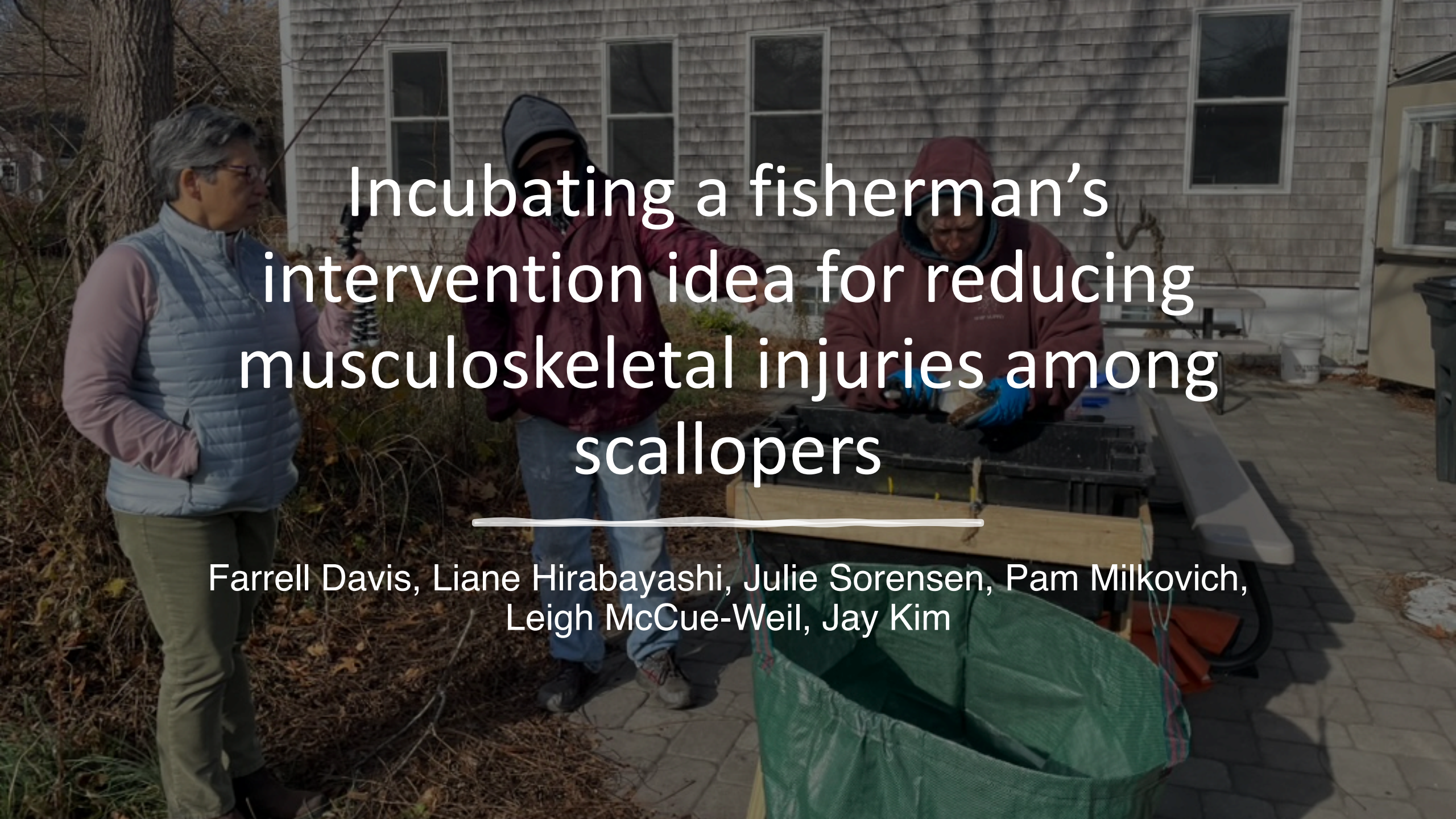


Incubating a fisherman's intervention idea for reducing musculoskeletal injuries among scallopers

Farrell Davis, Liane Hirabayashi, Julie Sorensen, Pam Milkovich, Leigh McCue-Weil, Jay Kim

Background

- Shucking scallops poses various health hazards including biotoxins, cuts, ergonomic risks.
- Existing studies have provided various recommendations to reduce biotoxin exposures and cuts.
- While shucking scallops is highly labor intensive and involves repetitive motions, awkward postures, and forceful exertions, the ergonomic risks and injuries related to this practice are understudied.

