

## Cohort studies using 3D-CT are needed to assess whether “home Gym-Bed” exercises are beneficial against sarcopenia

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I was interested to read the article by Quadrelli *et al.* on a study on the prevention of sarcopenia using daily “home Gym-Bed” training for 30 minutes per day over 10 years in a 70-year-old man who was examined using 3D CT imaging.<sup>1</sup> It was found that muscle mass did not change over the 10 years despite ageing.<sup>1</sup> It was concluded that whole-body exercise in bed can help preserve muscle mass and density in older people,<sup>1</sup> and that advanced imaging techniques can quantify the effectiveness of non-pharmacological interventions against sarcopenia.<sup>1</sup> The study is excellent, but some points should be discussed. The first point is that muscle mass depends not only on the level of physical activity, but also on various other factors such as the composition of the diet, the balance between sympathetic and parasympathetic tone, genetic background and hormone production. A high testosterone level and a low antitestosterone level can promote an increase in muscle mass. In a study of nine subjects who received testosterone enanthate (3 mg/kg per week) for 12 weeks, all nine subjects showed an increase in muscle mass as measured by urinary creatine excretion.<sup>2</sup> A high-protein, high-carbohydrate diet compared to a ketogenic diet can also promote an increase in muscle mass.<sup>3</sup> A hypocaloric or low-carbohydrate diet, on the other hand, can promote sarcopenia. There is also evidence that a high sympathetic tone can promote an increase in muscle mass.<sup>4</sup> The second point is that when analyzing muscle mass we must take into account comorbidities and drugs that can modify muscle mass. Several chronic diseases (e.g. immunologic diseases, autoimmune diseases, malignancies) are known to be complicated by sarcopenia. The third point is that imaging procedures that generate axial images before and after exercise must be performed with the same method at the same level before and after exercise. Since muscle size can change significantly from layer to layer, it is essential to standardize the assessment of 3D muscle volume using 3D CT. The fourth point is that the only study

in which home whole-body exercise in bed was performed in 22 patients found no significant reduction or prevention of sarcopenia through exercise.<sup>5</sup> Therefore, it is questionable whether daily or thrice-weekly 30-minute gymnastics in bed really prevents sarcopenia. The fifth point is that sarcopenia is not only a degenerative process associated with ageing, but can also depend on a person's genetic predisposition. For example, there are a number of neuromuscular diseases that are associated with muscle wasting and have a late onset that can be mistaken for sarcopenia. In such cases, home Gym-Bed may be of little benefit as muscle wasting is an inherent feature of the disease.

In summary, this interesting study has limitations that put the results and their interpretation into perspective. Addressing these limitations could strengthen the conclusions and corroborate the study's message. No general conclusion about the effect of a therapeutic intervention to prevent sarcopenia can be drawn from a single case. The effect of a therapeutic intervention can only be reliably assessed by a randomized, double-blind, placebo-controlled, cross-over trial. Until the results of such a study are available, no reliable conclusions can be drawn.

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Not applicable.

### **Consent to participation**

Not applicable.

### **Consent for publication**

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## “Home Gym-Bed” exercises and sarcopenia

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### Availability of data and material

All data are available from the corresponding author.

### Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Author contribution: JF was responsible for the design and conception, wrote the first draft, and gave final approval.

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