

Soporte nutricional y rehabilitación funcional COVID

Estrategias de recuperación de la masa muscular

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UNIVERSITAT DE BARCELONA



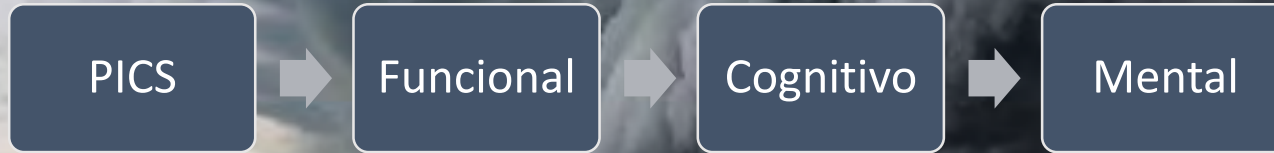
Campus de l'Alimentació de
Torribera



La naturaleza nos enseñó a
sobrevivir a ciertas agresiones ,
pero no a otras...



PICS “Persistent inflammatory immunosuppression catabolic syndrome” “Cytokine storm”



PICS



Funcional



Cognitivo



Mental

Cytokine storm

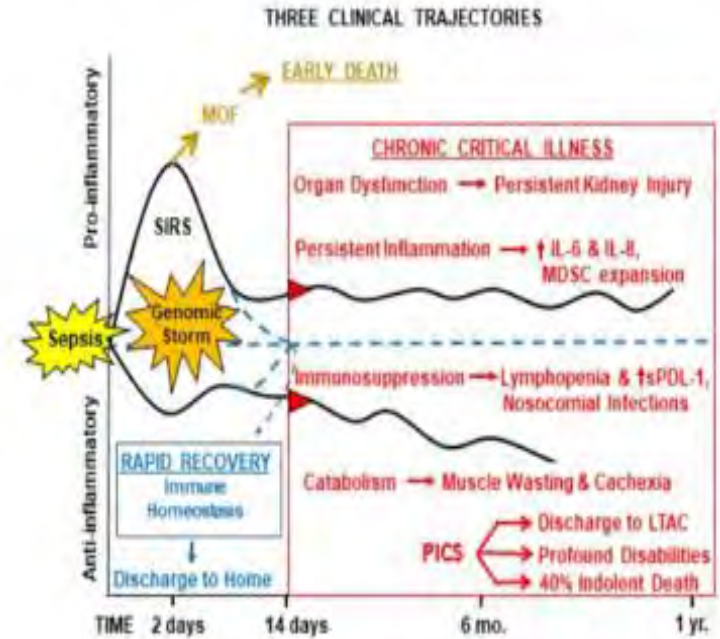


FIGURE 1 | Proposed hypothesis for the PICS. Abbreviations: SIRS, systemic inflammatory response syndrome; MDSC, myeloid-derived suppressor cell; sPDL-1, soluble programmed death ligand-1; LTAC, long-term acute care facility; PICS, persistent inflammation, immunosuppression, and catabolism syndrome.



Special report

Early nutritional supplementation in non-critically ill patients hospitalized for the 2019 novel coronavirus disease (COVID-19): Rationale and feasibility of a shared pragmatic protocol

Riccardo Caccialanza M.D.^{1,2}, Alessandro Laviano M.D.^{3,4}, Federica Lobascio M.D.⁵, Elisabetta Montagna R.D.⁶, Raffaele Bruno M.D.^{7,8}, Serena Ludovisi M.D.^{9,10}, Angelo Guido Corsico M.D., Ph.D.¹¹, Antonio Di Sabatino M.D.¹², Mirko Belliato M.D.¹³, Monica Calvi Pharm.D.¹⁴, Isabella Iacona Pharm.D.¹⁵, Giuseppina Grugnetti R.N.¹⁶, Elisa Bonadeo M.D.¹⁷, Alba Muzzi M.D.¹⁸, Emanuele Cereda M.D., Ph.D.¹⁹

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frontiers
in immunology

REVIEW

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Innate Immunity in the Persistent Inflammation, Immunosuppression, and Catabolism Syndrome and Its Implications for Therapy

