# Humoral Biomarkers of Skeletal Muscle Myopathothy in Atlantic Salmon, *Salmo salar*.

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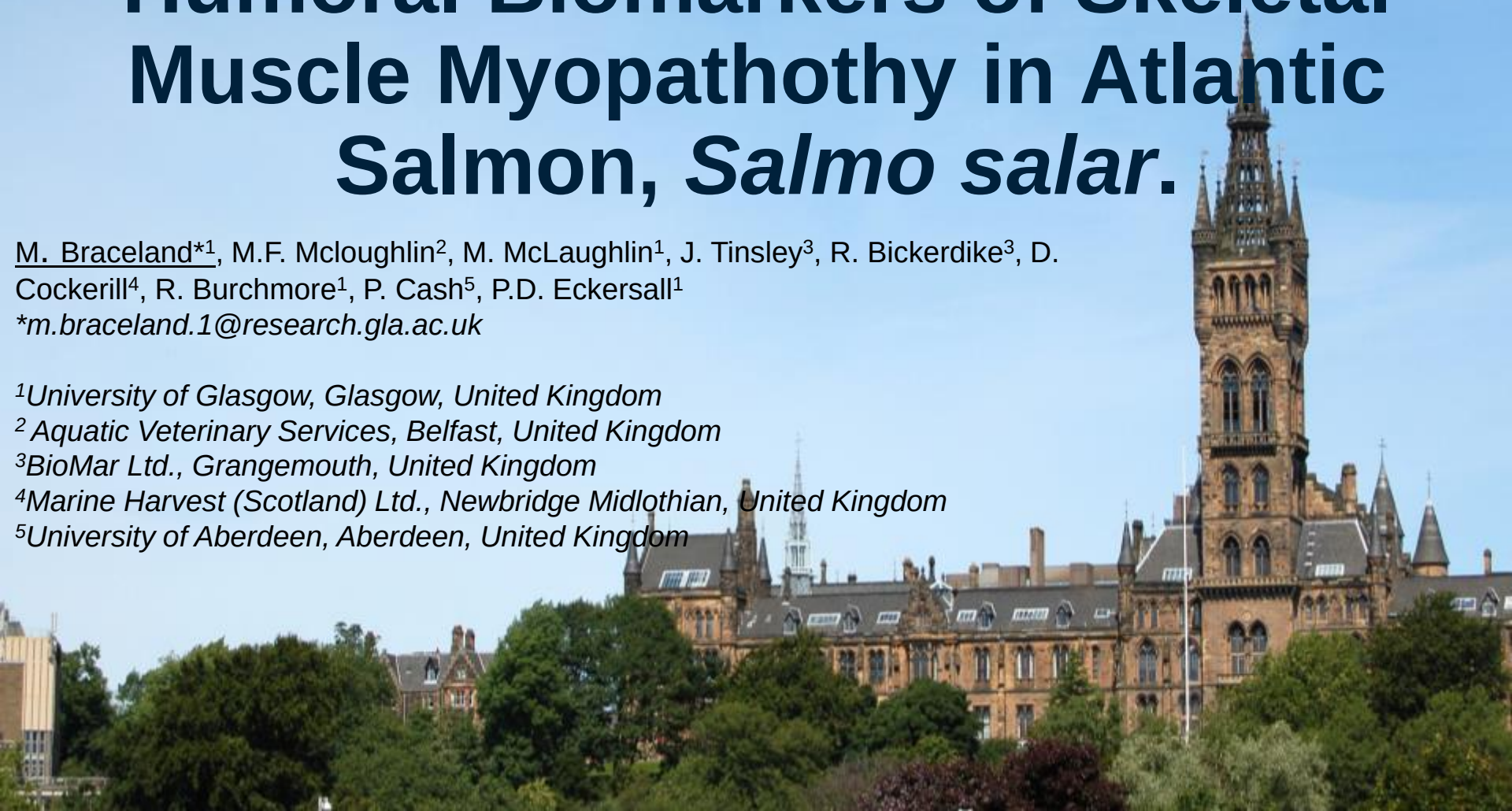
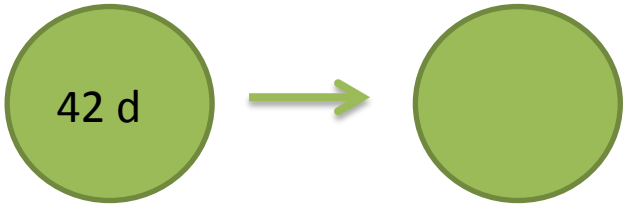


## Aim

Diseases of known and unknown aetiology that cause pathological lesions to skeletal muscle of Atlantic salmon, *Salmo salar*, are one of the biggest contributors to the economic impact disease has on the salmon aquaculture industry. In addition, most commonly used diagnostic tools are destructive and used in a reactive manner, thus increasing the costs of diagnosis and the risk of disease spread. Therefore, the aim of this study was to identify proteins which may be used as non destructive diagnostic tools via proteomics and histopathology.

## SAV3 Trial

In brief, samples were attained using an established cohabitational pancreas disease (PD) experimental model using Trojan shedders infected by salmonid alphavirus subtype 3 (SAV3). In total 12 tanks were used with 9 fish from each being sampled at 0, 2, 3, 4, 5, 6, 8, 10 and 12 weeks post challenge (wpc).



