

NURITAS

nuritas.com

# MUSCLE AND METABOLIC HEALTH REDEFINING HEALTHSPAN

**Dr. Andy Franklyn-Miller**  
Chief Medical and Innovation Officer



A man is running on a treadmill in a gym. The image is dark and has a green tint. The man is shirtless and wearing a watch. The text is overlaid on the image.

**LONGEVITY IS NOT ABOUT  
LIVING LONGER  
ITS LIVING BETTER  
HEALTHSPAN**

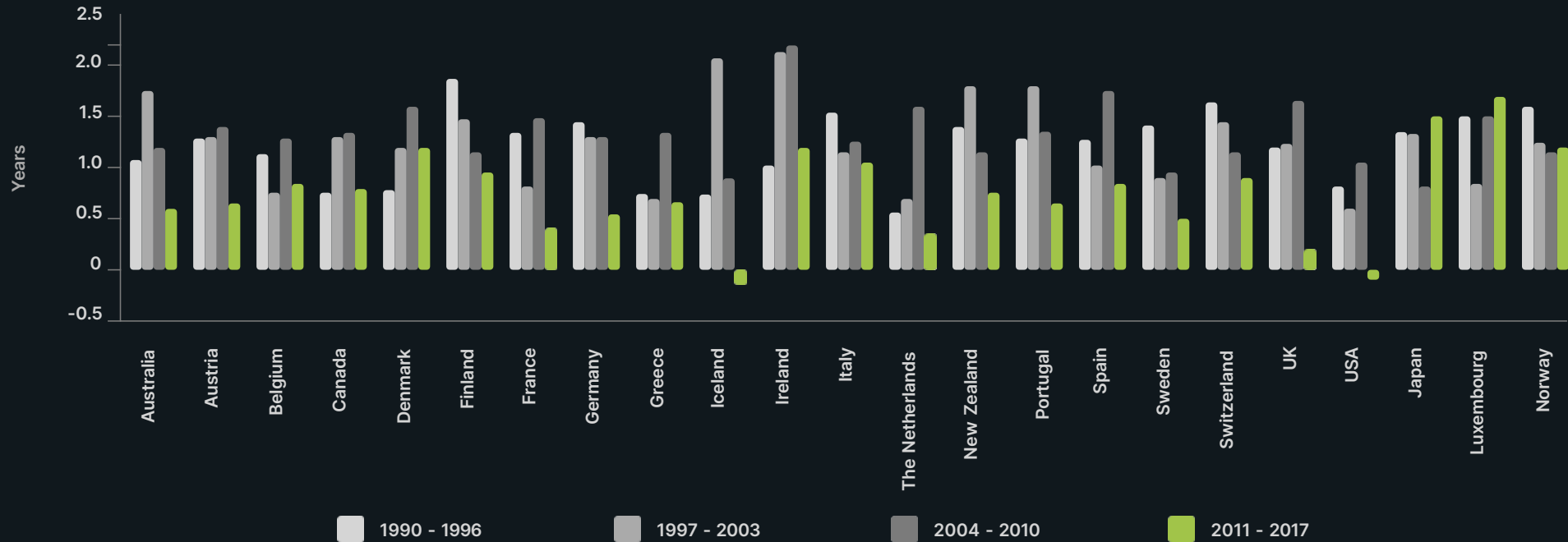
David Sinclair

THE ONLY CONTROL WE HAVE  
OVER THE DURATION OF OUR LIFE IS  
**TO SHORTEN IT,** AND WE DO  
THAT ALL THE TIME.

**Jay Olshansky**

Professor School of Public Health University of Illinois at Chicago

# ARE WE LIVING LONGER ?



Dark orange bars indicate lower increases in life expectancy in 2011-2017 than 2004-2010, and light green bars indicate greater recent increases in life expectancy. Relatively low gains in years of life expectancy from 2011-2017 can be seen in 20 out of 23 OECD countries compared to 2004-2010.

Recent trends and increasing differences in life expectancy present opportunities for multidisciplinary research on aging Nature Ageing 2021 1 12 Eileen Crimmins

**LOW LEAN MUSCLE MASS,  
MUSCLE STRENGTH AND  
PHYSICAL FUNCTION ARE  
RISK FACTORS FOR  
DISABILITY, FRAILTY AND  
LIFE EXPECTANCY**

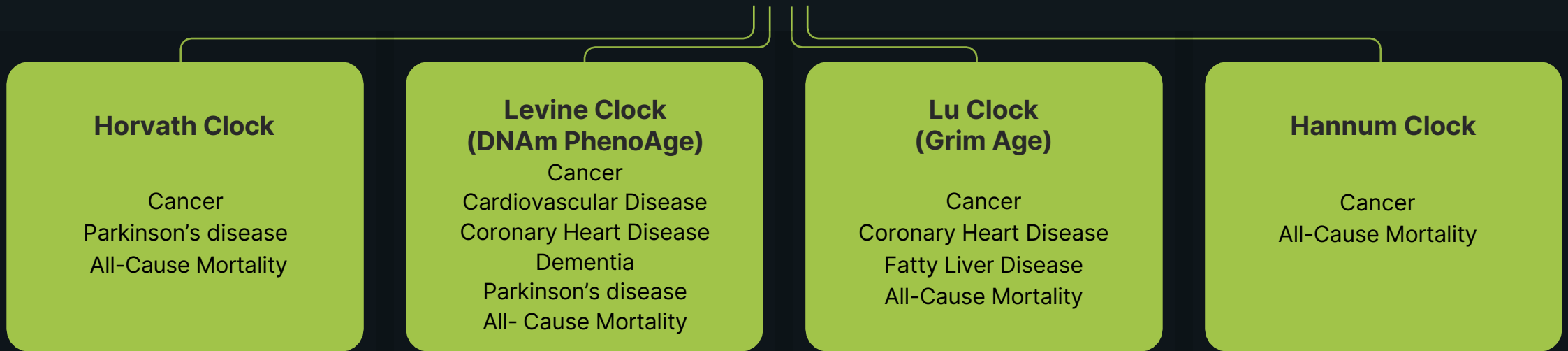
**The Copenhagen Sarcopenia Study: lean mass, strength, power, and  
physical function in a Danish cohort aged 20–93 years**