Henrik Holmberg^{1,2}, Tyler J. Loftus³, Russell B. Hawkins⁴, Steven L. Raymond⁵, Julie A. Storte⁶, McKenna R. Nollen⁷, Brett R. Weiss⁸, Elizabeth S. Miller⁹, Anja Bhavsar¹⁰, Shawn D. Larson¹¹, Alicia M. Mohr¹², Scott C. Brakenridge¹³, Horacio Tajiri¹⁴, Heidi Lewis¹⁵, Frederick A. Moore¹⁶, Lyle L. Moldawer¹⁷, Philip A. Efron¹⁸ and The Sepsis and Critical Illness Research Center Investigators*

OPEN ACCESS

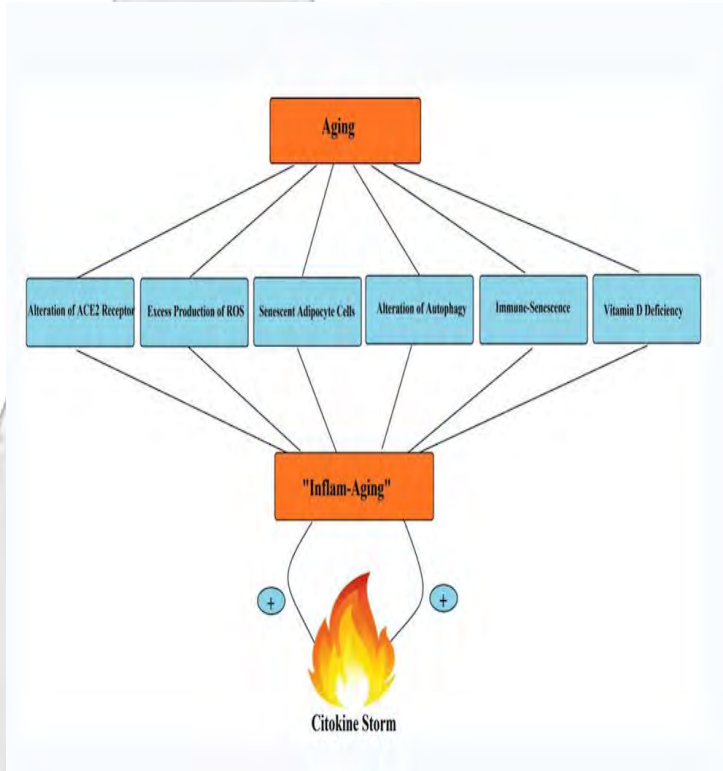
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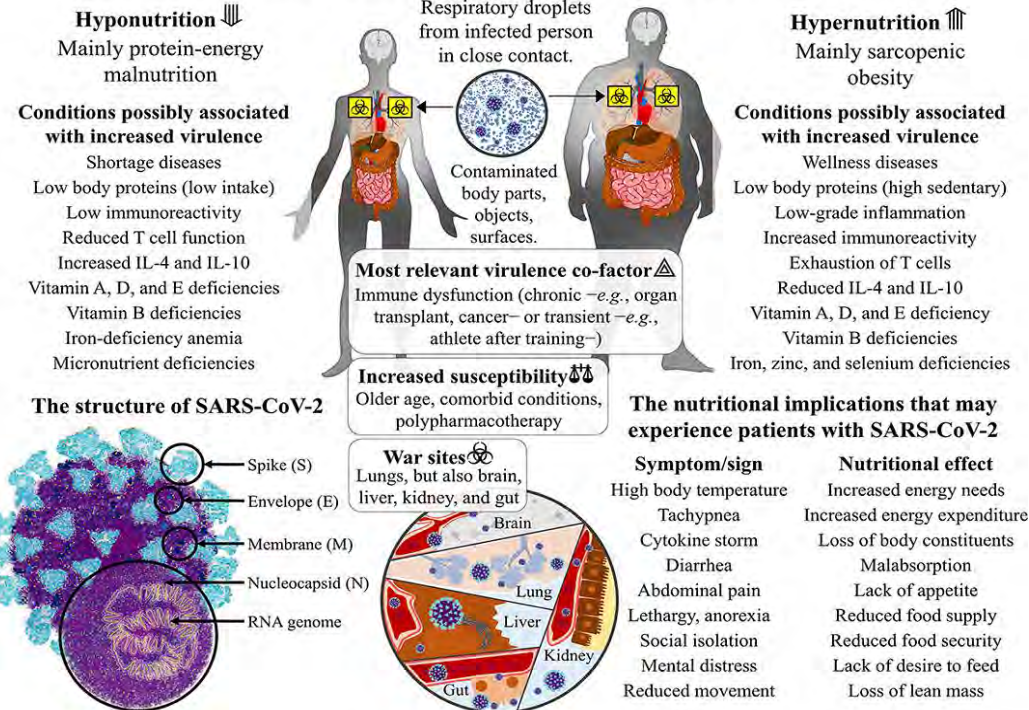
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*The Sepsis and Critical Illness Research Center Investigators

