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**Towards a new tool for parasitic lamprey assessment – quantitative metrics of attack dynamics and host response**

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**ABSTRACT:**

Sea lamprey (*Petromyzon marinus*) have decimated the Great Lakes fisheries over the past century, and their control has become the key to protecting native fish populations. Wounding data collected from host fish, including wound type and healing, helps to inform management decisions on where to apply lamprey control measures each year; however wound assessment is subjective and prone to error. The aim of the present study was to determine if protein biomarkers of lamprey parasitism could be quantified in host fish plasma that could serve as a potential aide to current wounding assessment practices. Male siscowet lake charr (*Salvelinus namaycush*) were parasitized in a lab setting for four days, after which the lamprey was removed, a blood sample was collected, and the wound was classified as A-type (penetrating) or B-type (non-penetrating). A second blood sample was collected from host fish with A-type wounds 7 months later to assess recovery. The plasma proteome was quantified using iTRAQ, and the relative abundances of 169 proteins were compared between parasitized and non-parasitized control fish. Three functional classes of proteins were differentially modified by lamprey parasitism: blood coagulation, immune response, and lipid transport. A major finding of this study was evidence of a concerted anticoagulation response in fish with A-type wounds, including decreased abundances of fibrin clot components, some of which did not fully recover within 7 months. A modified clotting assay was used to validate this finding and showed reduced fibrinogen concentration in parasitized fish. Therefore, quantifying aspects of the clotting response alongside lamprey wound assessment efforts may help improve the accuracy and efficacy of sea lamprey control measures.