UBC SHARC 2016 Workshop

Designing & Presenting a Research Poster

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Ada Lo
UBC MD 2019
Science Communication
Tips for effectively sharing your research

Part 3: Designing & presenting a research poster

Linda Herbert, MSc
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What is the purpose of a research poster?
Realities of a Poster Session...
Where to start?

1. Confirm the guidelines/constraints
2. Distil your research – keep it simple!
3. Start designing...
1. Confirm guidelines/constraints

- Orientation
- Size
- Format?
- Content?

**SHARC Guidelines**

- Any orientation
- Width ≤ 36” (ideally)
2. Distil your research

• Keep it simple!
• Focus on the important stuff
• Eliminate superfluous detail
• Be clear and concise
• Lead the reader/viewer
• Picture/diagram vs words
• 1-2 take home messages
• Think like an abstract!

Photo: Roger Ferrer Ibáñez flickr
My awesome poster title

Methods
- This is where I explain the methodology with a huge section of text.
- It is really time-consuming to read and the audience either stops listening to me while they are reading or, more likely, they just ignore my poster because it looks a little overwhelming and they don’t want to spend 15 minutes reading the ridiculous amount of text I’ve included here.
- Seriously, just looking at this much text in one block will make me skip a poster!
- Are you even still reading at this point?
- Do you have any idea what I have been saying while you have been reading?

The final poster section
- I just love text and I think everyone else should love it too!
- People should spend 15 minutes just reading my poster, that is realistic right?
- They should also be required to stand really close so that they can read this teeny, tiny text I have used.

Another poster section
- A whole bunch more text is down here.
- Look at all the text crammed on this poster!
My awesome poster title

The in situ perfused heart

Cardiac power output = flow \times \text{pressure generated}
\quad \left( P_{\text{in}} - P_{\text{out}} \right)

Another poster section
- A whole bunch more text is down here.
- Look at all the text crammed on this poster!

The final poster section
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3. Designing & presenting your poster

- Know your audience
- Be engaging
- Think visually
- Go the extra mile
- Practice, practice, practice
1. Know your Audience

Who?

What?

When?

Where?
Examples

Know your audience

A COMPARISON OF MYOCARDIAL β-ADRENORECEPTOR DENSITY AND LIGAND BINDING AFFINITY AMONG SELECTED TROPICAL FISHES

Linda M. Hanson¹, Yuen K. Ip² and Anthony P. Farrell¹
¹Department of Biological Sciences, Simon Fraser University, Burnaby, British Columbia, Canada
²Department of Biological Sciences, University of British Columbia, Vancouver, British Columbia, Canada

Introduction

Purpose: To examine interspecific variation in myocardial β-adrenergoreceptor density (βmax) and binding affinity (Kd) for ventricular tissue in 7 previously unstudied species of tropical fish.

• in fish, the β-adrenergoreceptor (β-AR) signaling pathway mediates the cardiac actions of adrenaline mainly via receptors of the β1 subtype.
• Temperature acclimation alters the heart's response to adrenaline and this change has partially attributed to a temperature-dependent change in cell surface β-AR density.
• Cleghorn et al. (2005) suggested that βmax and Kd differed intrinsically among species adapted to different temperatures.

Methods

Maximal heart performance under hypoxia

The role of adrenaline handling in high temperature tolerance of migrating adult sockeye salmon populations

Rescue of cardiac performance with adrenergic stimulation in acidosis and hyperkalemia in rainbow trout (Oncorhynchus mykiss)

Linda M. Hanson¹, Janet Mouniargi², Shannon Obradovich³, and Anthony P. Farrell¹
¹Department of Zoology, University of British Columbia, Vancouver, British Columbia, Canada
²Zoophysiology, Gothenburg University, Sweden
³Faculty of Agricultural Sciences & Dept. of Zoology, University of British Columbia, Canada

Introduction

• The rainbow trout heart relies primarily on haemal circulation (venous blood)

Systemic venous pressor response to α-adrenergic stimulation

Maximum cardiac performance under hypoxia

Hypoxia (Hyp) exposure:

• Exposure to hypoxia significantly reduced cardiac function

• Hypoxic adaptation increased cardiac function

• Maximal adrenergic stimulation partially restored cardiac function in hypoxic conditions

Rescue With Adrenergic Stimulation

• Adrenergic stimulation significantly increased cardiac function

Take Home

Under conditions of hypoxia, adrenaline plays a critical role in maintaining cardiac performance.
2. Be engaging

Manuscript ≠ Poster

Engaging title
but\(^\text{appropriate}\)

Tell a story

Limited time

Get excited

Be yourself
Cardiac performance of perfused crucian carp hearts during anoxia

Linda Hall
University of British Columbia

Kåre-Olav Stensland (Tony) Farrell, Jonathan
University of British Columbia

How do carp survive without oxygen?
3. Think visually

Do you think that anyone can actually read this tiny, tiny font... or that they want to spend 20 minutes reading one poster?

