

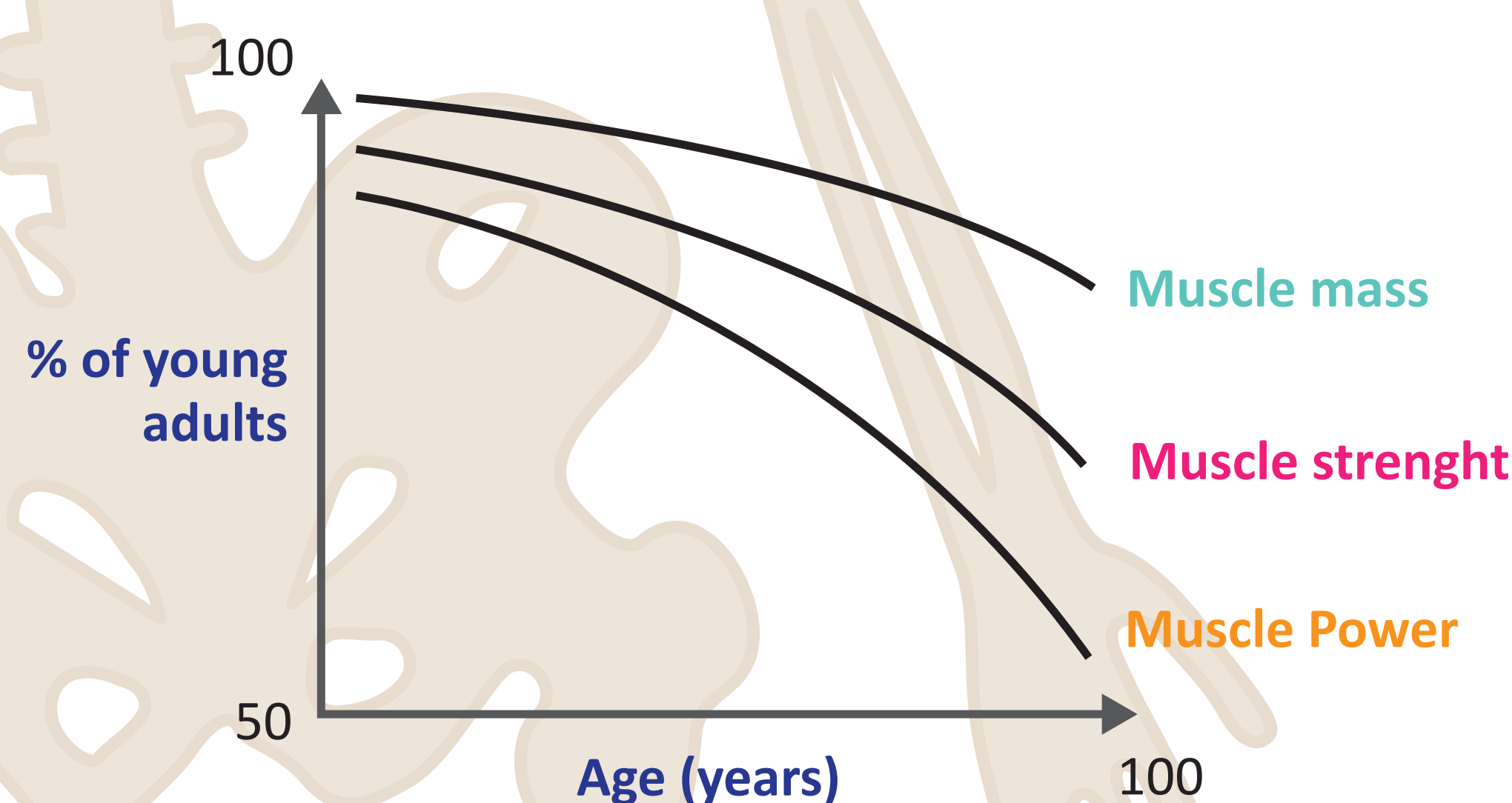
# THE NEW CONCEPT OF DYNAPENIC SKELETAL MUSCLE FUNCTION DEFICIT IN THE ASSESSMENT OF OSTEOPOROTIC PATIENTS

Moretti A.<sup>1</sup>, Giamattei M.T.<sup>1</sup>, Cannaviello G.<sup>1</sup>, Iolascon G.<sup>1</sup>