Journal of Cachexia, Sarcopenia and Muscle 2019 7 Suetta et al

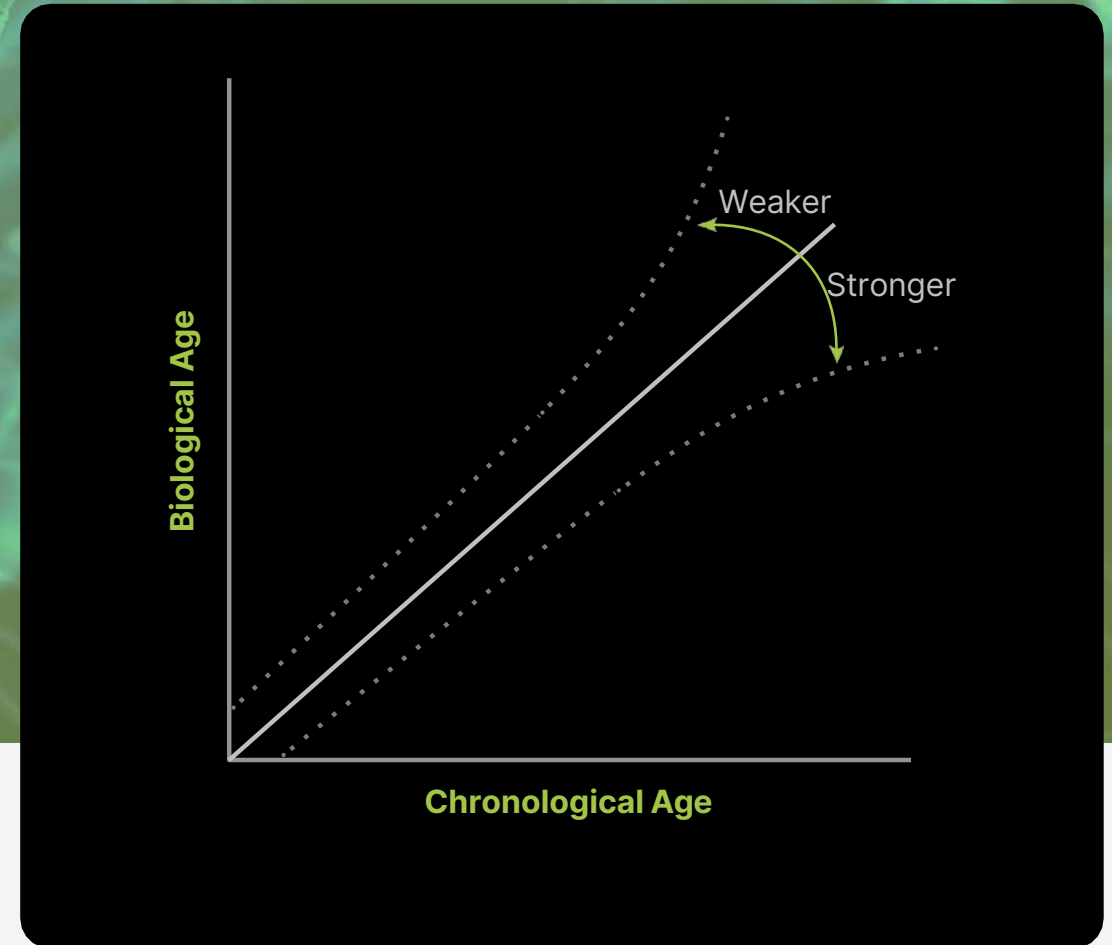
# DNA METHYLATION BIOMARKERS IN AGING AND AGE-RELATED DISEASES



## Epigenetic Age Acceleration



# DOES STRENGTH PLAY A PART ?



Grip Strength is inversely associated with DNA methylation age acceleration  
Journal of Cachexia, Sarcopenia and Muscle 2023 14 108-117

Papers



A strategy to reduce cardiovascular disease by more than 80%

N J Wald, M R Law

Abstract

**Objectives** To determine the combination of drugs and vitamins, and their doses, for use in a single daily pill to achieve a large effect in preventing cardiovascular disease with minimal adverse effects. The strategy was to simultaneously reduce four cardiovascular risk factors (low density lipoprotein

the diseases common. Cardiovascular disease can be avoided or delayed, but the necessary changes to Western diet and lifestyle are not practicable in the short term. Randomised trials show that drugs to lower three risk factors—low density lipoprotein (LDL) cholesterol,<sup>1</sup> blood pressure,<sup>2,4</sup> and platelet function (with aspirin)<sup>3,8</sup>—reduce the incidence of ischaemic heart

Editorial by Rodgers

Department of Environmental and Preventive Medicine, Wolfson Institute of Preventive



**A strategy to reduce cardiovascular disease by more than 80%:**  
British Medical Journal  
2003 326:7404



**1/3 patients don't take medication even 90 days after a myocardial infarction**



**50% don't take them at all !**  
Mayo Clin Proc. 2011 86 (4): 304-314





**POLYPILL A DAY SHOWS A  
11% DECREASE  
IN ALL CAUSE MORTALITY**

Association of polypill therapy with cardiovascular outcomes, mortality, and adherence: A systematic review and meta-analysis of randomized controlled trials  
Progress in Cardiovascular Disease 2023 73 48-55 Rao et al

A man with extensive tattoos is running up a set of stairs. The scene is dimly lit, with the man's form highlighted against the dark background of the stairs.

