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# The effect of exercise on muscle mass in older people: systematic review and meta-analysis

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*Affiliated with*

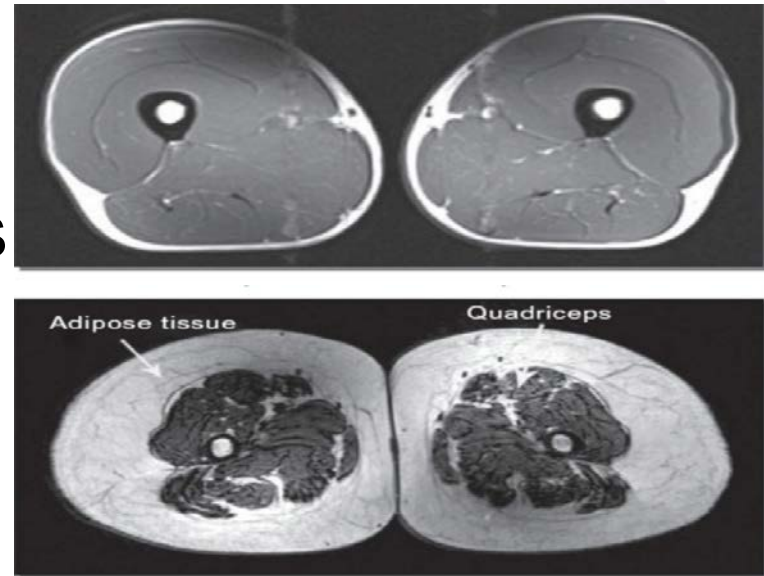


Australia | China | India | UK

# Background

## Sarcopenia

- Loss of skeletal muscle mass and strength
- <50% of people aged 80+
- Falls, disability, hospitalisation, death
- Effect of exercise on muscle mass in older people is unclear <sup>1,2</sup>



<sup>1</sup>Cruz-Jentoft, *Age Ageing* 2014;43(6):748-59

<sup>2</sup>Peterson, *Med Sci Sports Exerc* 2011;43(2):249-58

# Aim

- Does exercise increase muscle mass in older people?
- Does exercise increase muscle strength and mobility in older people?
- Does any type of exercise have a larger effect on muscle mass?

# Methods

Systematic review with meta-analysis of randomised trials

Registered on PROSPERO

Databases: MEDLINE, EMBASE, CENTRAL, CINAHL, LILACS, SportDiscus and PEDro

# Methods

## Inclusion

- Participants aged  $\geq 60$  years
- Intervention exercise
- Control no intervention or intervention excluding drug / nutritional therapy
- Outcome muscle mass

## Random effects meta-analysis

Records identified n=13,163

Duplicates n=5125

Records screened n=8038

Full text articles assessed n=473

Excluded n=434

*Age n=236*

*Mass measurement n=71*

*Data n=49*

*Not RCT n=37*

*Exercise n=32*

*Duplicate n=9*

Studies included in meta-analysis n=39

# Results (39 trials)

Total sample size, n	2194
Mean age (years), range	63-92
Proportion of females	66%
Setting:	
Community	35
Aged care facility	4
Exercise component	
Strength	33
Balance / functional	11
Walking program	10

# Effect of exercise on muscle mass

Hedges'  $g = 0.09$

95% CI 0.004 to 0.18

$p=0.04$

Author

Strength training  
 Ades, 1996 - resistance v control  
 Ades, 2005 - resistance v low intensity exercise  
 Caserotti, 2008 - resistance v control  
 Chin A Paw, 2006 - resistance v control  
 Dao, 2013 - resistance 2x/week v low intensity exercise  
 Fragala, 2014 - resistance v control  
 Henwood, 2008 - resistance v control  
 Kalapotharakos, 2004 - resistance v control  
 Kallinen, 2002 - resistance v control  
 Lovell, 2010 - resistance v control  
 Marques, 2011b - resistance v control  
 Marsh, 2009 - resistance v control  
 Nichols, 1993 - resistance v control  
 Scanlon, 2014 - resistance v control  
 Sipilä, 1995 - resistance v control  
 Solberg, 2013 - resistance v control  
 Souza, 2013b - resistance v control  
 Taaffe, 1995 - resistance (high intensity) v control  
 Vicent, 2002 - resistance (high intensity) v control  
 Wallerstein, 2012 - resistance v control  
 Wanderley, 2013 - resistance v control  
 Subtotal