Font choice

White space

Images

No distractions

Summarize

Readability
Examples

A really technical and super long poster title: featuring a colon

**Introduction**

Lots of text here that is really hard to read because I've used a terrible colour scheme.

How can anyone read my poster?

Are you even still reading at this point?

Do you have any idea what this poster is about? Do you have a headache yet? I do.

**Another poster section**

- The colour scheme is really off-putting.
- It looks like it's a bit of a mess.
- It's my fault.
- It's my fault.
- It's just an awful choice of background colours and accent colours.

**Method**

A lot of writing, and a bad example of a graph.

---

A really technical and super long poster title: featuring a colon

**Introduction**

Lots of text here that is really hard to read because I've used a terrible colour scheme.

How can anyone read my poster?

Are you even still reading at this point?

Do you have any idea what this poster is about? Do you have a headache yet? I do.

**Another poster section**

- People will get so bored reading all of this text.
- At least it is visible though, that is an improvement.
- No one is going to stop at this boring looking poster.
- What is wrong with the colours I used in the graph below?

**Methods**

A bad graph that uses a colour scheme that some people can't see.
**Examples**

Here is a bunch of text do you think it is easy to read these words when they are justified? What about when we use superdyduperdy long words that really mess up the spacing.

Here is a bunch of text that is not justified do you think it is easier to read these words when they are not justified? What about the superdyduperdy long words, how do they look?
Rescue of cardiac performance with adrenergic stimulation during hypoxia, acidosis and hyperkalemia in rainbow trout (*Onchorhynchus mykiss*)

Linda M. Hanson¹, Janet Mouniarigi², Shannon Obradovich³, and Anthony P. Farrell⁴

¹Department of Zoology, University of British Columbia, Vancouver, British Columbia, Canada; ²Zoophysiology, Gothenburg University, Sweden; ³Biological Sciences, Simon Fraser University, Canada; ⁴Faculty of Agricultural Sciences & Dept. of Zoology, University of British Columbia, Canada.

**Introduction**

- The rainbow trout heart relies primarily on hemal circulation (venous blood).
- Lymphatic circulation becomes hypoxic, acidic and hyperkalemic during strenuous exercise. Factors that are highly detrimental to cardiac performance.
- Nevertheless, the rainbow trout heart must maintain a high cardiac performance under these conditions.
- We hypothesized that Adrenergic stimulation plays a critical role in maintaining maximum cardiac performance under conditions of strenuous exercise (hypoxia, hyperkalemia and acidosis).
- In addition, we were interested in determining the hypoxic thresholds for cardiac collapse under hypoxia alone, and under strenuous exercise conditions with tonic and maximal adrenergic stimulation.

**Maximum cardiac performance under hypoxia**

- Hypoxia: Partial pressure of oxygen (torr) vs. change in maximum power (W/kg). Recovery vs. hypoxia ratio.
- Hypoxia & Hypoxic Recovery: Maximum power of perfused rainbow trout hearts was assessed under normoxic conditions (150 torr O₂, specific levels of hypoxia indicated on the x-axis), and then again under normoxic conditions (normax). Each P<0.05 value indicates a separate group of hearts (N=4-10). Values plotted are change from control ± SEM. *Denotes significant differences from control repeated measures ANOVA: P<0.05.

**Technique – The Perfused Heart**

- This in situ preparation isolates the heart in terms of perfusate delivery and collection while leaving the pericardium intact, allowing for assessment of maximum cardiac performance.
- The input cannula is introduced into the sinus venosus via a hepatic vein, and the output cannula is inserted into the ventral aorta (Farrell et al., 1986).