Background

- Pilot project collaboration
- Hypothesis: A transdisciplinary approach that brings together experts in fields such as engineering, marketing, distribution, and industry representatives, will lead to increased adoption of evidence-based solutions for improving safety in the fishing, agriculture, and logging industries
- Provide 2 years of financial assistance, mentoring, expertise, and resources to facilitate progress of innovation

NORTHEAST CENTER FOR OCCUPATIONAL HEALTH AND SAFETY

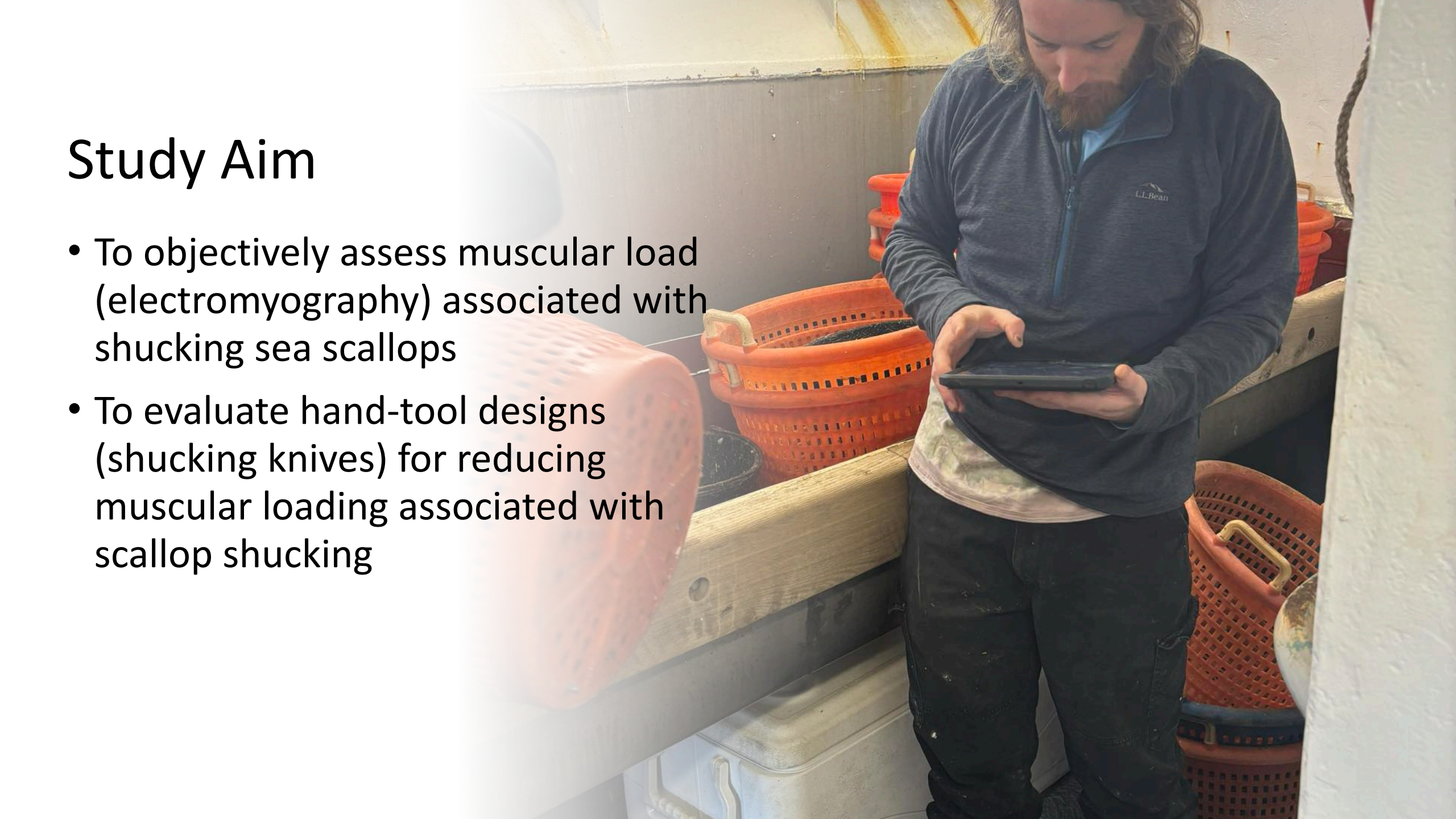
GEORGE MASON UNIVERSITY

Background

- 2 rounds of funding:
  - Jan 2024 – Dec 2025
  - Sep 2025 – Aug 2026
- Round 1 awardee: Farrell Davis, Coonamessett Farm Foundation
- Project goal: develop a more ergonomic knife handle for shucking sea scallops (*Placopecten magellanicus*)