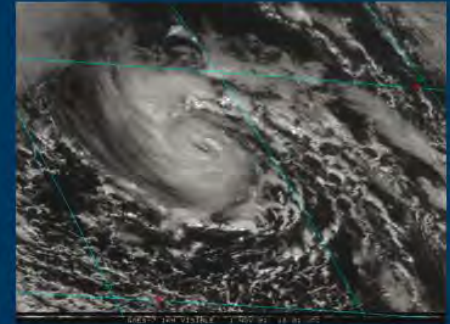
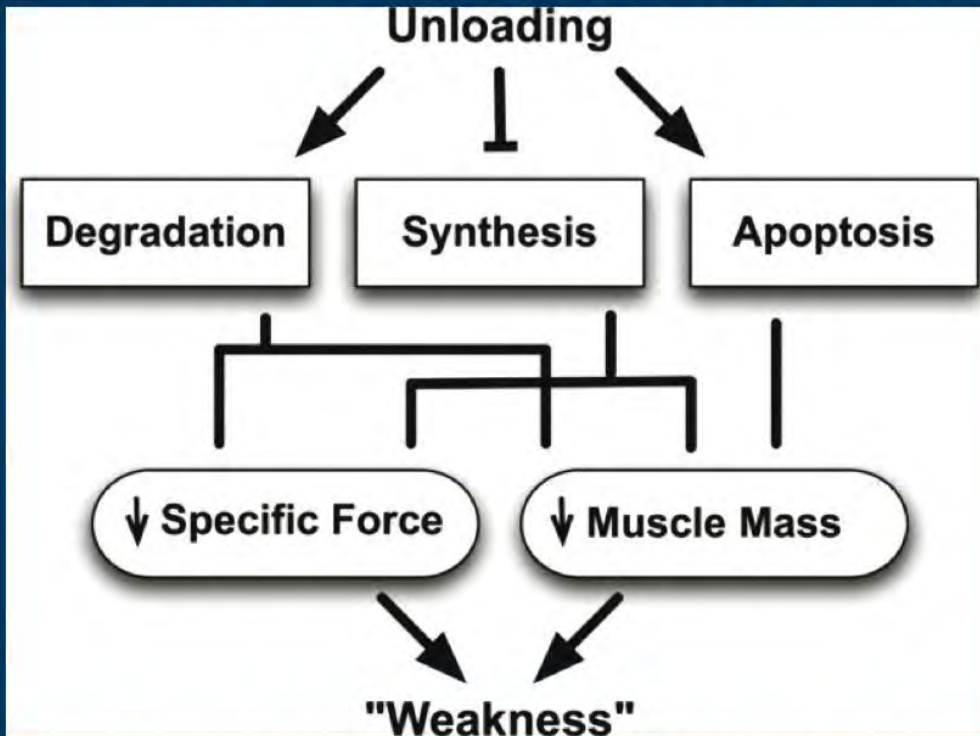
De inflamación silenciosa a tormenta..