**Experimental Procedure**

- Maximum cardiac performance of in situ perfused rainbow trout hearts was assessed at 10°C under varying levels of hypoxia (94-10 torr), both alone and in conjunction with hyperkalemia (5 mM K⁺) and/or acidosis (pH 7.5).
- In addition, the hypoxic, hyperkalemic, acidic exposure was done with both tonic (5 mM) and maximal adrenergic stimulation (500 nM AD).
- Sequential 15-min perfusions were done for individual hearts as follows:
  1. Normoxic (150 torr O₂, pH 7.9, 5 mM norepinephrine)
  2. Hypoxic (pH 7.9, 5 mM norepinephrine)
  3. Recovery, normoxic (150 torr O₂, pH 7.9, 5 mM norepinephrine)
  4. Strenuous exercise (5 mM K⁺, pH 7.5, 5 mM norepinephrine)
  5. Strenuous exercise with adrenergic stimulation (hypoxic, 5 mM K⁺, pH 7.5, 500 nM norepinephrine)

- For experiments conducted below hypoxic thresholds hearts were not exposed to lethal steps.

**Results & Conclusions**

- **Hypoxia Alone**
  - Exposure to hypoxic perfusate ≤ 50 torr resulted in significant reductions in maximum cardiac performance.
  - In addition, full recovery upon return to normoxic conditions was not seen.

- **Hypoxia, Hyperkalemia & Acidosis**
  - With tonic levels of adrenergic stimulation maximum performance during hypoxia and hyperkalemic exercise conditions was significantly decreased.
  - The threshold for cardiac collapse under the above conditions was between 37-50 torr.
  - Exposure to hypoxia ≤ 20 torr was lethal, thus the threshold for cardiac collapse under hypoxia occurred between 15-20 torr.

- **Rescue With Adrenergic Stimulation**
  - Maximum adrenergic stimulation restored cardiac performance in hearts previously exposed to strenuous exercise conditions when P<0.05≤ 75 torr.
  - Maximum adrenergic stimulation protected cardiac performance during exposure where P<0.05≤ 37 torr, conditions that would otherwise be lethal.
  - However, with adrenergic stimulation maximum performance was significantly decreased from that observed during normoxic.

**Take Home Message**

Under conditions simulating strenuous exercise, adrenergic stimulation plays a critical role in maintaining cardiac performance, raising the threshold for cardiac collapse to hypoxic levels similar to those seen in vivo.

**References**

- Parry SP & Reid SD (1992) Relationship between blood CO₂ content and catecholamine levels during hypoxia in rainbow trout and Atlantic salmon. J Fish Biol 62: B244-249.
Bad graph versus better graph

Bear et al. 2007

Acclimation temperature

Daily relative growth rate (%)

rainbow trout

cutthroat trout
Bad graph versus better graph

Bear et al. 2007

Daily relative growth rate (%)

Acclimation temperature (°C)

cutthroat trout
rainbow trout

Bear et al. 2007
A COMPARISON OF MYOCARDIAL β-ADRENORECEPTOR DENSITY AND LIGAND BINDING AFFINITY AMONG SELECTED TROPICAL FISHES

Linda M. Hanson¹, Yuen K. Ip² and Anthony P. Farrell¹

¹Department of Biological Sciences, Simon Fraser University, Burnaby, British Columbia, Canada
²Department of Biological Sciences, National University of Singapore, Republic of Singapore

Introduction

Purpose: To examine interspecific variation in myocardial β-adrenoceptor density (Bmax) and binding affinity (Kd) for ventricular tissue in 7 previously unstudied species of tropical fish.

- In fish, the β-adrenoceptor (β-AR) signaling pathway mediates the cardiac actions of adrenaline mainly via receptors of the β2 subtype.
- Temperature acclimation alters the heart’s response to adrenaline and this change has partially been attributed to a temperature-dependent change in cell surface β-AR density.
- Olsson et al. (2000) suggested that Bmax and Kd differed intrinsically among species adapted to different temperatures.

Methods

- Bmax and Kd were determined for ventricular punches using a titrated ligand technique (Watson-Wright et al., 1989; Gamperl et al., 1994).
- Ventricular tissue punches were incubated with the hydrophilic β-adrenoceptor ligand [H] CGP-12177.
- The mass of individual ventricles determined the degree of replication for binding assays.
- Binding curves were replicated up to 6 times (n).
- Binding parameters were determined using a Scatchard plot as described by Zivic and Waud (1982).
- The control group (rainbow trout) was compared separately with the tropical elasmobranchs, the tropical freshwater teleosts and the tropical saltwater teleosts.