<sup>1</sup> Department of Medical and Surgical Specialties and Dentistry, Second University of Naples, Naples, Italy

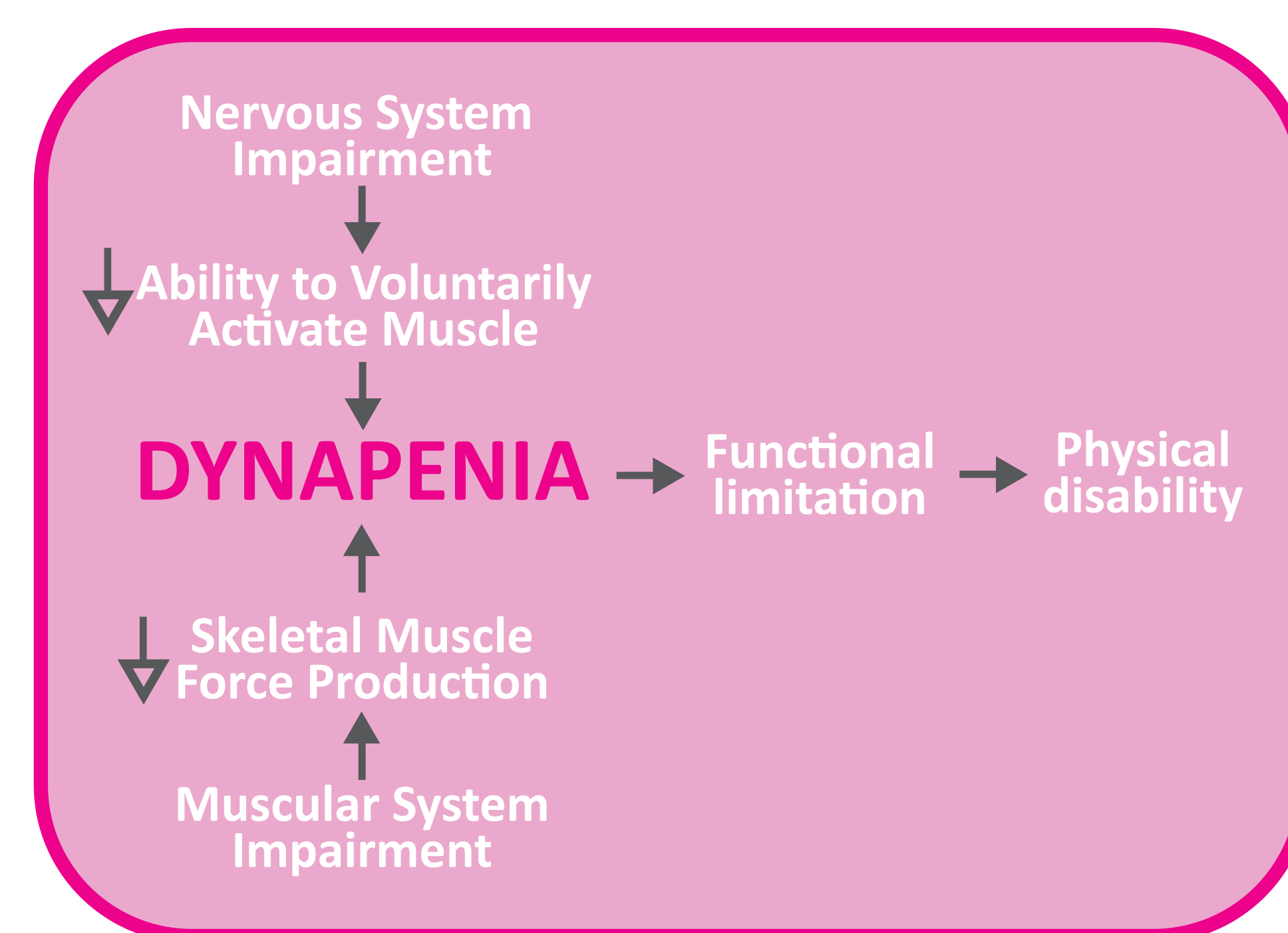
## INTRODUCTION

FIGURE 1. AGE-RELATED IMPAIRMENTS IN SKELETAL MUSCLE MASS AND FUNCTION.



