



AMINOGLYCOSIDE ANTIBIOTICS AND THE SENSORY HAIR CELLS OF INNER EAR IN THE ATLANTIC COD, *Gadus morhua*: EFFECTS ON FISH HEARING THRESHOLD

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AIMS OF THE STUDY: to investigate: a) the potential involvement of the fish lateral line system in hearing at 250 Hz, b) the consequences of the inner ear inactivation on hearing at 250 Hz and c) the possible regeneration of the inner ear hair cells in the Atlantic cod (*Gadus morhua*).

KEYWORDS: hearing threshold, ABR, inner ear, sensory hair cells, cod, *Gadus morhua*, gentamicin

MATERIAL AND METHODS: cods divided in 4 different groups:

Control cods
(n = 9)

Placebo cods
(seawater bath
for 4 h, n = 9)

Aminoglycoside bath cods (42 mg.l⁻¹
gentamicin + 1.5 g.l⁻¹ streptomycin
sulphate for 4 h, n = 9)

Aminoglycoside injection cods (80 mg.kg⁻¹
+ gentamicin in 2 injections at 2 days
interval, n = 9)

to evaluate stress related to bath

to damage lateral system (LS)

to damage inner ear (IE)

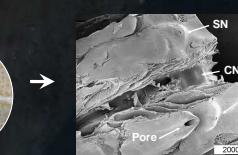
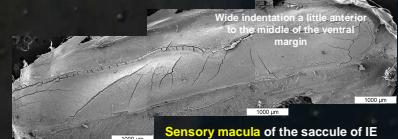
X 2 at one week interval

**AUDITORY BRAINSTEM
RESPONSE (ABR)**

MEASUREMENT (series of 2000 pure-tone sinusoidal 250 Hz tone bursts, with 5 cycles – 2,1,2 – duration and a presentation rate of 22.3 per second)



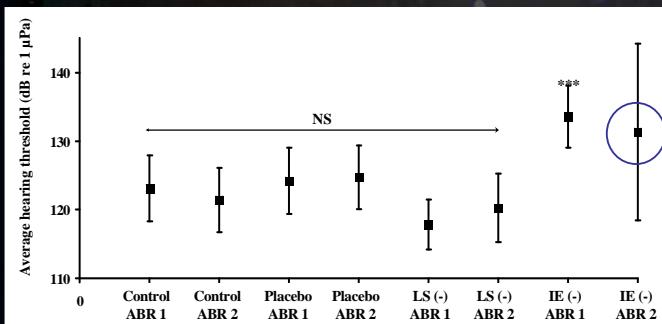
2 cods sacrificed after
ABR to examine hair
cell tissue status from
LS and IE in SEM



Superficial neuromasts (SN) were located on hillocks from both sides of the canal neuromasts (CN)

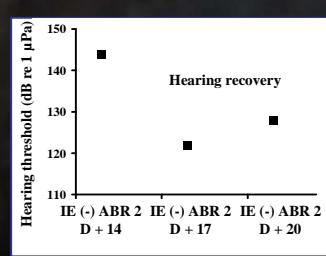
IE
LS

RESULTS:



Ten days after treatment, hearing thresholds of placebo fish and cod with lateral line damage did not differ significantly from control fish ($p = 0.387$ and $p = 0.095$, respectively), whereas the fish that received intravenous gentamicin injection had significantly elevated hearing thresholds compared to controls ($p < 0.0001$).

From the 17th day after antibiotic injection, ABR measurements showed recovery of hearing thresholds towards the range of the control cods ($p = 0.535$).



CONCLUSION and PERSPECTIVES:

This study first suggests that the lateral system inactivation did not influence cod hearing threshold at 250 Hz. After inner ear damage by gentamicin injection leading to increased auditory thresholds, hair cell regeneration led to the recovery of the hearing function within 17 days following treatment.

As the inner ear regeneration was only observed in a few animals, further investigations are needed to elucidate this capacity of regeneration.