Results

- Our results for rainbow trout compare favorably with previous studies done at similar temperatures.
- Bmax values ranged from 19.5 to 52.8 ± 8.0 fmol mg protein⁻¹.
- The highest Bmax values were observed in marble goby, blue spotted fantail ray, sleeper, and snakehead.
- Bmax was significantly higher than rainbow trout (P<0.05) in both blue spotted fantail ray and marble goby.
- Ligand binding affinity (Kd) varied from 0.19 ± 0.02 to 1.05 ± 0.11 nM.
- Kd values for blue spotted fantail ray and African catfish were both significantly higher than rainbow trout (P<0.05).

Conclusions

Tropical Marine Elasmobranchs

- Blue spotted fantail ray is the first elasmobranch in which β-AR density and binding affinity have been characterized.
- Bmax was significantly higher than rainbow trout (P<0.05).
- Kd (1.05 nM) was double that observed in any other species (0.48 nM).
- The significantly lower binding affinity observed may be due to variation in β-AR subtypes between teleosts and elasmobranchs.

Tropical Freshwater Teleosts

- β-AR density values tended to be higher in tropical freshwater teleosts when compared with temperate rainbow trout.
- The difference was statistically significant for marble goby (P<0.05).
- High variation within species meant differences for other tropical freshwater teleosts did not reach statistical significance.
- Kd of African catfish was significantly different from rainbow trout.

Tropical Marine Teleosts

- Neither Bmax nor Kd differed significantly from rainbow trout.

Discussion

- The present results suggest that Bmax is higher in freshwater, but not marine, tropical species.
- However, Olsson et al. (2000) reported high Bmax values for both marine tropical species (mahi mahi = 46.9, skipjack tuna = 41.3) and marine temperate species (sockeye salmon = 47.5).
- No clear phylogenetic or environmental pattern of β-AR values is evident.

Future Research

- A comparison of β-AR density values between both temperate and tropical saltwater and freshwater teleosts within family groups.
- Studies of β-AR density and binding affinity in elasmobranchs.
- Characterization of β-AR subtypes in elasmobranchs.

References


Hepatic Portal Vein Cannulation Technique in Fish

Erika J. Eliason1, Anders Kiessling1, Anders Karlsson1, Brankica Djordjevic1, A.P. (Tony) Farrell1,3

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3Faculties of Land and Food Systems, University of British Columbia, Canada
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Introduction
Non-invasive sampling of blood from the hepatic portal vein (HPV) in fish has tremendous value for both nutritionists and physiologists. Furthermore, the combination of HPV and dorsal aorta (DA) techniques enables the examination of physiological changes associated with gut function (such as acid-base balance and ion and osmotic regulation) in greater detail and with greater precision than previously possible.

Objectives
1. Evaluate a chronic hepatic portal vein cannulation technique in Atlantic salmon (Salmo salar). L.
2. Measure the plasma amino acid profiles of blood simultaneously sampled from the hepatic portal vein and dorsal aorta following a meal in rainbow trout (Oncorhynchus mykiss).

HPV Cannulation Method

1. Prepare for surgery
   - Create a 45°-60° incision on the left side of the fish, starting from the anterior tip of the body and extending 5 cm posteriorly.
   - Cut the skin and muscle using surgical scissors.
2. Insert the cannula into the body cavity
   - Insert the cannula into the abdominal cavity and secure it with a suture.
3. Isolate the branch of the intestinal vein
   - Use fine scissors to isolate a branch of the intestinal vein.
4. Insert the cannula and close the wound
   - Advance the cannula into the vessel, ensuring it is fully inserted.
   - Close the incision with a suture.

Results

Baseline values for plasma cortisol (15-45 nmol/l), plasma glucose (2.5-3.2 mmol/l), and Hb (80-120 g/l) were within the normal range for healthy, unstressed fish.

1A. Plasma Cortisol
   - Plasma cortisol remained within the normal range throughout the experiment.
2A. Plasma Glucose
   - Plasma glucose levels were similar to baseline levels at 24 hours post-cannulation.
1C. Hematocrit
   - Hematocrit levels were similar to baseline levels at 24 hours post-cannulation.

Suggests that internal hemorrhaging and stress were not serious problems.

Conclusions

Successful HPV cannulation technique – Key blood variables returned to baseline levels within 3 days post-surgery.

Hepatic metabolism – Some amino acids undergo hepatic transformation during their first pass through the liver.
Cardiovascular and respiratory responses to hypoxia in bar-headed geese (Anser indicus) and barnacle geese (Branta leucopsis)

Sabine L. Eagle, Beverly Chua, Anthony P. Farrell, Yuxiang Wang, and William K. Milsom

* Department of Zoology, University of British Columbia, Vancouver, Canada. ** Department of Biology, Queen’s University, Kingston, Canada.

