent work showed that it was possible to extract HAp based materials from Atlantic codfish bones with similar biocompatibility to commercial products [3].

Chitosan medical grade and hydroxyapatite (HAp) obtained from Atlantic codfish bones in the form of paste was produced to be further used in titanium prosthetic joints, combining the antimicrobial properties of chitosan and osteogenic ability of HAp. The formulations were tested with to evaluate their antimicrobial potential upon relevant pathogenic microorganisms, considered to be the main infectious agents of PJI. Briefly, an optimized paste of 3% of chitosan and 5% of HAp was tested with Gram-positive *Staphylococcus aureus* (*S. aureus*) and methicillin-resistant *Staphylococcus aureus* (MRSA) as well as Gram-negative *Escherichia coli* (*E. coli*). Controls of chitosan and HAp alone, as well as acetic acid 1% (solution in which chitosan was dissolved) were also evaluated. The number of viable bacteria was counted after 0, 90, 180 and 360 minutes, time after which no more growth was observed for all tested conditions (previously verified).

Medical grade chitosan (DD of 87.6 - 92.5% and MW 200 - 400 kDa) and codfish derived HAp (extracted from codfish bones, kindly provided from Pascoal company) were used to develop the paste. The HAp was subjected to high energy ball milling process to decrease the particles size and to sonication process to homogenize the HAp suspension. The required formulation was produced through an optimization process until a homogeneous paste was created containing 3% of chitosan solution and 5% of HAp.
The produced paste showed to present noticeable antimicrobial potential against both Gram-positive bacteria, more pronounced for *S. aureus*. The *E. coli* tested showed to be unaffected by the presence of the paste.

[1] Tavaria et al., Curr Bio Comp, 12:114 (2016)
[2] Costa-Pinto et al., JTERM, 6: 21 (2012)
[3] Piccirillo et al., Mat Sci Eng, 51:123 (2015)
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