Malnutritional statuses as virulence factor for the SARS-CoV-2

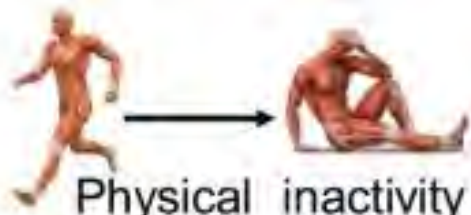


The ICU = the Perfect Storm for muscle loss:



**“weakness” following ICU lasts for months to years:
49% of ICU survivors were not back to work at one year !**

Herridge MS et al NEJM 2013
Burd NA et al J Appl Physiol 2011
Godon BS et al int J Biochem Cell Biol 2013



Inflammation

Persistent
Inflammatory
Catabolic
Syndrom
PICS

Microvascular
impairment/
reduced nutrient
delivery

Insulin
resistance

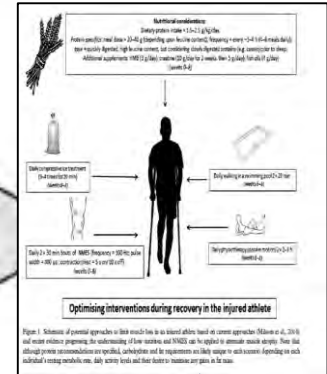
Anabolic
resistance

Reduced satellite
cell
activation/muscle
regeneration

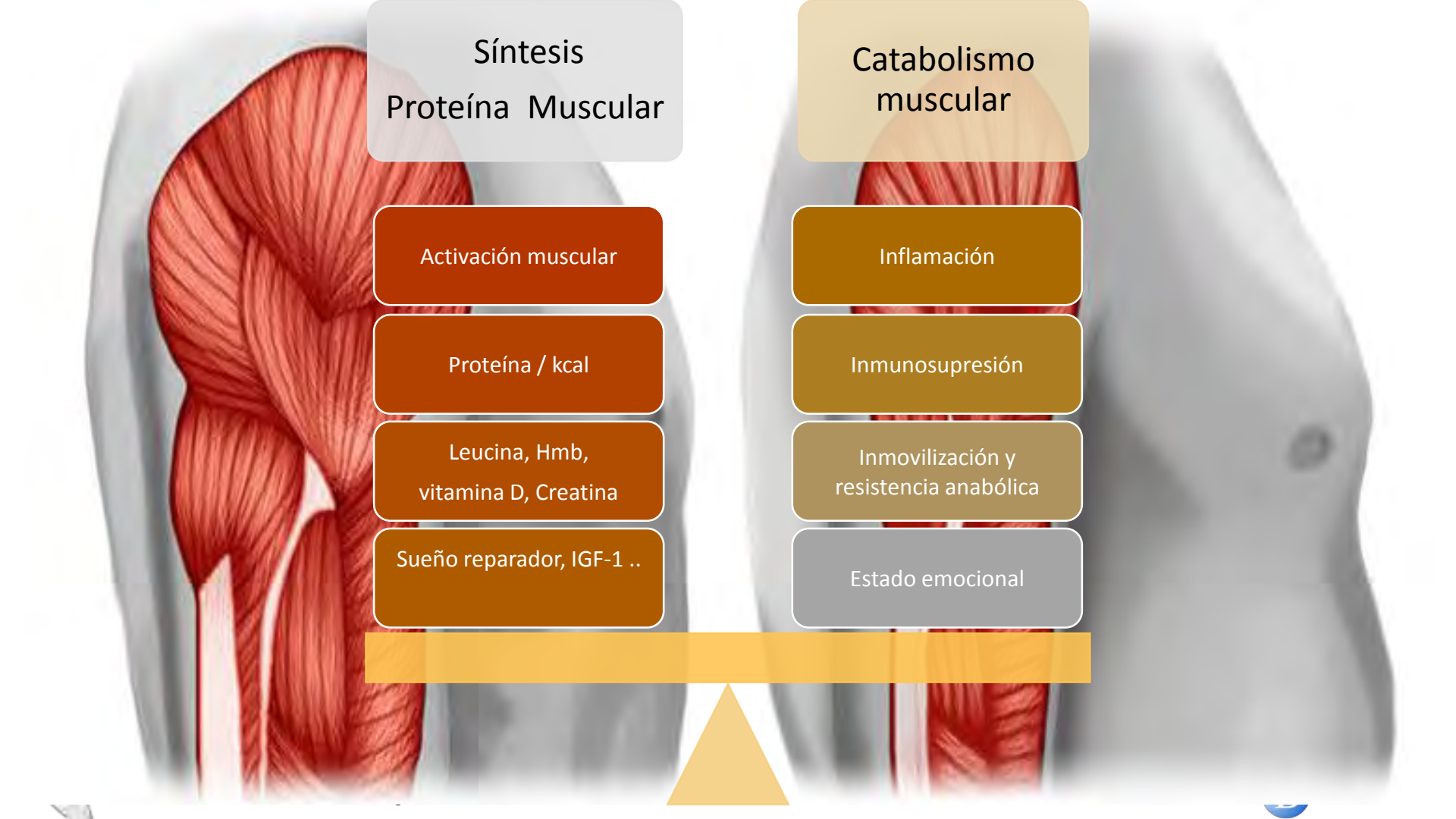
Blunted
MPS

Increased
MPB

Skeletal muscle atrophy



¿LESIÓN ?



The diagram illustrates the balance between muscle synthesis and catabolism using a balance scale. The left side, representing synthesis, is lower and contains four stacked boxes. The right side, representing catabolism, is higher and contains