**Abstract**

Bar-headed geese (Anser indicus) are the only species of goose that has adapted to high altitude as they migrate across the Tibetan plateau at altitudes up to 6,000 m. In contrast, barnacle geese (Branta leucopsis) are not adapted to high altitude. To adapt, bar-headed geese have evolved enhanced oxygen transport and respiratory responses. The aim of this study was to: (1) determine if enhanced cardiovascular and respiratory responses to hypoxia are present in barnacle geese, and (2) determine if these responses are maintained at high altitude.

**Introduction**

High altitude flight entails potential mismatch between O2 supply and demand, necessitating an increased O2 extraction at high altitude. To cope with high altitude, bar-headed geese adapt through enhanced oxygen transport and respiratory responses. These adaptations are particularly evident in the high-affinity hemoglobin (HbA) and the ability to maintain high oxygen extraction during exercise.

**Study Groups**

**Methods**

The following methods were used:

- **Study Animals**: A total of 3 adult birds from each study group.
- **Variables**: respiratory, metabolic, and cardiovascular.
- **Surgery**: cannulation of right brachial artery and vein.
- **Protocols**: each bird was exposed to acute hypoxia (P50 of 25 mm Hg) and intermittent exercise (hypoxic metabolism).
- **Blinded Samples**: at 21 min in all exposures except recovery (5, 25 min).

**Enhanced O2 Transport Cascade**

High-affinity hemoglobin (HbA), red blood cell (RBC) mass, and RBC oxygen affinity are maintained in response to hypoxia.

**Hypoxic Cardiovascular Response (HCR)**

Hypoxic cardiovascular response (HCR) is characterized by increased heart rate, blood pressure, and cardiac output in response to hypoxia.

**Hypoxic Ventilatory Response (HVR)**

Hypoxic ventilatory response (HVR) is characterized by increased minute ventilation in response to hypoxia.

**Research Question 1**: Do the HVR and HCR differ between bar-headed and barnacle geese at low altitude? - Yes

**Results**

- Hypoxic cardiovascular response (HCR)
  - Bar-headed geese have a higher HCR than barnacle geese.
- Hypoxic ventilatory response (HVR)
  - Both species have a similar HVR at low altitude.

**Research Question 2**: Is there plasticity in the HVR and HCR between bar-headed geese at high and low altitude? - Yes

**Summary**

- Hypoxic cardiovascular response (HCR): Bar-headed geese have a higher HCR than barnacle geese.
- Hypoxic ventilatory response (HVR): Both species have a similar HVR at low altitude.

**References**

HIV-1 Tat Protein Induces Downregulation of CD127 Transcripts in CD8 T-Cells

Juzer A. Kakal1, Elliott M. Faller1,2 and Paul A. MacPherson1,2,3
1) Ottawa Health Research Institute, 2) University of Ottawa - Department of Biochemistry, Microbiology and Immunology, 3) The Ottawa Hospital - Department of Infectious Diseases

Summary
- We have recently established that HIV-1 Tat protein (Tat) causes a specific downregulation of Interleukin-7 receptor-alpha (CD127) on CD8 T-cells.
- This downregulation is both time and dose dependent.
- Tat has previously been shown to downregulate IL-2 gene expression in Jurkat cells through alterations in the AP1 complex.
- Since Tat is known to effect the transcriptional regulation of other cellular genes, we hypothesize that this down regulation by Tat occurs at the level of transcription initiation within the CD127 gene promoter.
- Addition of purified Tat protein to CD8 T-cells induced a significant decrease in the level of CD127 mRNA. The majority of CD8 T-cells cultured in media alone remained CD127+ over 24 hours and contained high levels of CD127 transcripts. In contrast, the bulk of the CD8 T-cells cultured in the presence of Tat shifted to CD127- and demonstrated a 6-fold decrease in CD127 mRNA (p < 0.05).
- To determine if Tat affected CD127 transcript stability, mRNA levels were measured in the presence and absence of Tat in cells transcriptionally arrested with Actinomycin D. In CD8 T-cells treated with Actinomycin D (5 mg/ml) or Actinomycin D plus Tat (10 mg/ml) for 12 and 24 hours, equivalent levels of CD127 mRNA were found indicating Tat does not enhance CD127 mRNA degradation.
- Future work will include a mutational analysis of the putative human CD127 promoter examining transcriptional activity in the presence and absence of Tat protein.