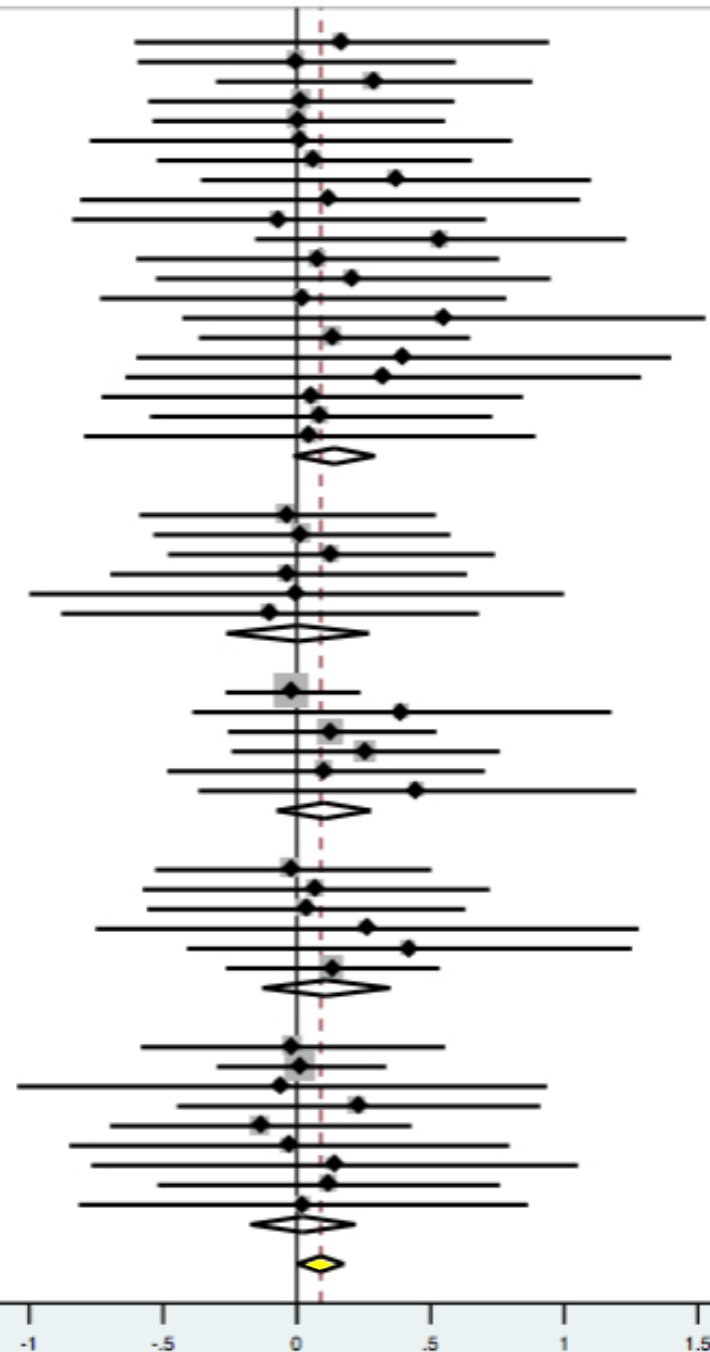
Low intensity strength training  
 Bergamin, 2013 - multicomponent land/aquatic v control  
 Dao, 2013 - resistance 1x/week v low intensity exercise  
 So, 2013 - resistance v control  
 Souza, 2013a - resistance v control  
 Taaffe, 1995 - resistance (low intensity) v control  
 Vicent, 2002 - resistance (low intensity) v control  
 Subtotal

Strength training + other exercise  
 Bunout, 2005 - multicomponent v control  
 Cadore, 2014 - multicomponent v low intensity exercise  
 Galvao, 2014 - multicomponent v control  
 Marques, 2011a - multicomponent v control  
 Toraman, 2004 - multicomponent v control  
 Tsorlou, 2006 - multicomponent aquatic v control  
 Subtotal

Low intensity strength training + other exercise  
 Chin A Paw, 2006 - skills and resistance+skills v control  
 Delaney, 2014 - multicomponent v treadmill  
 Goodpaster, 2008 - multicomponent v control  
 Souza, 2013b - multicomponent v control  
 Yoo, 2010 - multicomponent v control  
 von Stengel, 2012 - multicomponent v low intensity exercise  
 Subtotal

Non strength training intervention  
 Antunes, 2005 - aerobic v control  
 Beavers, 2014 - walking v control  
 Kallinen, 2002 - aerobic v control  
 Marques, 2011b - aerobic v control  
 Osbak, 2012 - aerobic v control  
 Paillard, 2004 - walking v control  
 Sipilä, 1995 - aerobic v control  
 Solberg, 2013 - aerobic v control  
 Wanderley, 2013 - aerobic v control  
 Subtotal

Overall



Favours control

Favours exercise



# Results

Following an average of 25 weeks of exercise, muscle mass was 0.65kg greater in intervention groups than control groups

Moderate effect of exercise on muscle strength

- Hedges'  $g = 0.77$ , 95% CI 0.51 to 1.04,  $p < 0.001$

Moderate effect of exercise on mobility

- Hedges'  $g = 0.74$ , 95% CI 0.4 to 1.09,  $p < 0.001$

# Effect of different types of exercise on muscle mass

Pooled effect in trials where intervention included:

- strength training = 0.11, 95% CI 0.007 to 0.21
- no strength training = 0.02, 95% CI -0.18 to 0.23

Effect of strength training in meta-regression,  $p=0.46$

# Clinical implications

- Exercise increases muscle mass in people aged 60 and over
- Exercise should be prescribed to prevent and reduce sarcopenia
- Further investigation required to determine optimal type of exercise to increase muscle mass in older people

# Acknowledgements

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