**10,000 STEPS A DAY SHOWS A  
23% DECREASE  
IN ALL CAUSE MORTALITY**

Daily steps and all-cause mortality: a meta-analysis of 15 international cohorts  
Lancet 2022 7 (3) 219 Paluch et al

**MUSCLE MASS SHOWS A  
17% DECREASE  
IN ALL CAUSE MORTALITY**

Muscle-strengthening activities are associated with lower risk and mortality in major non-communicable diseases: a systematic review and meta-analysis of cohort studies  
Brit J Sports Med 022;56:755-763. Momma et al



# MUSCLE STRENGTH SHOWS A 10% DECREASE IN ALL CAUSE MORTALITY

Muscular Strength as a Predictor of All-Cause Mortality in an Apparently Healthy Population: A Systematic Review and Meta-Analysis of Data From Approximately 2 Million Men and Women  
Arch Phys Med Rehabil 2018 99 (10) Garcia-Hermoso et al



# MUSCLE STRENGTH SHOWS A **10% DECREASE** IN ALL CAUSE MORTALITY

Muscular Strength as a Predictor of All-Cause Mortality in an Apparently Healthy Population: A Systematic Review and Meta-Analysis of Data From Approximately 2 Million Men and Women  
Arch Phys Med Rehabil 2018 99 (10) Garcia-Hermoso et al

NURITAS

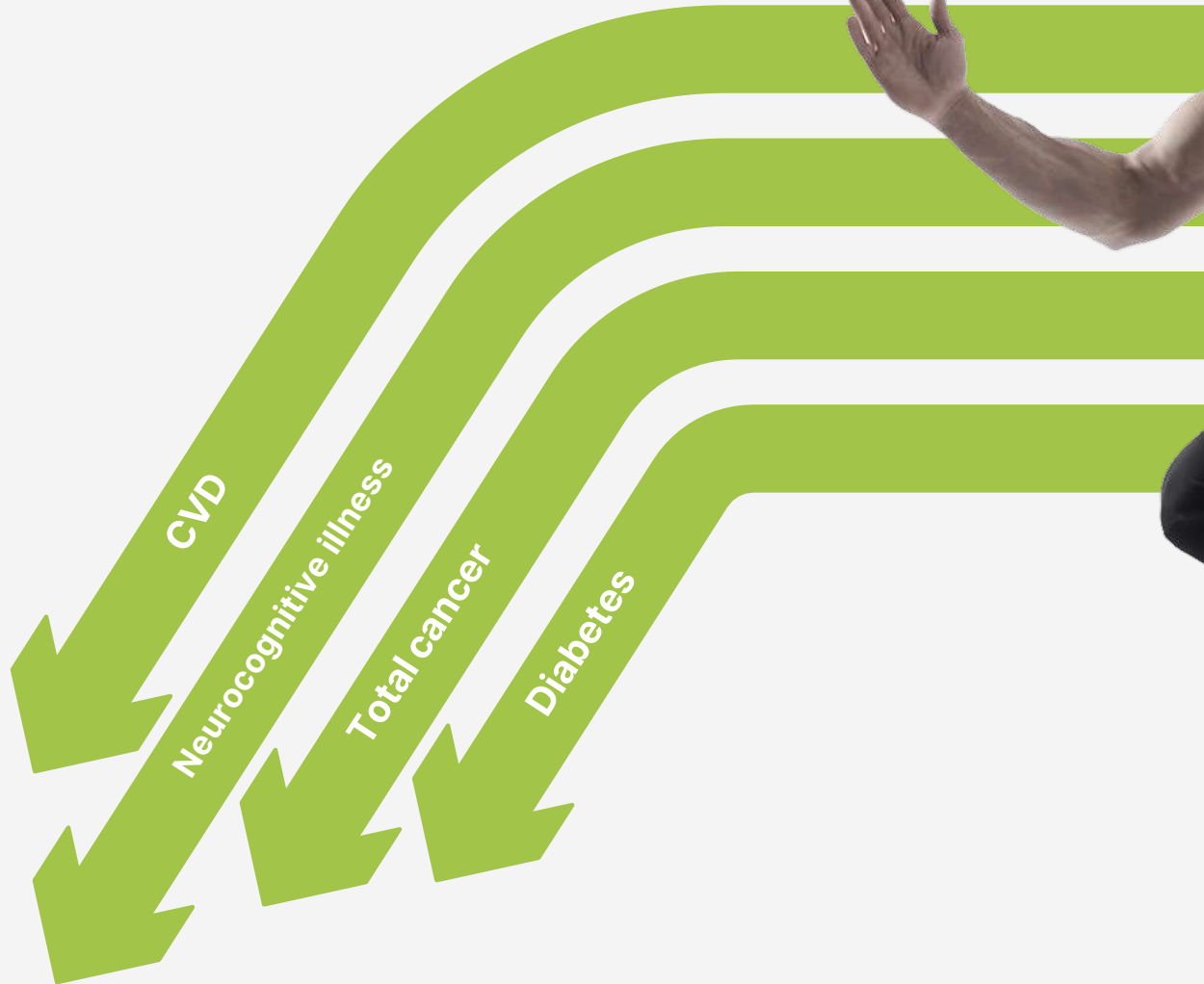
# THE AGGREGATION OF MARGINAL GAINS.