four stacked boxes. A horizontal bar serves as the fulcrum, and a triangle points upwards from the center. The background features a faint anatomical illustration of a human torso with muscles highlighted in red.

Síntesis Proteína Muscular

Activación muscular

Proteína / kcal

Leucina, Hmb,
vitamina D, Creatina

Sueño reparador, IGF-1 ..

Catabolismo muscular

Inflamación

Inmunosupresión

Inmovilización y
resistencia anabólica

Estado emocional

Factores que favorecen el catabolismo muscular “MPB” y.. “Resistencia anabólica “

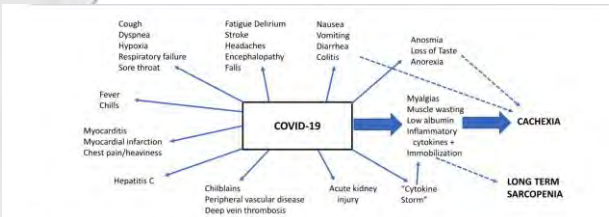
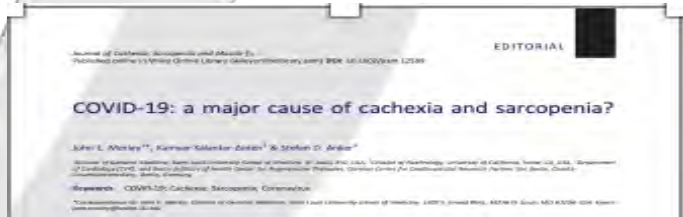


FIGURE 1 The effects of COVID-19



La tormenta inflamatoria de citoquinas



Anorexia, anosmia, disgeusia, disfagia..



Inmovilización, pronación..



Ventilación asistida



Alteraciones en ritmo circadiano
patrón de sueño etc..



Malabsorción intestinal



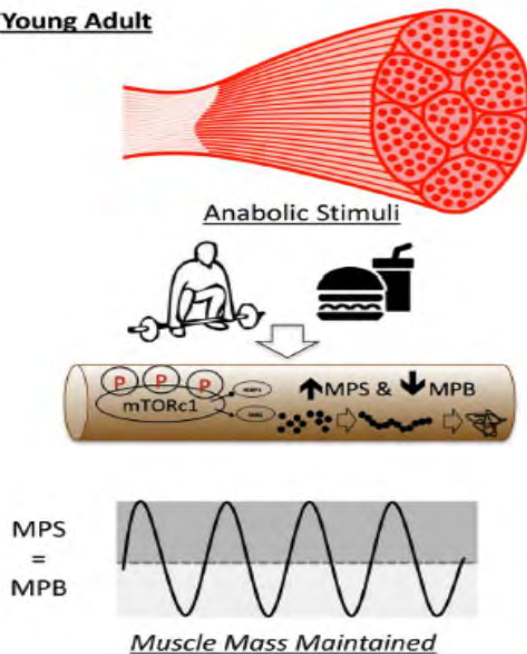
Medicación : corticoides, antibiótico, sedación...



