INFLAMMATION, MUSCLE WEAKNESS AND DISABILITY IN OLDER PEOPLE

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BACKGROUND

Skeletal muscle is the largest organ in the human body and plays an important role in body movement and metabolism. Muscle strength and mass reach their peak at the age of 30 years. Around the age of 60 years the deterioration accelerates due to structural and functional changes in the neuromuscular system and the diminished use of muscles. Poor muscle strength is a risk factor for disability, morbidity and mortality in older people.

Although recent studies have suggested that inflammation may play an essential role in the process of aging and the development of disabilities, the pathway from inflammation to functional limitation and disability is not fully understood.

PURPOSE

1. To examine to what extent the inflammatory markers are associated with muscle weakness, functional limitation and disability among old (aged 65 years and over) and the oldest-old (aged 90 years and over) men and women.

2. To examine whether the genetic factors account for the association between inflammatory markers and muscle weakness, functional limitation and disability in a genetically controlled population.

3. To examine to what extent the gene polymorphisms that regulate the inflammatory markers are associated with muscle weakness, functional limitations and disability among old and the oldest-old men and women.

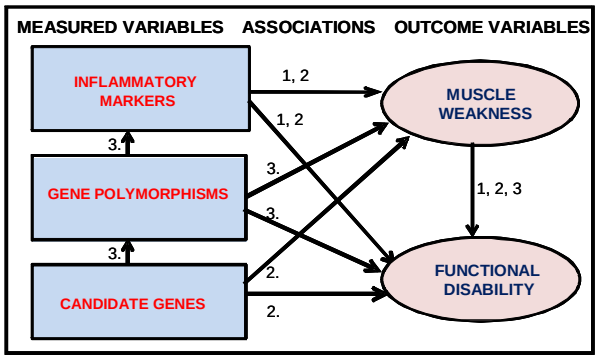

Figure 1. Measured variables, associations and the main outcome variables of the study. The numbers describe the study questions.

SUBJECTS

• The present study utilizes pre–existing data from four different studies:

- The Vitality 90+ study
- The Evergreen study
- The Finnish Twin Study on Aging
- Longitudinal Study of Aging Danish Twins

• N= 8 127 men and women aged 65 years and older.

• The functional performance of the participants varies from well functioning to disabled people.

METHODS

• **Physical characteristic measurements**
body weight and height, body mass index
lean body mass, fat mass and fat content
• **Health factors** (questionnaires and/or by interviews)
chronic conditions, medication
family history
• **Life style factors** (questionnaires and/or by interviews)
smoking,
self-reported physical activity
• **Muscle strength and muscle power measurements**
• **Muscle cross-sectional area measurement**
• **Functional performance tests**
• **Self-report of perceived difficulty in daily activities**
• **Blood sampling:** Inflammatory markers (CRP, IL-6, IL-1Ra, TNF-α, fibrinogen, ICAM-1and fibrinogen)

RESULTS

J Appl Physiol 11: 321-334, 2009: The study examined changes in contribution of genetic and environmental effects to isometric knee extensor strength and leg extensor power among 63 to 76-year-old female twins over a three-year follow-up. Results indicated that contribution of genetic effects to isometric muscle strength was stable, whereas for leg extensor power the proportion of genetic effects decreased during the follow-up. We observed new specific environmental effects underlying follow-up muscle strength and power, which effects could be due to the onset of new disease processes or changes in lifestyle.
J Gerontol A Biol Sci Med Sci 65:658-663, 2010: This study examined associations between inflammatory markers and physical performance among men and women aged 90 years of age. Associations between high levels of inflammatory markers and worse hand grip strength as well as a worse Barthel Index result were evident among nonagenarians. However, the association with the chair stand was not significant.

IMPACT OF THE STUDY

• This project produces new understanding about factors related to the development of muscle weakness.
• Results help to understand the association between inflammation, muscle weakness and functional disability among old people but especially among the oldest-old.
• Results help to understand why some person can live without functional disabilities whereas others suffer mobility problems even in the younger age.

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