Sir David Brailsford

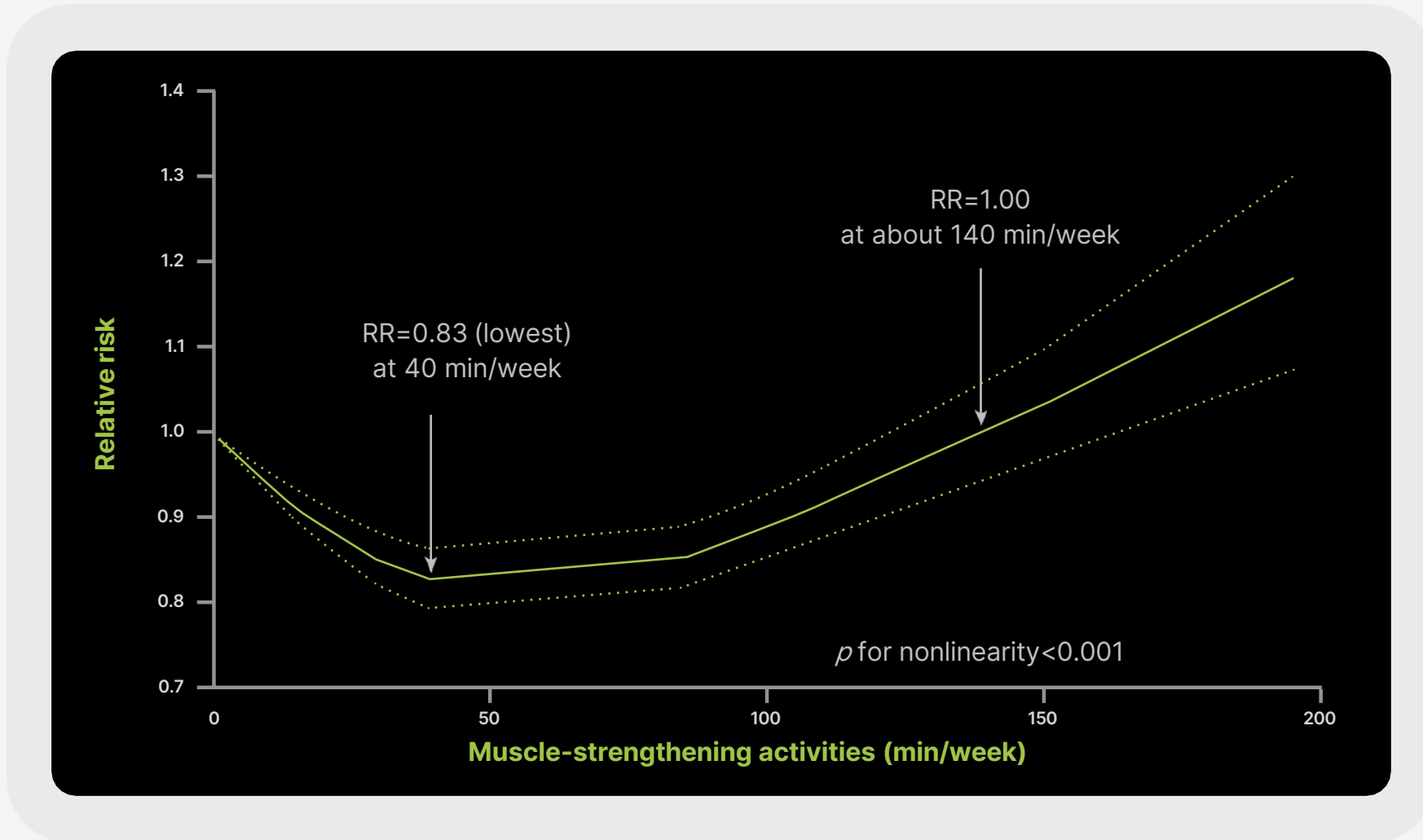


NURITAS

# MUSCLE STRENGTH REDUCES ALL CAUSE MORTALITY

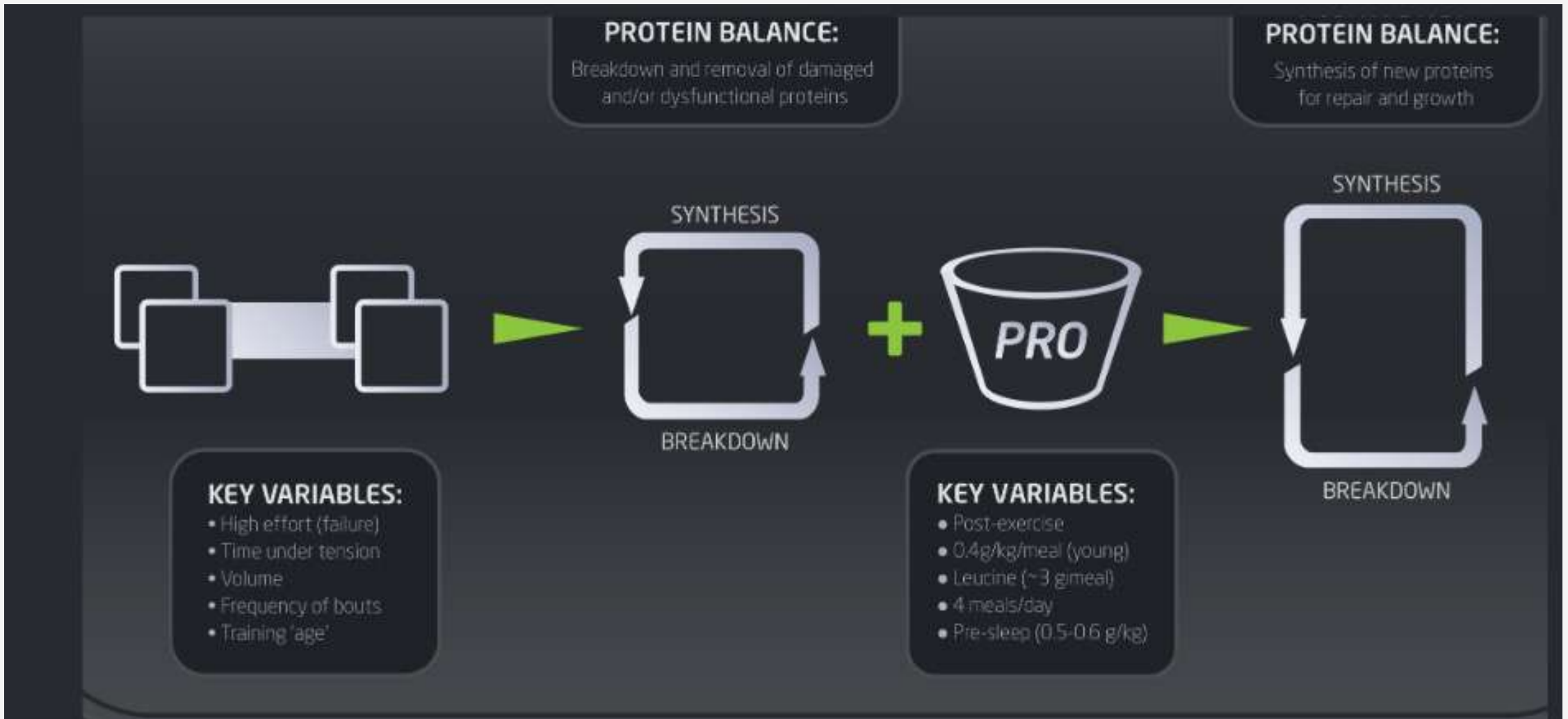


# IS THERE AN OPTIMUM AMOUNT OF STRENGTH?