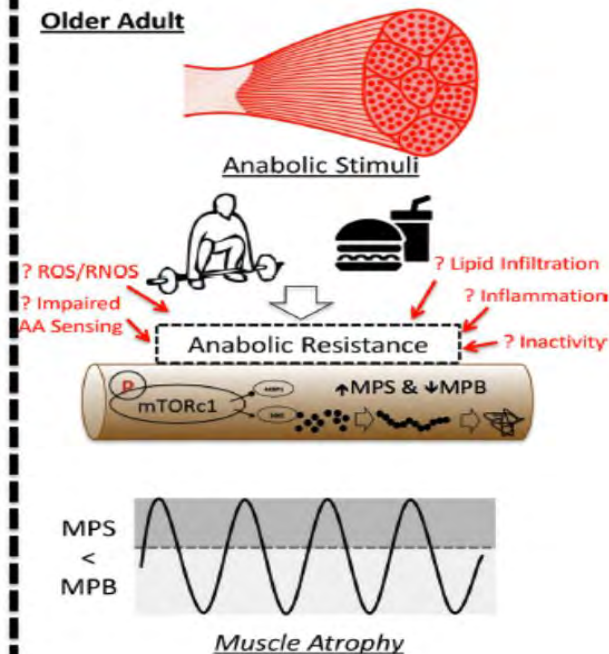
“Post viral fatigue syndrom”

Resistencia anabólica

Young Adult



Older Adult



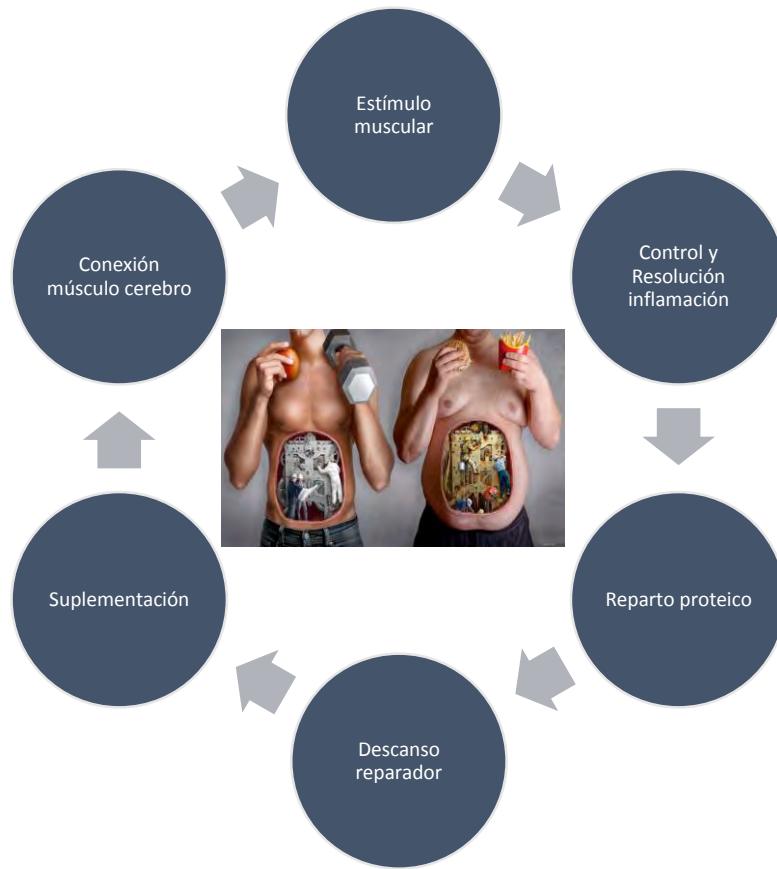
Defining anabolic resistance: implications for delivery of clinical care nutrition

