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# Modulation of fish fibroblast proliferation with $\beta$ -glucan and hydrogen peroxide during wound healing.

N.I. Vera-Jiménez & M.E. Nielsen

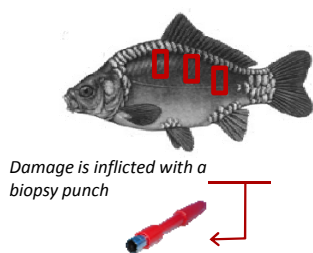
Biological Quality Research Group, National Food Institute, Technical University of Denmark

## Introduction

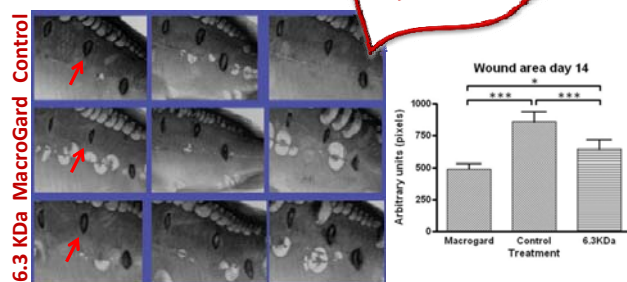
Wound healing and tissue regeneration are essential mechanisms to ensure the survival and health of any organism. Although several diseases and even mechanical injury can damage fish tissues, only a few studies have been directed to tissue regeneration and modulation of cell proliferation during wound healing in fish. Mammalian studies suggested the importance of fibroblasts, leukocytes and radical oxygen species (ROS) during tissue regeneration processes. This study is directed to their fish counterparts and their involvement during wound healing in fish.

## Can we modulate tissue regeneration in fish using different $\beta$ -glucans?

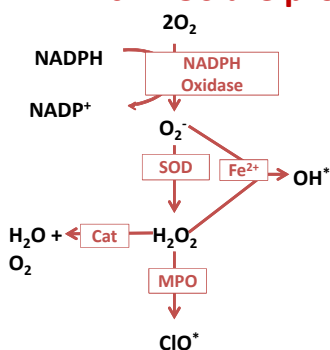
Yes, we can...



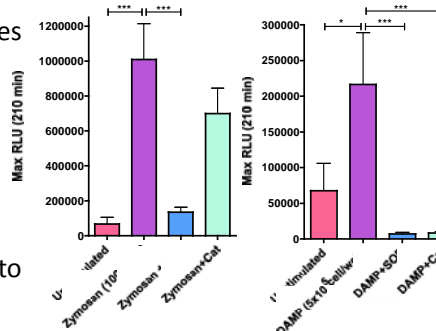
1.  $\beta$ -glucans bath [0.1mg/L], 14 days.
  - ❖ MacroGard®
  - ❖ PromOat 6.3KDa
2. Multispectral image (VideometerLab)



## Which ROS are produced by the immune-system after recognition of $\beta$ -glucans or a wound?



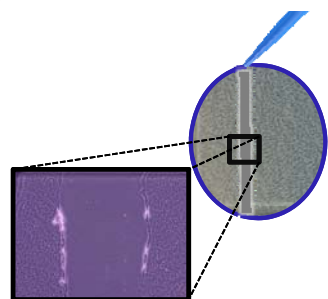
1. Head kidney derived leukocytes were cultured for 6 days
2. Stimulation of Leukocytes
  - ❖ Zymosan (100  $\mu$ g/ml)
  - ❖ DAMPs (5X10<sup>5</sup> cells/well)
  - ❖ SOD (O<sub>2</sub><sup>-</sup> scavenger)
  - ❖ Catalase (H<sub>2</sub>O<sub>2</sub> scavenger)
3. Real time luminol assay was used to measure ROS.



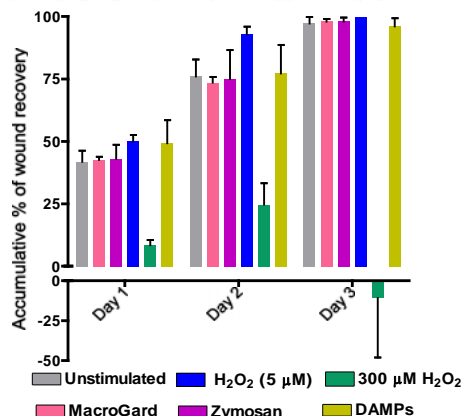
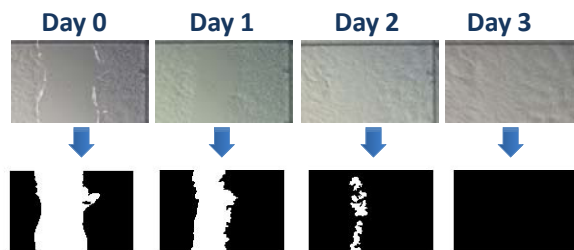
DAMP stimulation induces H<sub>2</sub>O<sub>2</sub>

$\beta$ -glucans stimulation induces O<sub>2</sub><sup>-</sup>

## Do $\beta$ -glucans and H<sub>2</sub>O<sub>2</sub> modulate directly fibroblast proliferation during wound healing?



1. Culture Stimulation (daily)
  - ❖ MacroGard® (100  $\mu$ g/ml)
  - ❖ Zymosan (100  $\mu$ g/ml)
  - ❖ H<sub>2</sub>O<sub>2</sub> (5  $\mu$ M, 10  $\mu$ M, 300  $\mu$ M)
  - ❖ DAMPs (5X10<sup>5</sup> cells/well)
2. Image analysis (MatLab)



❖ H<sub>2</sub>O<sub>2</sub> can influence the rate of tissue regeneration  
 ❖  $\beta$ -glucan did not show a direct effect on fibroblast proliferation  
 ❖ Interaction with components of the fish immune system are required to induce fibroblast proliferation using  $\beta$ -glucans