# THE BEST EVIDENCE: MUSCLE/PROTEIN INTAKE



# THE BEST EVIDENCE: LEUCINE



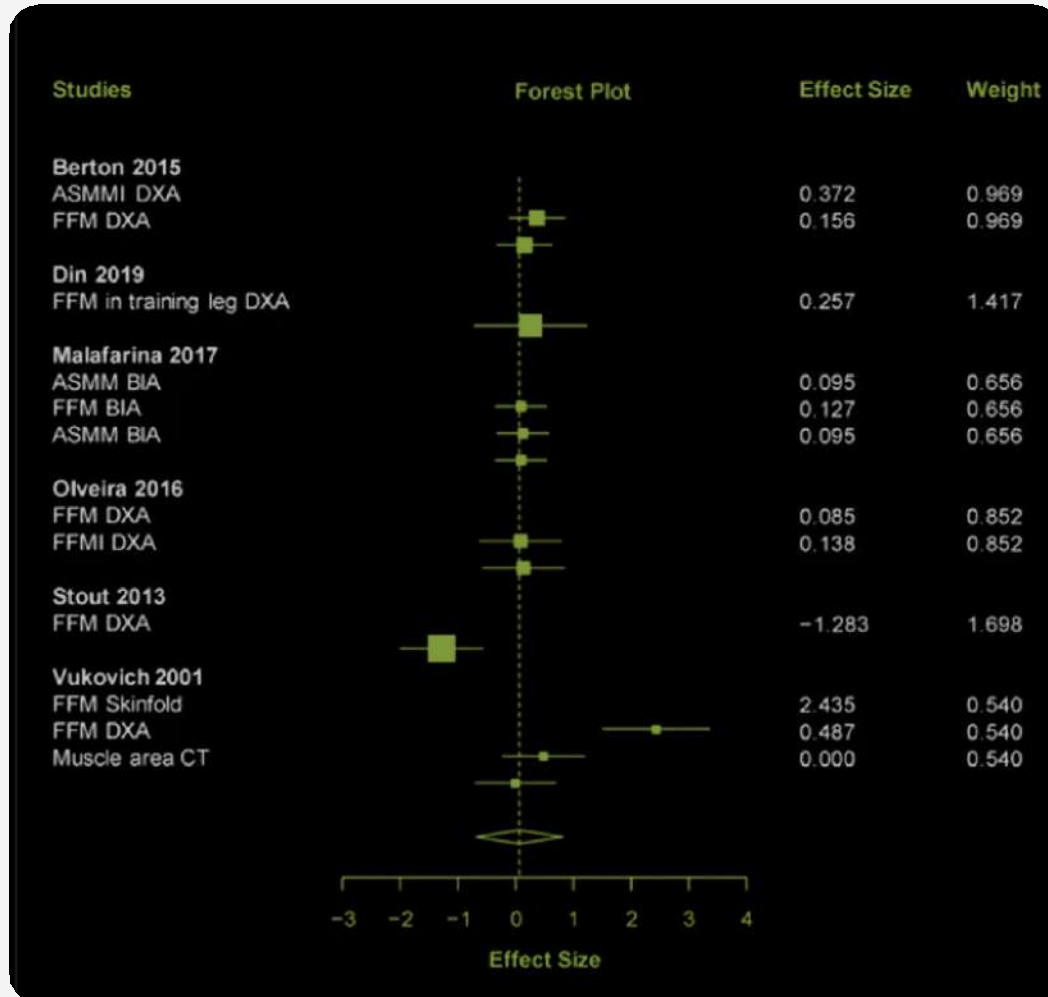
The effectiveness of leucine on muscle protein synthesis, lean body mass and leg lean mass accretion in older people: a systematic review and meta-analysis