Robert W. Morton¹, Daniel A. Taylor², Peter J.M. Wijk³, and Stuart M. Phillips¹



Estrategias para recuperar masa muscular

No sólo energía



Nutrition and inflammation

INFLAMMATION ↑	Working mechanism	Ratio ↑, LA ↑: -Lipoxins/resolvins/protectins ↓ -Pro-inflam. cytokines ↑ like IL6, TNFα, CRP -via P450 → leukotoxins/diols → ROS ↑, AP-1 ↑ -Cell wall EPA, DHA ↓ -Desaturase/elongase ↓	Hypoglycaemia, stress via SAM/HPA ↑ Low grade inflammation Immune suppression Hyperinsulinemia - Androgens ↑, IGF ↑ GH ↓, IL-6 ↑ etc Empty calories	Body fat (VAT,SAT) ↑ Insulin resistance ↑ ROS ↑ IL6 ↑ CRP ↑ Leptin ↑ Resistin ↑	Bind to gut, gut permeability ↑ -IMS activation -Low grade inflammation -Auto-immune diseases, via molecular mimicry
	Nutrition	Vegetable oils (not olive,cocos, cocoa) Margarine, Dairy, Cereals, Meat (not wild) Nuts: peanuts, cashew	Refined carbs (bread,potatoes, rice, etc) Sugar (sweeties, cookies)	High calorie diet: Calorie intake > Energy expenditure	Harmful Saponins (legumes, cereals, soy, tomatoes, etc) Lectins (cereals, legumes) Gliadin (gluten)
	Factors	Ratio Ω6:Ω3	Glycemic index/load	Calories	Anti-nutrients
RESOLUTION ↓	Nutrition	Fish Walnuts Flaxseed Chloroplast –green leaves vegetables	Slow carbs: vegetables, nuts GL ↓: fruit Fibers ↑	Low calorie diet: Calorie intake < Energy expenditure	Avoid harmful saponins, lectins and gliadin
	Working mechanism	Ratio ↓, ALA ↑: -Lipoxins/resolvins/protectins ↑ -Block pro-inflammatory cytokines production -Cell wall EPA, DHA ↑	-Regulation of blood sugar and insulin levels: Inflammation markers ↓ -Micro nutrients ↑	Body fat (VAT,SAT) ↓ Insulin resistance ↓ ROS ↓ IL6 ↓ CRP ↓ Leptin ↓ Resistin ↓	Repair gut, avoid intestin permeability: Foreign proteins in periphery ↓, IMS ↓



Posibles ayudas nutricionales para recuperar masa muscular



Leucina
BCAA

HMB

Creatina

Glutamina

Whey
protein

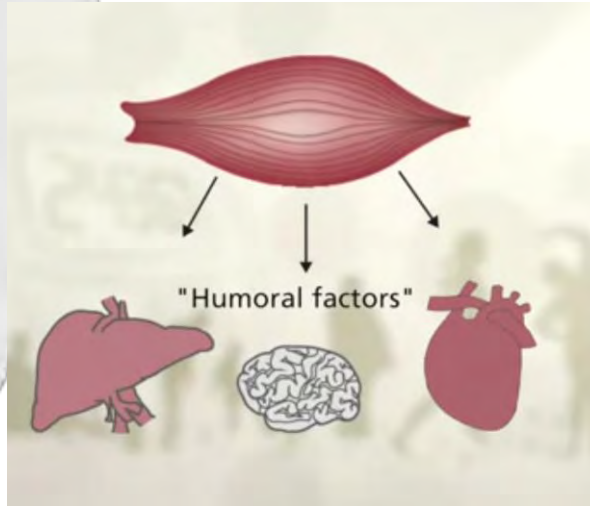
Omega 3 .
Resolvinas

Curcuma

Vitamina
D*

Melatonina

La mejor ayuda : Mioquinas



Wackerhage H¹, Everett R², Krüger K³, Murgia M^{4,5}, Simon P⁶, Gehlert S⁷, Neuberger E⁸, Baumert P¹, Schönfelder M¹

Sport, Exercise and COVID-19, the Disease Caused by the SARS-CoV-2 Coronavirus

Sport und COVID-19, die Krankheit, die von dem SARS-CoV-2-Coronavirus verursacht wird

REVIEW

ACCEPTED: May 2020

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DOI: 10.5966/asas.2020.441

Wackerhage H, Everett R, Krüger K, Murgia M, Simon P, Gehlert S, Neuberger E, Baumert P, Schönfelder M. Sport, exercise and COVID-19, the disease caused by the SARS-CoV-2 coronavirus. *Disch Z Sportmed*. 2020; 71: E3-E32.



Healthy adults

What problems are caused by COVID-19 lockdowns?

Closure of gyms, swimming pools, sports clubs, in some countries no outdoor exercise.

What exercise is recommended?

Home-based endurance and resistance exercise maintain fitness and health and to boost immune system. Consider online exercise classes.