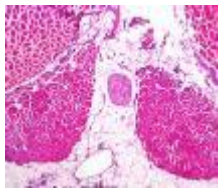

X 8 (tanks)
350 fish

SAV 3 infected CHSE cell culture supernatant at ca. $10^5$ TCID/fish into their intraperitoneal cavity

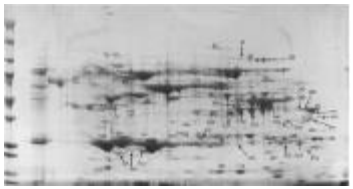
24 fish
X 12

X 12 tanks
120 fish

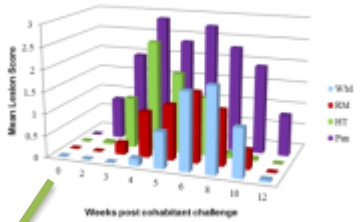
**Serum taken**



**Tissues taken**



**Two dimensional gel proteomics**

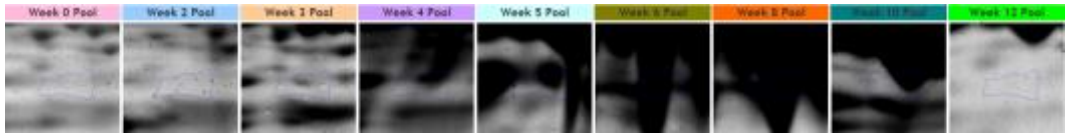


**Histopathiological scoring**

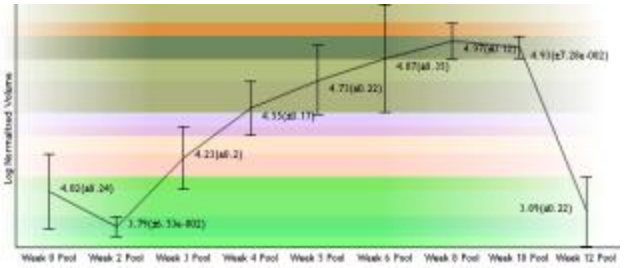
Significant Correlation of spot profiles and muscle histopathological score, by GLM analysis

## Results

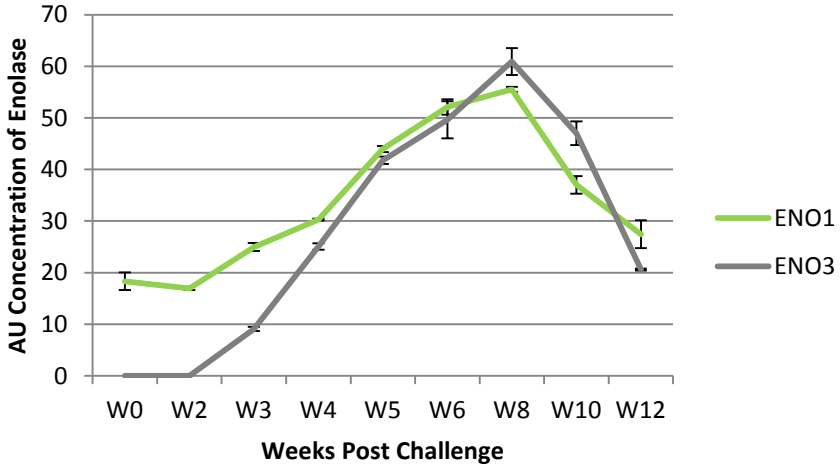
Proteomics identified 72 protein spots that altered following the experimental infection of salmon with SAV3, with a number of proteins being significantly associated with muscle histopathological lesion scores, including: enolase, glyceraldehyde-3-phosphate dehydrogenase, pyruvate kinase, and creatine kinase. A number of these findings are now in the process of validation by other techniques such as western blot and immunological assays being developed, below shows the validation of proteomic results for enolase (isoforms 1 and 3) by western blot and immunoassay.

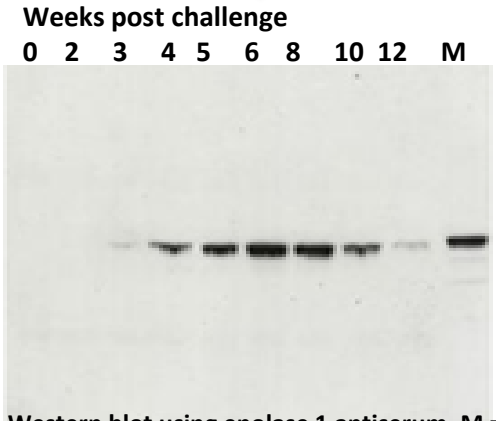



**Enolase (Spot 360) expression profile throughout the trial from week 0 sampling point to week 12.**



**Graph of Enolase (Spot 360) expression profile**




**Western blot using enolase 1 antiserum. M = muscle lysate**

## Conclusion

The value of proteomics in biomarker discovery coupled with histopathology demonstrated in this study with biomarkers of tissue damage being identified as non destructive means to assess health status of salmon. In addition, enolase isoforms have been identified which may be linked to tissue distribution. Serum biomarkers of myopathy can add value to the semi quantitative histopathological scoring systems regularly used in aquaculture and it is hoped that these can aid in the monitoring of health status at aquaculture sites.