

Muscle wound healing in rainbow trout (*Oncorhynchus mykiss*) - DTU Orbit (08/11/2017)

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We followed the progression of healing of deep excisional biopsy punch wounds over the course of 365 days in rainbow trout (*Oncorhynchus mykiss*) by monitoring visual wound healing and gene expression in the healing muscle at regular intervals (1, 3, 7, 14, 38 and 100 days post-wounding). In addition, we performed muscle texture analysis one year after wound infliction. The selected genes have all previously been investigated in relation to vertebrate wound healing, but only few specifically in fish. The selected genes were interleukin (IL)-1 β , IL-6, transforming growth factor (TGF)- β 1 and - β 3, matrix metalloproteinase (MMP) -9 and -13, inducible nitric oxide synthase (iNOS), fibronectin (FN), tenascin-C (TN-C), prolyl 4-hydroxylase α 1-chain (P4H α 1), lysyl oxidase (LOX), collagen type I α 1-chain (Coll α 1), CD41 and CD163.

Wound healing progressed slowly in the presented study, which is at least partially due to the low temperature of about 8.5 °C during the first 100 days. The inflammation phase lasted more than 14 days, and the genes relating to production and remodeling of new extracellular matrix (ECM) exhibited a delayed but prolonged upregulation starting 1-2 weeks post-wounding and lasting until at least 100 days post-wounding. The gene expression patterns and histology reveal limited capacity for muscle regeneration in rainbow trout, and muscle texture analyses one year after wound infliction confirm that wounds heal with fibrosis. At 100 dpw epidermis had fully regenerated, and dermis partially regenerated. Scales had not regenerated even after one year.

CD163 is a marker of "wound healing"-type M2c macrophages in mammals. M2 macrophage markers are as yet poorly described in fish. The pattern of CD163 expression in the present study is consistent with the expected timing of presence of M2c macrophages in the wound. CD163 may thus potentially prove a valuable marker of M2 macrophages - or a subset hereof - in fish.

We subjected a group of fish to bathing in an immunomodulatory β -glucan product during wound healing, but found this to have very limited effect on wound healing in contrast to a previously published study on common carp.

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