

# Tratamiento de la sarcopenia

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# Puntos preliminares o determinantes

- Comorbilidades
- Potencial rehabilitatorio

# Estrategias de tratamiento

- Nutrición
- Ejercicio
- Otras terapéuticas

# Nutrición

- Ingesta proteica 1.2 a 1.5 g/kg
- Carotenoides en dosis moderadas
- Ac. Linoleico conjugado
- Suplementos en estudio
  - Vitamina D
  - Leucina

# Vitamina D

## Desempeño muscular y caídas

**TABLE 1**

Effects of vitamin D on muscle performance and falls in randomized controlled intervention trials<sup>1</sup>

Trial	Vitamin D dose and preparation	Duration of trial	25(OH)D concentration achieved	Outcome
	$\mu\text{g (IU)/d}$		$\text{nmol/L}$	
Muscle performance				
Sato (12)	25 (1000) D <sub>2</sub>	3 y	84	+
Pfeiffer (16)	20 (800) D <sub>3</sub>	2 mo	66	+
Bischoff (15)	20 (800) D <sub>3</sub>	3 mo	66	+
Falls				
Bischoff (15)	17.5 (700) D <sub>3</sub>	3 y	99	+
Broe (14)	20 (800) D <sub>2</sub>	5 mo	75	+
Flicker (13)	20 (800) D <sub>2</sub>	2 y	NA	+
Grant (17)	20 (800) D <sub>3</sub>	5 y	62	Null

<sup>1</sup> 25(OH)D, 25-hydroxyvitamin D; +, significantly reduced the number of falls; NA, not available.

# Ejercicio

- Entrenamiento de resistencia + dieta rica en proteínas promueve el anabolismo y disminuye catabolismo.
- Aminoácidos esenciales en bolo post ejercicio recupera la síntesis proteica a niveles de jóvenes.
- Ornitina alfa-cetoglutarato (OKG) y ejercicio está en estudio y posible mejora del rendimiento muscular.

# Ejercicio

- Ejercicio Aeróbico
  - Resultados conflictivos de diversos estudios por la heterogeneidad y limitaciones en el diseño
- Entrenamientos de resistencia (2-3/semana)
  - De Fuerza: mejora la fuerza (65% 1RM)
  - De Poder: mejora la fuerza y el poder (contracción rápida 0 – 60 % 1RM)

# Otras terapéuticas

- |                         |                  |
|-------------------------|------------------|
| • Antioxidantes         | DE LA DIETA      |
| • IECAs                 | PROBABLE         |
| • SARM                  | EN INVESTIGACIÓN |
| • Antimiostatina        | EN INVESTIGACIÓN |
| • Testosterona          | NO DEMOSTRADO    |
| • GH                    | NO DEMOSTRADO    |
| • Estrógenos y tibolona | NO DEMOSTRADO    |
| • Creatina              | NO DEMOSTRADO    |

IECAs, inhibidores de la enzima convertidora de angiotensina; SARM, moduladores específicos de receptores de andrógenos; GH, hormona del crecimiento.



**Table 2** Summary of treatment options

Intervention	Effect	Comments
Exercise	Increased cardiovascular fitness with increased endurance	Pros: overall beneficial effects of exercise to individual
Aerobic	Increases mitochondrial volume and activity	Cons: motivation to exercise remains low
Resistance	Increased muscle mass and strength Increased skeletal muscle protein synthesis and muscle fiber size Improvement in physical performance	
Nutritional supplement	Varying evidence of increased muscle mass and strength	Pros: ensures good protein intake Cons: may reduce natural food intake
Hormone therapy	Varying evidence of increased muscle mass and strength	Cons: masculinization of women; increased risk of prostatic cancer in men
Testosterone		Cons: risk of breast cancer
Estrogen	Poor evidence of increased muscle mass but not function	Cons: side effects including fluid retention, orthostatic hypotension
Growth hormone	Some evidence for increased muscle mass. Varying evidence for increased muscle strength	Pros: fracture reduction; possible cardiovascular benefits
Vitamin D	Variable evidence for increased muscle strength Reduced falls in nursing home residents	
ACE inhibitors	Some evidence for increased exercise capacity	Pros: other cardiovascular benefits Cons: renal function needs monitoring
Creatine	Variable evidence of increased muscle strength and endurance especially when combined with exercise	Cons: reports of nephritis
Potential new treatments		
Myostatin antagonists	No trials in older people	
PPAR [ $\delta$ ] agonist	No human trials	
AICAR	No human trials	

**Abbreviations:** PPAR- $\delta$ , peroxisome-proliferator-activated receptor- $\delta$ ; AICAR, 5-aminoimidazole-4-carboxamide-1- $\beta$ -D-ribofuranoside; ACE, angiotensin-converting enzyme.

**Table 1. Examples of Potential Pathway and Molecular Targets for the Drug Treatment of Sarcopenia**

<b>Target or Pathways</b>	<b>Potential Beneficial Effect on Muscle</b>
Androgen receptors	Increase muscle mass and strength
Peroxisome proliferator-activated receptor-gamma coactivator 1-alpha	Increase muscle oxidative metabolism
Myostatin	Increase muscle mass and strength
Peroxisome proliferator- activated receptor-delta	Increase type I fibers and oxidative metabolism
Insulin-like growth factor 1	Increase muscle mass and strength
$\beta$ -adrenergic receptor	Increase muscle mass
Neuregulins	Increase muscle mass and enhance glucose utilization
Angiotensin-converting enzyme	Improve muscle function and physical performance
Inflammatory cytokines	Decrease catabolic effects

# Determinar antes del Tratamiento

- Estado pretratamiento
  - Masa muscular
  - Fuerza
  - Desempeño
  - Funcionalidad
- Metas a obtener con el tratamiento
  - ??????

# Conclusiones

- Ejercicio + Nutrición + Control de Comorbilidad
- Manejo farmacológico ????????