Athletes

No competitions, no group training, in some countries no outdoor training. No anti-doping tests.

Continue training but avoid exhaustive training to avoid compromising immune system.



Elderly

Likely to stay at home to avoid infection and severe course of COVID-19.

Mixture of resistance, strength and balancing exercises. Add a social element to improve adherence and to reduce risk of depression. Support by internet, media broadcasts or phone calls.

FIGURE 4

Problems caused by COVID-19 lockdowns and exercise recommendations for healthy adults, athletes and the elderly.

Tenemos un Plan

Ejemplo de Protocolo
Personalizado
Prioridades..

EJEMPLO DE PAUTA:

	Salud intestinal	<u>Probióticos..</u>
	Tomar el <u>sol</u> y/ o Vitamina D	
 + 	Ejercicio Rehabilitación Muscular + Proteína de Calidad	Receta proteica
	"Comida de alta calidad nutricional " <u>y</u> descanso no más de 30'	
 + 	Ejercicio Rehabilitación Muscular + Proteína de Calidad	Receta proteica
	Omega-3, cúrcuma ...	1 cápsula de omega 3 alta calidad



Proteína de calidad versus calorías (2 g/ kg pero
sobretudo bolus y adecuado aporte alrededor
del *******Estímulo muscular, Movimiento*******



Combinar proteína vegetal y animal (importancia
de grasa acompañante y de no exceder azúcares
que aumentan grasa y no musculo

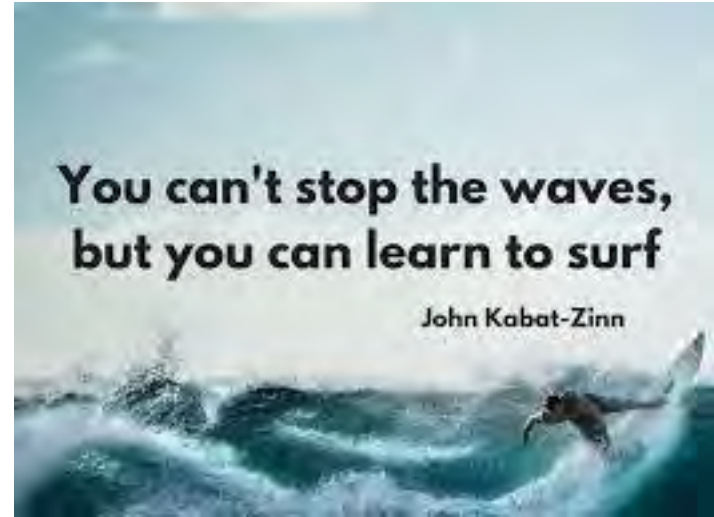
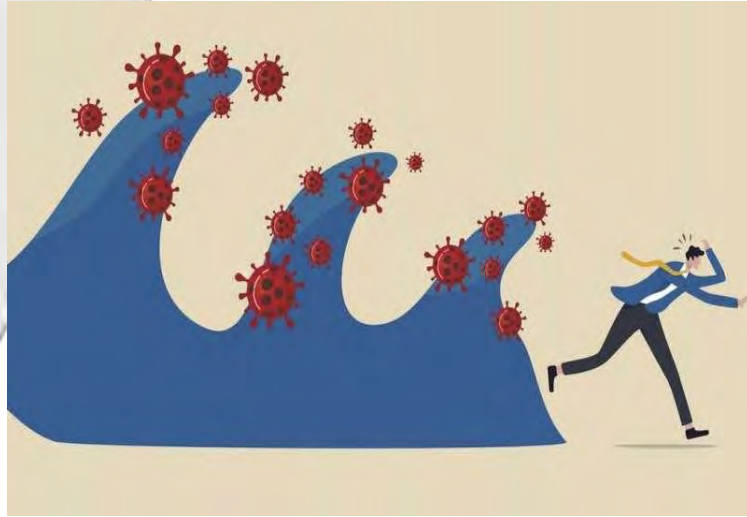


Optimizar vitamina D e incrementar omega 3 y
alimentos anti- inflamatorios



Salud intestinal :Probióticos...

“Second wave” effect of COVID-19 to the human body



Muchas gracias

