How does muscle energy production relate to physical performance in older people?

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Background

- Low muscle mass and strength is common in older people.
- This causes falls, hospital admissions and need for care.
- There are different theories as to why muscle mass and strength decrease with age.
- Problems with energy production may be important in explaining low muscle strength in older people.

Aims

- This project aimed to answer two main questions:

A) Is energy production in muscles related to physical performance in older people?
B) What factors influence these relationships?

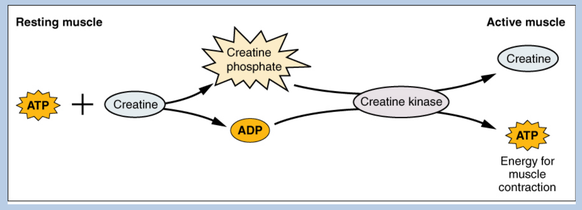

Figure 1. Diagram of muscle energy production

By answering these two questions, we will be able to better understand why muscle strength declines with increasing age and help us to design treatments to keep older people strong and active.

This will also allow us to keep older people out of hospital as much as possible, where they at a lower risk of getting sick or getting other medical conditions.

Figure 2. Exercise set up for the main trial to measure muscle energetics

Methods

- The data for the statistical analysis was taken from the ALFIE trial, a clinical trial involving 124 older people with muscle weakness.
- The trial used an MRI scanner, as shown in Figure 2, to study how muscles generate energy.
- The trial also tested how strong people were and how far they could walk in 6 minutes.
- We analysed how different measures of muscle energy production are related to muscle strength and endurance.
- We also analysed how muscle energy production was affected by other factors such as medical conditions.
- Finally, we analysed how different muscle mass, height, weight and muscle energetics affected each other and physical performance tests.

Test of fitness	Factor	Relationship?
Short physical performance test	Muscle energy production	✗
	Muscle size	✓
	Weight	✓
Six minute walk test	Muscle energy production	✗
	Muscle size	✓
	Weight	✓
	Height	✗

Table 1. Table of main findings

Results and discussion

- Measures of muscles energy production **did not** relate to physical performance measures in older people.
- The results showed that the **amount of weight a person's muscle has to move** is a better associated with physical performance than the quality of the muscle itself
- Sex is related to measures of muscle energy which could be linked to the fact that the **average muscle mass for males was higher than average muscle mass for females.**
- The threshold for exhaustion, measured by the depletion of muscle energy stores, varied a lot within this cohort of participants. This suggest the trial may not have measured the maximum capacity of the muscle.

Conclusion

- In this cohort of participants, we did not find a link between muscle energy production and physical performance.

Future work

- We would like to do a similar study involving older people who have more age-related muscle damage.

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