Effects of acute and chronic stress on telencephalic neurochemistry and gene expression in rainbow trout (Oncorhynchus mykiss) - DTU Orbit (19/03/2019)

Effects of acute and chronic stress on telencephalic neurochemistry and gene expression in rainbow trout (Oncorhynchus mykiss)

By filtering relevant sensory inputs and initiating stress responses, the brain is an essential organ in stress coping and adaptation. However, exposure to chronic or repeated stress can lead to allostatic overload, where neuroendocrinal and behavioral reactions to stress become maladaptive. This work examines forebrain mechanisms involved in allostatic processes in teleost fishes. Plasma cortisol, forebrain serotonergic (5-HTergic) neurochemistry, and mRNA levels of corticotropin-releasing factor (CRF), CRF-binding protein (CRFBP), CRF receptors (CRFR1 and CRFR2), mineralocorticoid receptor (MR), glucocorticoid receptors (GR1 and GR2) and serotonin type 1A (5-HT1A) receptors (5-HT1Aα and 5-HT1Aβ) were investigated at 1 h before and 0, 1 and 4 h after acute stress, in two groups of rainbow trout held in densities of 25 and 140 kg m-3 for 28 days. Generally, being held at 140 kg m-3 resulted in a less pronounced cortisol response. This effect was also reflected in lower forebrain 5-HTergic turnover, but not in mRNA levels in any of the investigated genes. This lends further support to reports that allostatic load causes fish to be incapable of mounting a proper cortisol response to an acute stressor, and suggests that changes in forebrain 5-HT metabolism are involved in allostatic processes in fish. Independent of rearing densities, mRNA levels of 5-HT1Aα and MR were downregulated 4 h post-stress compared with values 1 h post-stress, suggesting that these receptors are under feedback control and take part in the downregulation of the hypothalamic-pituitary-interrenal (HPI) axis after exposure to an acute stressor.

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Aquaculture, University of Copenhagen, Uppsala University, Lund University, Norwegian Institute for Water Research
Contributors: Moltesen, M., Laursen, D. C., Thörnqvist, P. O., Aberg Andersson, M., Winberg, S., Höglund, E.
Pages: 3907-3914
Publication date: 2016
Peer-reviewed: Yes

Publication information
Journal: Journal of Experimental Biology
Volume: 219
Issue number: 24
ISSN (Print): 0022-0949
Ratings:
BFI (2019): BFI-level 2
Web of Science (2019): Indexed yes
BFI (2018): BFI-level 2
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 2
Scopus rating (2017): CiteScore 2.6 SJR 1.611 SNIP 1.306
Web of Science (2017): Impact factor 3.179
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 2
Scopus rating (2016): CiteScore 2.62 SJR 1.824 SNIP 1.27
Web of Science (2016): Impact factor 3.32
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 2
Scopus rating (2015): CiteScore 2.4 SJR 1.821 SNIP 1.211
Web of Science (2015): Impact factor 2.914
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 2
Scopus rating (2014): CiteScore 2.51 SJR 1.742 SNIP 1.315
Web of Science (2014): Impact factor 2.897
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 2
Scopus rating (2013): CiteScore 2.75 SJR 1.733 SNIP 1.314
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
Keywords: 5-HT, Allostatic load, Cortisol, Gene expression, HPI axis, Neurochemistry, Medicine (all), Physiology, Ecology, Evolution, Behavior and Systematics, Aquatic Science, Molecular Biology, Animal Science and Zoology, Insect Science

Original language: English

Electronic versions:

Publishers version

DOIs:
10.1242/jeb.139857

URLs:
http://jeb.biologists.org/content/219/24/3907

Source: FindIt

Source-ID: 2346846830

Research output: Research - peer-review > Journal article – Annual report year: 2017