Background
- CD8 T-Cells are required for recognition and control of viral replication during infection.
- CD8 T-Cell functions are impaired during HIV infection. Although viral specific T-Cells persist in blood, they do not appear to respond to antigen or show cytolytic function.
- Interleukin-7 (IL-7) is essential for CD8 T-Cell proliferation and function.
- The IL-7 receptor is composed of two chains, a unique alpha chain (CD127) and a common gamma chain (CD132) that is shared among IL-2, IL-4, IL-7, IL-9, IL-15 and IL-21 receptors.

HIV Tat protein downregulates CD127 expression on CD8 T-cells in a time and dose dependent fashion.

Hypothesis
Downregulation of CD127 expression on CD8 T-cells by Tat occurs at the level of transcription initiation.

Results
Does Tat Decrease the level of CD127 mRNA transcripts in CD8 T-Cells?
- To determine if Tat causes a decrease in CD127 transcripts, cells were treated with or without Tat (10 µg/ml) and after 24 hours were sorted by FACS into CD127+ and CD127- populations.

Conclusions
- Tat induces a decrease in the rate of CD127 gene transcription in CD8 T-cells resulting in a shift from CD127+ surface expression to CD127-.
- This decrease is not due to cell death or mRNA degradation.

Future Work
- Putative Transcriptional Factor Binding sites within the CD127 Promoter and potential enhancer region.

The CD127 Promoter region (1.1 kb) and five truncation mutants have been cloned upstream of the luciferase reporter gene.

Methods
CD8+ T-Cell Isolation:
CD8 T-cells from healthy HIV seronegative volunteers (n=10) were isolated using the AutoMACS Microbead CD8+ isolation system. The cells were allowed to recover overnight in RPMI-1640 with 20% FCS.

Transcript Studies:
The cells were incubated either in medium alone or in the presence of purified Tat protein (10 µg/ml) for 12 or 24 hours. The cells were then sorted by FACS into CD127+ and CD127- populations. Total RNA was harvested.

Degradation Studies:
CD8 T-cells were transcriptionally arrested by pre-treatment for 2h with Actinomycin D (5 mg/ml). Cells were then treated with purified Tat protein (10 µg/ml) for 12 or 24 hours when total RNA was harvested.

CD127 Transcript Quantification:
CD127 transcripts were measured using real-time PCR and normalized to the expression of the RPS18 reference gene.
Differential Expression of Semaphorin-4f in Axotomized CNS Versus PNS Neurons

Introduction:

While peripheral nervous system (PNS) neurons are able to regenerate that occurs after injury, central nervous system (CNS) neurons typically fail to do so. Studies suggest that one of the reasons for the presence of inhibitory molecules among the Semaphorin family of guidance molecules. However, the function of many Semaphorins in the nervous system is still unknown.

Here, we compared the expression of transmembrane Semaphorin-4f (Sema-4f) in the non-regenerating neurons of the red nucleus following cervical spinal cord lesion (CNS injury), versus the regenerating neurons of the facial nucleus after Facial Motor Neurons - FMNs (a model of regenerating neurons). After injection, the expression of Sema-4f in the non-regenerating neurons was observed several days following axotomy, and the expression was maintained for several weeks. In contrast, in regenerating neurons, we did not observe any change in Sema-4f expression until several days following axotomy. Sema-4f protein levels may be downregulated. We propose that enzyme expression of Sema-4f following axotomy may in fact benefit to regenerating neurons.

Objective:

To compare the levels of Sema-4f (Sema-4f) mRNA and protein expression, following either:

1. PNS injury - Transection of the facial nerve to axotomize the Facial Motor Neurons - FMNs (a model of regenerating neurons)
2. CNS injury - Lateral hemisection of the cervical spinal cord to axotomize the Rubrospinal Neurons - RSNs (a model of non-regenerating neurons)

Materials and Methods:

Surgical Procedures:

For all experiments, adult male Sprague-Dawley rats (200-250 grams) were used. All animals were anesthetized (i.p.) with ketamine (70 mg/kg) and xylazine (10 mg/kg) and killed with carbon dioxide (95%). Rubrospinal Path Model of CNS injury. The spinal cord was exposed at the cervical level (C2-C3) and a lateral hemisection performed. Animals were killed at 1, 3, 7, and 14 days post-injury.