# THE BEST EVIDENCE: CREATINE

Author Year	Subjects	Duration	Dosing Protocol	Primary Variables	Results	Adverse Events
Grindstaff et al. 1997	18 (7 male, 11 female) junior competitive swimmers	9 days	21 g/day for 9 days	100-m sprint performance arm ergometer performance	↑ sprint swimming performance	None reported
Kreider et al. 1998	25 college football players	28 days	15.75 g/day for 28 days	total work during sprints on a cycle ergometer bench press volume total volume	↑ total work ↑ bench press volume ↑ total volume	None reported
Noonan et al. 1998	39 college football players	9 weeks	20 g/day for 5 days 100 or 300 mg/kg/fat-free mass for 8 weeks	bench press 40-yard dash % body fat fat-free mass vertical jump	↑ bench press ↑ 40-yard dash ↔ % body fat ↔ fat-free mass ↔ vertical jump	None reported
Peyrebrune et al. 1998	14 male college swimmers	5 days	9 g/day for 5 days	single 50-m sprint time repetitive 50-m sprint time	↔ single 50 m sprint time ↑ repetitive 50 m sprint time	None reported
Stout et al. 1999	24 college football players	8 weeks	21 g/day for 5 days 10 g/day thereafter	vertical jump 100-yard dash bench press strength	↑ vertical jump ↑ 100-yard dash ↑ bench press strength	None reported
Jones et al. 1999	8 elite ice hockey players	11 weeks	20 g/day for 5 days 5 g/day for 10 weeks	5 × 15 s skating sprints 6 timed 80-m skating sprints	↑ 5 × 15 s skating sprints ↑ 6 timed 80 m skating sprints	None reported

Creatine for Exercise and Sports Performance, with Recovery Considerations for Healthy Populations

# THE BEST EVIDENCE: HMB



The Effect of  $\beta$ -hydroxy- $\beta$ -methylbutyrate (HMB) on Sarcopenia and Functional Frailty in Older Persons: A Systematic Review

# THE BEST EVIDENCE: MYOSTATIN

Deldicque et al. (2008) [55]	9 young men on RT	Acute (measures after 5 d of creatine loading)	Creatine (21 g/d; 7 g 3 x/d)	↔
Sire et al. (2019) [70]	20 patients submitted to hip replacement	8 week	Amino acids (4 g 2 x/d)	↓serum myostatin levels for amino acid (from 1.2 ± 0.2 to 0.9 ± 0.3 ng/mL) and placebo (from 1.3 ± 0.3 to 1.1 ± 0.4 ng/mL) groups
Paoli et al. (2015) [22]	18 active young men without experience with RT	8 week	High-protein diet (1.8 g protein/kg BW/d) vs. normal-protein diet (0.85 g protein/kg BW/d)	↑plasma myostatin levels after RT session (pretraining and posttraining levels: from 3.66 ± 1.42 to 12.0 ± 2.5 ng/mL) in the high-protein group
Bagheri et al. (2020) [52]	30 young men	12 week	Whole eggs (3 units) vs. egg whites (6 units)	↔
<i>Non-protein supplements</i>				
Willoughby (2004) [75]	22 untrained health men	12 week	<i>Cystoseira canariensis</i> (1200 mg/d)	↔
García-Merino et al. (2020) [81]	44 training endurance athletes (men)	10 week	Cocoa (5 g cocoa powder, 425 mg flavonoids)	↔
Mafi et al. (2018) [83]	62 older individuals	8 week	Epicatechin (1 mg/kg BW/d)	↓49% in plasma myostatin levels in the RT plus epicatechin group than in the RT group
Gonnelli et al. (2021) [87]	50 postmenopausal women	180 d	Calcifediol (20 or 30 µg/d)	↔
Bagheri et al. (2021a) [79]	40 male wrestlers	12 d	Spirulina (3 g/d)	↓serum myostatin levels by 0.1 ng/mL

The Effects of Dietary Supplements, Nutraceutical Agents, and Physical Exercise on Myostatin Levels: Hope or Hype?





# PeptiStrong

By NURITAS



01

First **AI discovered** new ingredient

02

**4 benefits** in one 2.4 g dose from a fava bean

03

**Clinical claims** on Strength, Power, Recovery and Energy

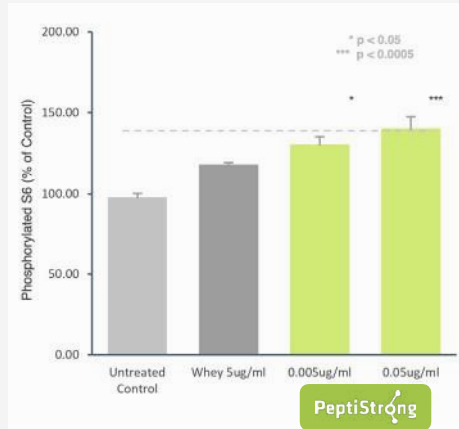
04

Strong Patents, **multiple formulations**



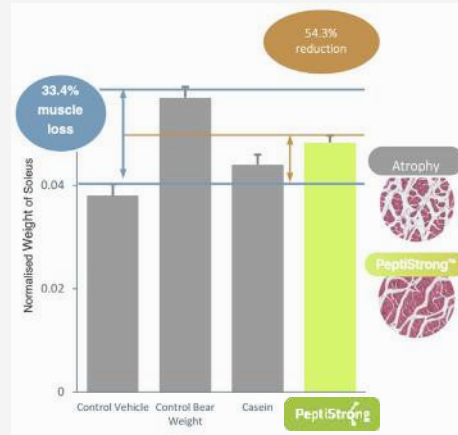
# Anabolic cell signalling plant peptides

**Significantly increases protein synthesis more effectively than whey protein**



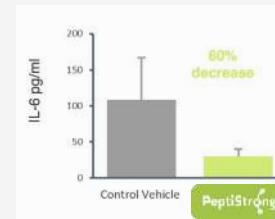
Effect of PeptiStrong on S6 phosphorylation. C2C12 cells were treated with whey or PeptiStrong for 30 minutes following a starvation protocol and compared to untreated cells.