- IFISH6: Northeast Center connected with Jay Kim, Texas A&M, to conduct biometric assessment of ergonomic strain

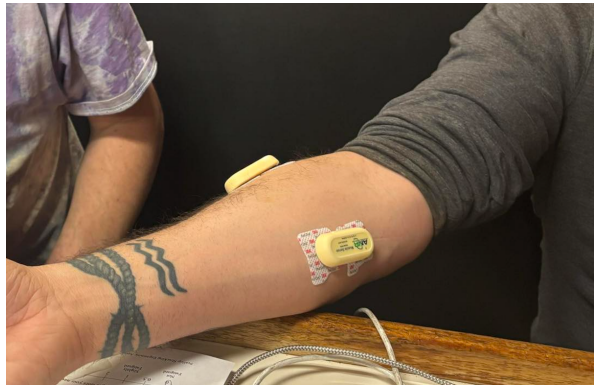
Study Aim

- To objectively assess muscular load (electromyography) associated with shucking sea scallops
- To evaluate hand-tool designs (shucking knives) for reducing muscular loading associated with scallop shucking



Methods

- Participants
  - 6 professional scallopers
  - Age: 51 years on average
  - Years of experience: 20-25 years
  - 4 Males, 1 Female, 1 Unidentified
- Apparatus
  - ANR Muscle Sensor (Electromyography)



Methods Cont.

- A stock knife was evaluated relative to a customized knife created by the participant.

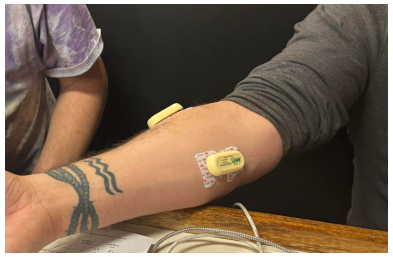
Control Condition (Stock Knife)

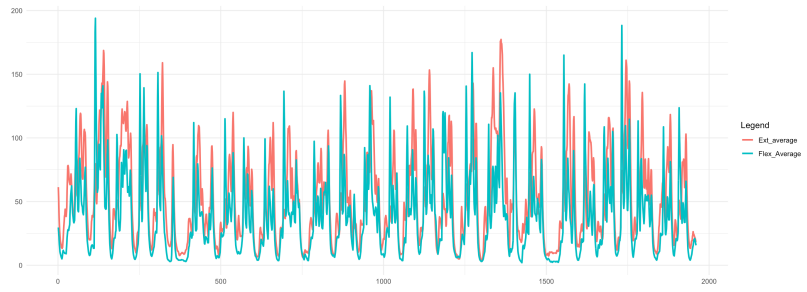
Customization

Experimental Condition (Taped Knives)