Immunohistochemistry:

Sections were immunostained with anti-Sema-4f antibodies (Santa Cruz Biotechnology) and visualized using the ABC method (Vector Laboratories). Immunostaining was examined using fluorescence microscopy.

In Situ Hybridization:

Semaphorin-4f mRNA expression was detected using radiolabeled oligonucleotide probes for Sema-4f (Sipperley, 2003). Following hybridization, sections were washed for 4 hours, and post-hybridization sections for 2 hours, and then subjected to autoradiography (Kodak X-OMAT). Autoradiography was visualized with an imaging system (Fujifilm). Protein expression was confirmed with an antibody to Sema-4f and protein visualized with a secondary antibody (Jackson Laboratories).

Western Blot Analysis:

Protein from Facial FMNs and Facial RSNs was extracted, separated by SDS-PAGE (7.5%), and transferred to a PVDF membrane (Millipore). Membranes were incubated with a primary antibody to Sema-4f (Abcam), followed by a secondary antibody (Jackson Laboratories), and visualized with an ECL detection system. Levels of Sema-4f were confirmed with an antibody to actin (1:1000, Sigma) as a loading control.

Summary and Conclusions:

1. Following injury, axotomized Facial Motor Neurons show upregulation of Sema-4f mRNA and protein.
2. In contrast, while axotomized Rubrospinal Neurons show no change in Sema-4f mRNA levels, Sema-4f protein levels may be downregulated following injury.
3. Cells present in the spinal cord grey matter, adjacent to the spinal cord injury site, express Sema-4f.

Conclusion:

The observation that Sema-4f is upregulated after a PNS, but not a CNS, injury, may suggest that Sema-4f plays a beneficial role in regenerating neurons.

Acknowledgements:

This study was funded by grants from the Rick Hansen Neurotrauma Initiative and the Christopher Reeve Paralysis Foundation.
DETECTION OF *Kudoa thrysites* DNA FROM SEAWATER USING GRAVITY-FLOW FILTRATION AND qPCR

Amelia Mahony, Steve Cho, Wyth Marshall, Ahmed Siah, Heather Brown & Simon Jones

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Centre for Aquatic Health Sciences, 871A Island Highway, Campbell River, B.C. V9W 2C2

**Introduction**

The myxosporean, *Kudoa thrysites* is endemic to the marine environment in the Pacific Northwest of North America. Infection of farmed Atlantic salmon muscle is of concern to aquacultureists whereby losses due to this parasite are upwards of $50 million annually. Infected muscle contains plasma filled with *Kudoa* myxospores while ascospores are found in seawater. Infection is characterized by local post mortem myositis or 'soft flesh syndrome' caused by a protozoa that digest muscle fibres resulting in compromised quality of the fish product.

To attempt to detect the parasite in seawater, our objectives were to:

- Develop a practical, field-friendly filtration protocol to trap ascospores for quantification by qPCR.
- Using linear DNA and isolated myxospores, optimize and develop qPCR standard curves for 3 different conditions in order to 1. assess qPCR efficiency; 2. establish thresholds for sensitivity of this assay for use in interpreting real seawater sample results.
- Assess minimum filtration volumes for *Kudoa* detection & diurnal trends in our local waters.

**Materials & Methods**

**DNA extraction and qPCR assay development & optimization.**

**Traditional Method**

1. Linear DNA template
2. Myxospores in tubes
3. qPCR
4. DNA extraction
5. Myxospores on filter
6. Samples processed by a second laboratory

**Alternate Methods**

1. Dried spores in qPCR wells
2. Serial dilutions of spores
3. Myxospores on filter
4. Spilled spores filtered through 5 pm filters
5. Used different DNA extraction kits

**Results – Assay Development and Optimization**

**Results – Assay Application**

<table>
<thead>
<tr>
<th># spores in sample</th>
<th>Ct</th>
<th>18S copies/spore</th>
<th>Volume</th>
<th>Average Ct</th>
<th>Range of 18S copies/3 (n=12)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>41.18</td>
<td>19.8</td>
<td>12.5</td>
<td>36.73 (9.73)</td>
<td>18.8-60.5</td>
</tr>
<tr>
<td>10,000</td>
<td>25.24</td>
<td>142.25</td>
<td>2.5</td>
<td>37.28 (10.13)</td>
<td>41.4-60.7</td>
</tr>
<tr>
<td>2500</td>
<td>32.03</td>
<td>2.8</td>
<td>0.5</td>
<td>27.58 (6.9)</td>
<td>35.4</td>
</tr>
</tbody>
</table>

Examples of high and low number space Ct values in relation to calculated 18S copies per spore.

