**How Do Babies Roll?**

Danielle Siegel\(^1\), Safeer Siddicky Ph.D.\(^1\), Wyatt Davis\(^1\), Abby Prow\(^2\), Olivia Scholes\(^2\), and Erin Mannen Ph.D.\(^1\)

\(^1\)Mechanical and Biomedical Engineering, Boise State University, Boise, ID. \(^2\)Idaho College of Osteopathic Medicine, Meridian, ID.

Understanding How Babies 3-7 Months Achieve a Roll

**BACKGROUND**

- Achieving a roll is a crucial developmental milestone for babies, understanding the mechanics gives insight into development.
- Only one previous study has established different coordinated movements that a baby may use to achieve a roll.\(^1\)
  1. Contralateral Arm & Leg with Ipsilateral Leg
  2. Contralateral Arm
  3. Contralateral Arm & Leg
  4. All Limbs
  5. Contralateral Arm with Ipsilateral Leg
- No studies have explored how these coordinated movements are related to muscle activation.

**RESULTS**

- Preliminary results indicate similar muscle patterns that would be expected for each coordinated movement.
- Muscle activation of the contralateral side compared to the ipsilateral side for each roll type observed:
  1. Higher abdominals and quadriceps with both triceps being used about equally
  2. Higher triceps and abdominals with lower hamstring and quadriceps
  3. Higher triceps and gluteus maximus with lower hamstring and quadriceps
  4. Higher triceps and quadriceps with lower abdominals and gluteus maximus
  5. Higher triceps and gluteus maximus with lower abdominals and hamstrings

**CONCLUSION**

- Promising approach towards quantifying the movement patterns of roll initiation using a combination of motion capture and EMG analysis.

**IMPACT:** Understanding how babies achieve a roll will help determine how rolling changes as a healthy baby ages. A rolling standard can then be created that shows when a baby’s rolling is not progressing as expected, indicating developmental concerns.

**FUTURE WORK**

- Develop methodology that would allow us to understand the different coordinated movements of a roll from home video.
- Allowing us to complete a longitudinal study from the comfort of a baby’s home in a more realistic rolling environment.

**REFERENCES:**