**Significantly reduces muscle loss more effectively than milk protein**



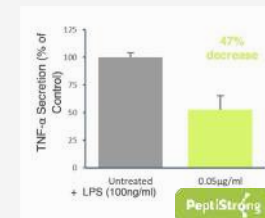
Effect of peptistrong on soleus muscle mass following hindlimb unloading. C57Bl/6 mice were treated with 650mg/kg/day with peptistrong or casein over 18 days.

**Significantly reduces inflammation in vivo and in vitro**



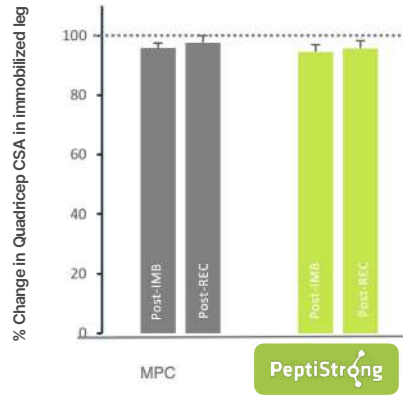
Effect of PeptiStrong in circulation IL-6. C57Bl/6 mice were treated with 650mg/kg/day with PeptiStrong over 18 days.

Effect of PeptiStrong on TNF-α secretion in THP-1 differentiated macrophages.



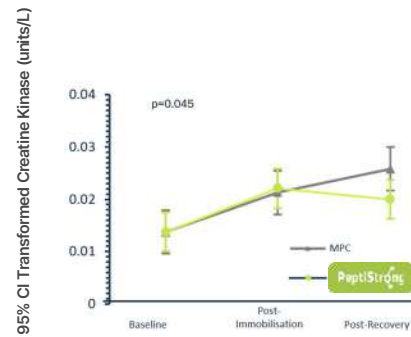
# Strength and Power clinical claims

## Muscle Mass



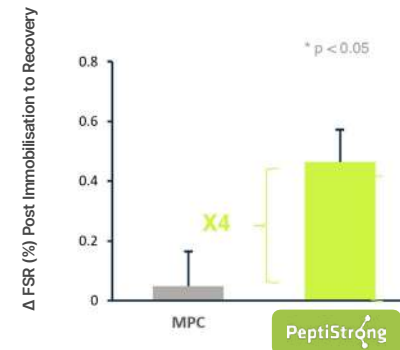
Effect of PeptiStrong on muscle mass in quadricep muscle following two week recovery period after one week immobilization. Males aged 18-35 were treated with 20g/day of PeptiStrong or MPC over 23 days.

## Plasma CK



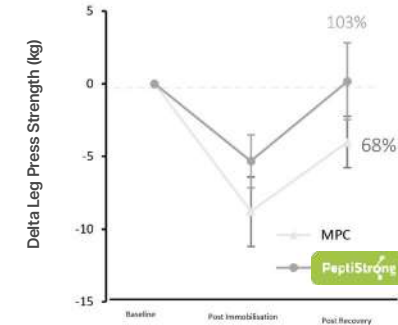
Effect of PeptiStrong on plasma levels of creatine kinase at baseline, following 1 week of immobilisation and following two week recovery period after one week immobilization. Males aged 18-35 were treated with 20g/day of PeptiStrong or MPC over 23 days.

## Muscle Protein Synthesis



Effect of PeptiStrong on muscle synthesis in quadricep muscle following two week recovery period after one week immobilization. Males aged 18-35 were treated with 20g/day of PeptiStrong or MPC over 23 days.

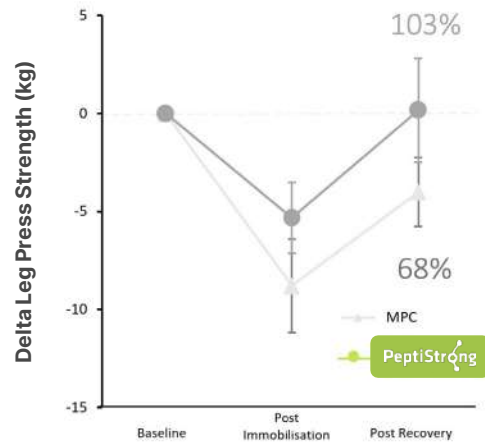
## Leg Strength



Effect of PeptiStrong on leg press strength compared to baseline following two week recovery period after one week immobilization. Males aged 18-35 were treated with 20g/day of PeptiStrong or MPC over 23 days.

# Recovery claims

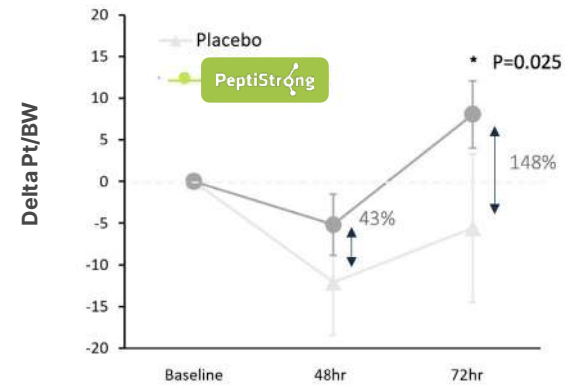
## DAILY SERVING 20g Immobilisation Trial



Effect of PeptiStrong on leg press strength compared to baseline following two week recovery period after one week immobilization. Males aged 18-35 were treated with 20g/day of PeptiStrong or MPC over 23 days.

## DAILY SERVING 2.4g Strength Recovery Trial

### Total Change of Peak Torque per Body Weight from Baseline



Effect of PeptiStrong on knee extension strength recovery compared to baseline after a muscle injury protocol at 48hours and 72 hours. Males aged 30-45 were treated with 2.4g/day of PeptiStrong or MCC (Placebo) over 17 days.