**Conclusions & Future Directions**

- Dried spores in qPCR wells resulted in the highest calculated values of 18S copy number per spore.
- Relative to dried spores, spores in tubes and spores on filters resulted in a minimum range of 8-40 & 4000-6000 fold loss of signal, respectively.
- The reason for the loss of qPCR sensitivity is unknown.
- Increased reproducibility for each sample type in order to establish a clear linear framework to interpret field samples and refine the relationship between Ct and 18S copy #.
- Further establish threshold for detection of *Kudoa thrysites* by sequencing targeted seawater samples.
- Once a clear linear framework is established, process diurnal and fish farm samples

**Acknowledgements**

Funds were provided by the Aquaculture Collaborative Research and Development Program (ACRDP) and Marine Harvest Canada.
Skeena Salmon
Using Bayesian analysis to improve in-season estimates of salmon run size and timing

Problem
The Skeena River fishery is a mixed-stock fishery dominated by a single large sockeye stock. In the case of salmon fisheries, management agencies often try to respond to variability in run timing and abundance by varying harvests in agreement with a harvest control rule. Estimating run timing and abundance is very difficult within season and can often lead to less than optimal fishing efforts (Lins and Peterson 1998). It is difficult to distinguish between run size and run timing as a fishing season develops because a salmon run will behave in the same way if it is a small run coming early or a large run arriving late in the season. Fear of over-harvest can lead to delays in opening the fishery which concentrates effort and can exacerbate weak stock problems reducing fishing opportunity for the commercial fleet.

Methods
This Bayesian approach builds on methods developed for Bristol Bay salmon stocks by Fried and Hilborn (1995) but takes advantage of advances in Bayesian software to perform full Bayesian inference and evaluate the posterior probability of both the run size and run timing as the fishing season develops. A salmon run is modeled as a logistic curve while run size and run timing are the parameters that shape the curve. The model uses data collected from the commercial fishery and an in situ fishery and incorporates prior information on run size from previous male spawns from the year before and escapements from years previously to infer run size and run timing.

Results
Simulations show the Bayesian model more accurately predicts run size than either of the two non-Bayesian methods tested, in addition it provides an explicit measure of uncertainty in forecasts. The non-Bayesian models fail to accurately distinguish between run timing and run size variation until after the peak of the salmon run and present only point estimates of abundance.

Discussion
Salmon stock management is characterized by high uncertainty within season and managers are forced to make decisions about openings and closings in the face of this uncertainty. A harvest control rule that depends on stock sizes to determine allowable harvest rates of salmon catches requires in-season estimates of abundance. The current methods of in-season run size estimation in use on the Skeena River should be updated. A general Bayesian method for estimating run size and timing should be added to the suite of tools managers available to managers of salmon fisheries. The posterior probability distributions associated with Bayesian estimates of run size and the explicit acceptance of uncertainty that they entail should lead to renewed discussion of appropriate harvest control rules. Currently management strategies and embracing uncertainty could be as valuable to the fishery as any marginal improvement in management performance arising from improved in-season estimates.

Next Steps
I’m working on a retrospective analysis of run size and timing estimates using historic Skeena data to test the performance of different methods of estimating run size and timing on real data.

References
4. Go the extra mile

- Anticipate questions
- Be accessible
- Provide access to additional information

http:\mypretendshorturl.ca
5. Proofread and practice

- Proofread!!!
- Mini (test) poster
- Standalone?
- Opening
- Summarize!
- Different versions
- Watch language
- Be engaging

Photo: [David Cornejo](https://flickr.com)
SHARC Poster Session

• Assigned judging time – all judges at once
• Format: “Presentation” + questions
• Length: TBC; ~8 minutes (inc. questions)
• Awards: Top Poster
  Honorable Mention
  People’s Choice
  Top Overall (poster + lightning)
SHARC Judging Criteria

- Visual appeal (organization, appearance)
- Presentation
  - Flow
  - Comprehension
  - Time management
  - Handling questions
- Study design
- Study significance
Final Workshop

Preparing/presenting a 1 minute 1 slide lightning talk

March 4th at noon

DHCC 1020 LT, IMP: MSB 160 LT; SMP: RHS 257 LT; NMP: NHSC 9-235 LT.

https://survey.ubc.ca/s/SHARC-workshops/
Resources & Contacts

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