A significant association between sarcopenia and severe osteoporosis has been demonstrated in post-menopausal women.<sup>1</sup> Age-associated loss of muscle mass and function is due to multiple factors that lead to an impairment of physical performance<sup>2</sup>. However, the decline in muscle performance and mobility limitation is related only in part to the reduction of muscle mass in ageing<sup>3</sup>. (Fig. 1) The term “dynapenia” has been used to describe the age-related loss of muscle strength<sup>5</sup> or power,<sup>6</sup> which can be caused by a variety of factors independently of the loss of muscle mass<sup>7</sup>. (Fig. 2) The concept of skeletal muscle function deficit (SMFD) is useful to define the age-related muscle dysfunctions, that contribute to clinically meaningful mobility impairments.<sup>7</sup> The aim of our study was to evaluate the effect of dynapenic SMFD on bone fragility and falls in a cohort of postmenopausal women.

FIG.2. CONCEPTUAL MODEL OF HOW NERVOUS AND MUSCLE SYSTEM IMPAIRMENTS LEAD TO DYNAPENIA.<sup>8</sup>



## MATERIALS AND METHODS

In this retrospective study we analyzed data derived from the medical record of postmenopausal women aged 55 or older referring to an outpatient rehabilitation service. In our population, we defined dynapenic SMFD according to the Foundation for the National Institutes of Health’s (FNIH) criteria,<sup>3</sup> based on reduction of usual gait speed (<0.8 m/s), handgrip strength (<16 kg), and normal appendicular lean mass adjusted for body mass index (>0.512). We analyzed the Vertebral Fracture Assessment (VFA) from DXA spine images to identify vertebral fragility fractures.

## RESULTS

Assessment of anthropometric characteristics, bone density, comorbidities, bone metabolism lab values, falls, and vertebral fragility fractures are shown in Table 1. There is not a statistically significant difference between anthropometric characteristics in two groups. In our cohort, women with dynapenic SMFD had an odds ratio (OR) for vertebral fragility fractures of 3.92 (95% CI = 1.20-13.99; p= 0.001) and an OR for falls of 0.66 (95% CI = 0.10-3.16; p=

|                                       | Dynapenic SMFD (n=25) | Healthy subjects (n=47) | P values |
|---------------------------------------|-----------------------|-------------------------|----------|
| Age (years)                           | 69.64 ± 5.89          | 66.57 ± 6.49            | 0.053    |
| BMI (kg/m <sup>2</sup> )              | 25.05±3.12            | 25.09±3.73              | 0.963    |
| LS BMD (g/cm <sup>2</sup> )           | 0.917±0.188           | 0.864±0.185             | 0.259    |
| LS T-score (SD)                       | -2.19±1.57            | -2.56±1.27              | 0.283    |
| FN BMD (g/cm <sup>2</sup> )           | 0.726±0.105           | 0.719±0.095             | 0.755    |
| FN T-score (SD)                       | -2.12±0.88            | -2.16±0.75              | 0.842    |
| CIRS-SI                               | 1.62±0.27             | 1.51±0.29               | 0.130    |
| CIRS-CI                               | 2.96±1.57             | 2.26±1.44               | 0.059    |
| Serum 25 (OH)D <sup>3</sup> (ng/ml)   | 27.48±15.39           | 36.45±18.96             | 0.046    |
| Serum PTH (pg/ml)                     | 44.11±19.28           | 41.15±28.40             | 0.643    |
| Serum Calcium (mg/dl)                 | 9.48±9.56             | 9.33±0.60               | 0.304    |
| Falls (n) (%)                         | 3 (12.00%)            | 8 (17.02%)              | 0.573    |
| Vertebral fragility fractures (n) (%) | 19 (76.00%)           | 21 (44.68%)             | 0.011    |

Abbreviations: SMFD, skeletal muscle function deficit; BMI, body mass index; LS, lumbar spine; BMD, bone mineral density; FN, femoral neck; CIRS-SI: Cumulative Illness Rating Scale – Severity Index; CIRS-CI, Cumulative Illness Rating Scale – Comorbidity Index; 25(OH)D<sub>3</sub>, 25-hydroxy-vitamin D<sub>3</sub>; PTH, parathyroid hormone.

## CONCLUSIONS

Our analysis demonstrated a statistically significant association between dynapenic SMFD and vertebral fragility fractures. Furthermore, the risk of falls seems to be independent from dynapenic SMFD. In our opinion, the concept of dynapenic SMFD might be useful to provide a comprehensive assessment of the risk of fragility fractures in post-menopausal women.

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