

## QUANTITATIVE PCR ANALYSIS OF ATLANTIC SALMON

### CYP1A IN GILLS

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### EXTENDED ABSTRACT ONLY - DO NOT CITE

Environmental pollutants are hypothesized to be one of the causes of recent declines in wild populations of Atlantic salmon (*Salmo salar*) across Eastern Canada and the United States. Some of these pollutants, such as polychlorinated biphenyls and dioxins, are known to induce expression of the CYP1A subfamily of genes. We applied a highly sensitive technique, quantitative reverse transcription-polymerase chain reaction (Q-RT-PCR), to measure CYP1A induction and expression patterns in Atlantic salmon gills. This assay was used to detect patterns

of CYP1A mRNA levels, a direct measure of CYP1A expression, in Atlantic salmon exposed to pollutants under both laboratory and field conditions. Two groups of Atlantic salmon juveniles (48-76 g) received an intraperitoneal injection of 50  $\mu\text{g g}^{-1}$   $\beta$ -naphthoflavone (BNF) or vehicle only (n=10 for both groups). Non-lethal gill biopsies were taken for each treatment group prior to injection and 1, 2, and 7 days post-injection. The same fish were used at each sampling point. After RNA extraction and Q-RT-PCR analysis, control fish showed static levels of CYP1A over the course of sampling. Induced salmon demonstrated similar levels of CYP1A to control fish at time zero and a significant induction over the course of each additional sampling period. The quantitative RT-PCR was also applied to salmon sampled from two streams (n=10 for each stream) in Massachusetts, USA. Salmon gill biopsies sampled from Millers River (South Royalston, Worcester County), known to contain polychlorinated biphenyls (PCBs), showed a significant induction over those collected from a stream with no known contamination (Fourmile Brook, Northfield, Franklin County). Gill biopsies coupled with Q-RT-PCR analysis is a novel, sensitive, and accurate method to estimate CYP1A expression dynamics in gill tissues of Atlantic salmon. This method has the potential to be a valuable tool in environmental assessment of not only wild Atlantic salmon populations, but many other populations of salmonids as well.

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