Catalyst Project Grant Application – Aquatic Therapy Prosthesis

1. Please list all team members, their disciplines, and departments:
Anna Atkins, Prosthetist Resident, Prosthetics and Orthotics
Laura Miller, Research Scientist, Center for Bionic Medicine
Walter Guminiak, Physical Therapy Assistant, Allied Health – OP
Monica Hendricksen, Physical Therapist, Allied Health – OP
Chrestien Ilaya, Engineer II, Center for Bionic Medicine

2. Briefly, what is your project idea?
We would like to create a non-custom, transtibial prosthesis for use as an aquatic therapy tool. This prosthesis will be available in three sizes and adjustable in height, residual limb length, and circumference to accommodate various limb presentations. Physical therapists will use this tool in an aquatic environment to perform tasks such as safe entering and exiting the pool via stairs, independent standing with weight bearing through the residual limb, flutter kicks, and strength-based activities.

3. What problem does your idea solve?
Custom water prostheses are expensive and often not covered by insurance policies. Aquatic therapy is beneficial for patients with limb loss for pain reduction, encouraging weight bearing through the residual limb, offering alternative modalities to improve mobility, strength, and progression to more advanced skills. Currently, people with limb loss must balance on one leg to perform standing activities in the pool, are unable to safely access the pool via stairs, and cannot simulate weight bearing or gait training through the residual limb in the pool. Providing a prosthesis to utilize in therapy will reduce limitations in the pool, allowing progression of rehabilitation.

4. How are you going to solve the problem (List the steps)?
1. Create prosthesis (3 size variations: S/M/L)
    A. Purchase three prosthetic feet (Niagra Foot)
    B. Create adjustable pylon (CBM Engineer)
    C. Create adjustable socket (Anna & Prosthetic Technician)
2. Trial prosthesis
    A. Identify three subjects with the following criteria:
        - Transtibial limb loss, unilateral
        - Would benefit from aquatic therapy/already participate in aquatic therapy
    B. Initial aquatic therapy session – 30 min (Monica & Anna)
    C. Perform 2 x 30 min aquatic therapy sessions with pool prosthesis (Monica)
    D. Debrief with patient at end of third therapy session (Monica & Anna)
3. Assess results: Debrief results with team (Walter & Monica & Anna), report findings to Laura

5. What is the desired outcome for this project? How will you determine if you were successful?
The primary goal of this project is to create a non-custom prosthesis for use in aquatic therapy. If successful, the prosthesis will be easily adjustable for therapists, safe for the patient, and benefit the rehabilitation experience. This will be determined from feedback from the participants and therapists.

Ultimately, we would later like to use these prostheses in a formal research study to evaluate the effectiveness with a greater sample size, longer duration, and implementation of outcome measures.

6. What help do you need?
Receiving the Project Grant would provide monetary funding to allow purchasing of parts for the prostheses and dedicated time for the team to create, trial, utilize and debrief on the outcome.

I require assistance from:

An engineer to assist design and fabrication of 3 adjustable height pylons which are easy to adjust, safe, and waterproof. (Chrestien)

A prosthetic technician to fabricate three adjustable sockets.

Investigator input on research principles and processes. (Laura)

Research therapist for sessions and debriefing (Monica) and time for refining the design of the prosthesis and debriefing (Walter).

I will also require time to assemble the prostheses, educate Monica on fitting to patients, attend initial and final therapy sessions, and debrief with the team.

7. **Amount funding requested:** (See attached budget)
   Total: $9,892.94
   Person Hours: $7,928.59
   Equipment/Supplies: $1,065

8. **Sketch**