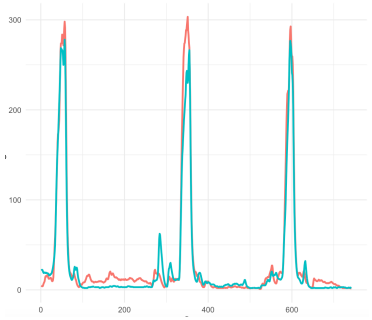
Outcome measures

- Muscle activity measured on
  - Extrinsic finger flexors and extensors
  - Normalized the muscle activity by maximum voluntary contractions (%MVC).
- Summarized as
  - 10th (static)
  - 50th (median)
  - 90th (peak)





MVC



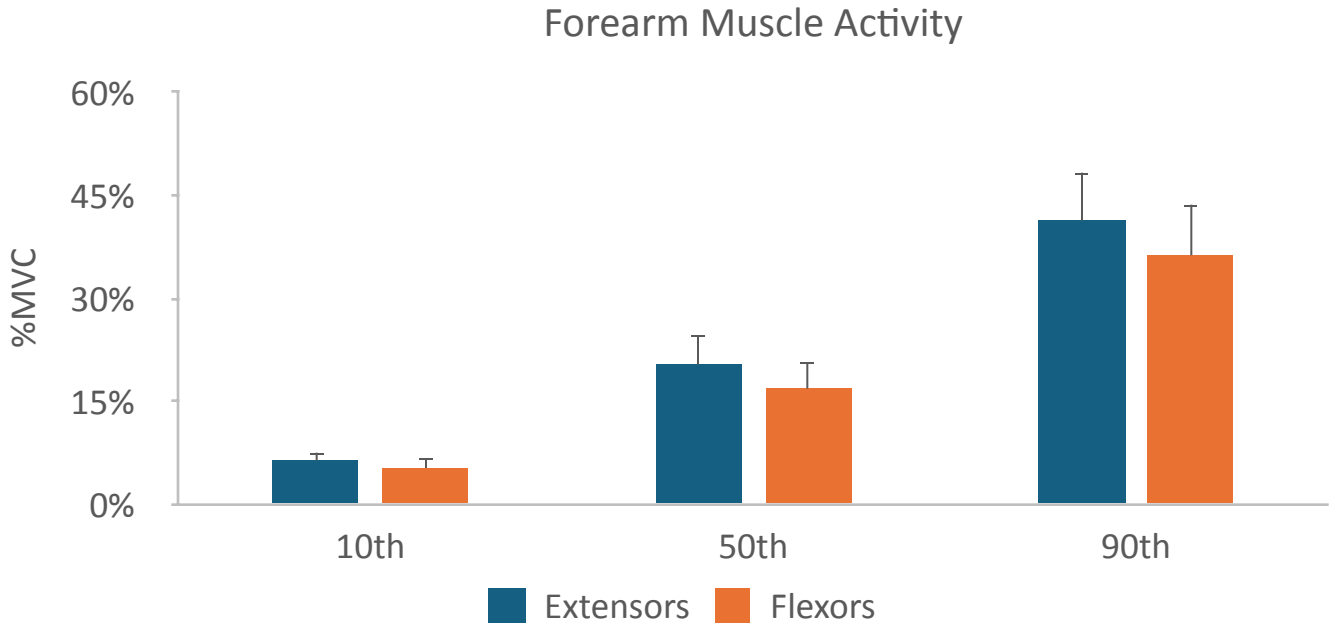
Normalization

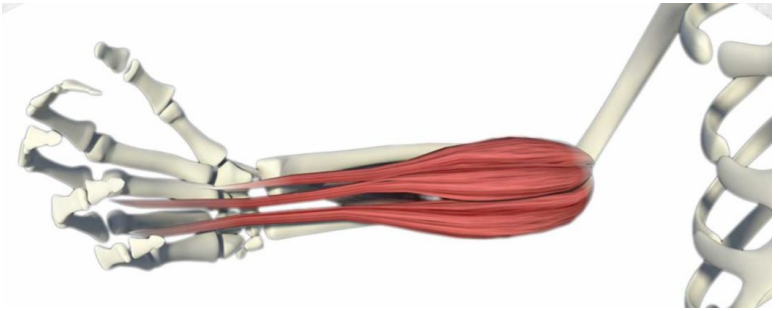
%MVC

Results

Shucking scallops required considerable forearm muscle exertions.

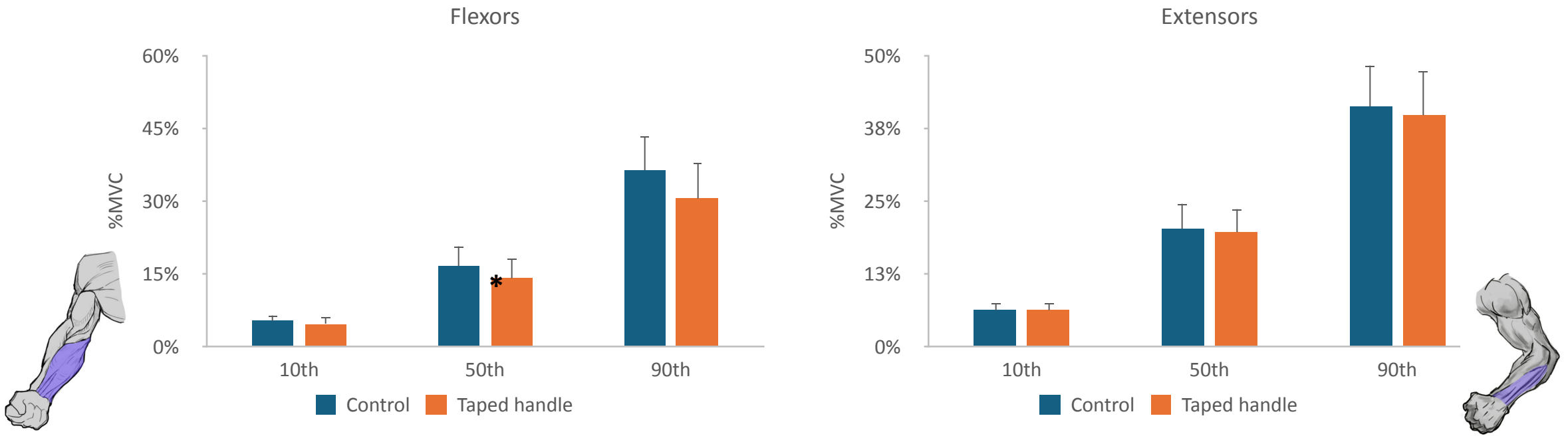
- **Over 20%** of maximum voluntary contraction (MVC) muscle activities of extrinsic finger extensor muscles
- **Over 17%** of maximum voluntary contraction (MVC) muscle activities of extrinsic finger flexor muscles.





Results

- The taped knives reduced finger flexor muscle activity ~14% compared to the control condition (stock knives).
- No effects on finger extensor muscle activity were found.



Discussion

- Summary
  - Shucking scallops requires considerable forearm muscle exertions.
  - Shucking knife handle design can reduce risks for musculoskeletal disorders.
  - IdeasThatWork Incubator can provide innovators with customized resources to implement AgFF OSH projects.
- Future directions
  - Scallop-shucking project: Conduct biometric assessment with prototype handle versus taped handle
  - **Incubator: Round 2 funding announced March 1 [Liane to provide QR code for Web page]**

Acknowledgments

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- We greatly appreciate the sea scallopers who have offered their time to participate in the ergonomic assessments.
- Many thanks to the IdeasThatWork advisory board members for their support and feedback.