# Poor blood sugar control is a huge health problem



**96 million people** (1 in 3) in the US have Prediabetes

Using continuous glucose monitor's (CGM's) in Diabetes **is well established to adapt insulin dosage**

**Reducing the burden** on the pancreas and insulin production saves lives

Tracking blood glucose is an **emerging bio-hack** to reduce inflammation and burden on insulin production

What if rather than avoid low GI food, we could add DPP4 inhibition to food?

What if we **flatten the glucose curve** and reduce the burden?

What if we **avoided the poor compliance** with diets by making food the health mechanism?

# METABOLIC HEALTH SHOULD BE THE #1 PRIORITY POST COVID

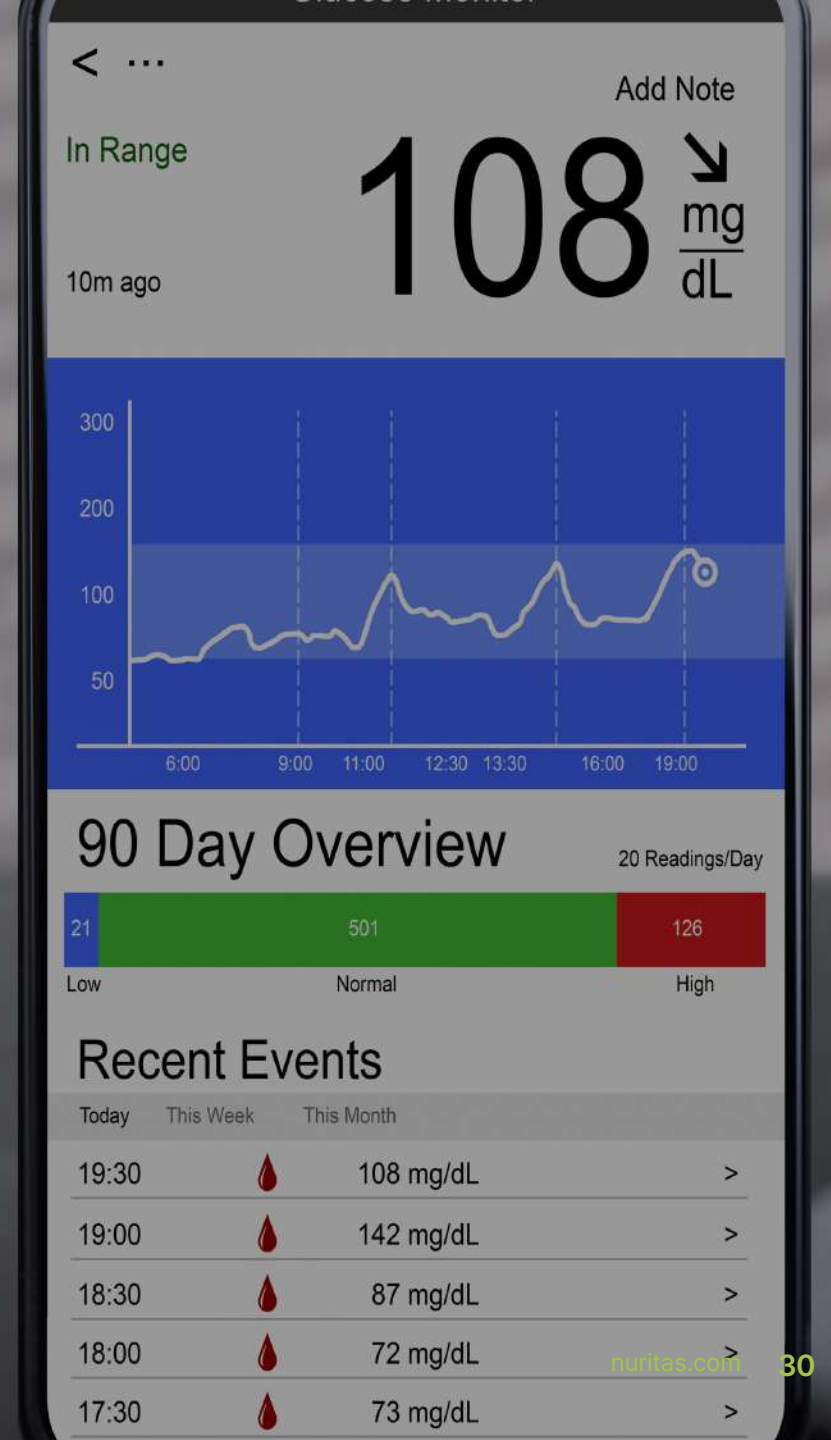
Metabolic health: a priority for the post-pandemic era


Lancet 2021 9 (4) 189



**\$8000M**  
**GROWTH**  
**INDUSTRY**  
**CONTINUOUS**  
**GLUCOSE**  
**MONITORING**

# WEARABLE TECHNOLOGY INFORMS THE CONSUMER TO MAKE CHOICES



A woman with long brown hair, wearing a black tank top and black leggings, is sitting on a blue mat. She is holding a white bowl filled with a colorful salad of lettuce, tomatoes, and other vegetables. She is also holding a fork with a piece of broccoli to her mouth, smiling. The background is blurred, showing what appears to be a gym or fitness studio.

# WHAT IF WE COULD SMOOTH THE GLUCOSE SPIKE?

# WHAT IF AN INGREDIENT COULD ALLOW THE CONSUMER TO BE LESS RESTRICTIVE





# ALLOWING MORE CHOICE WITH HIGH GI AND SUGARY FOODS WITHOUT THE IMPACT





**SMOOTH THE SPIKE**



**FEEL FULL AFTER A MEAL**



**REDUCE POST FOOD SLUMP**




**INTEGRATE WITH WEARABLES**

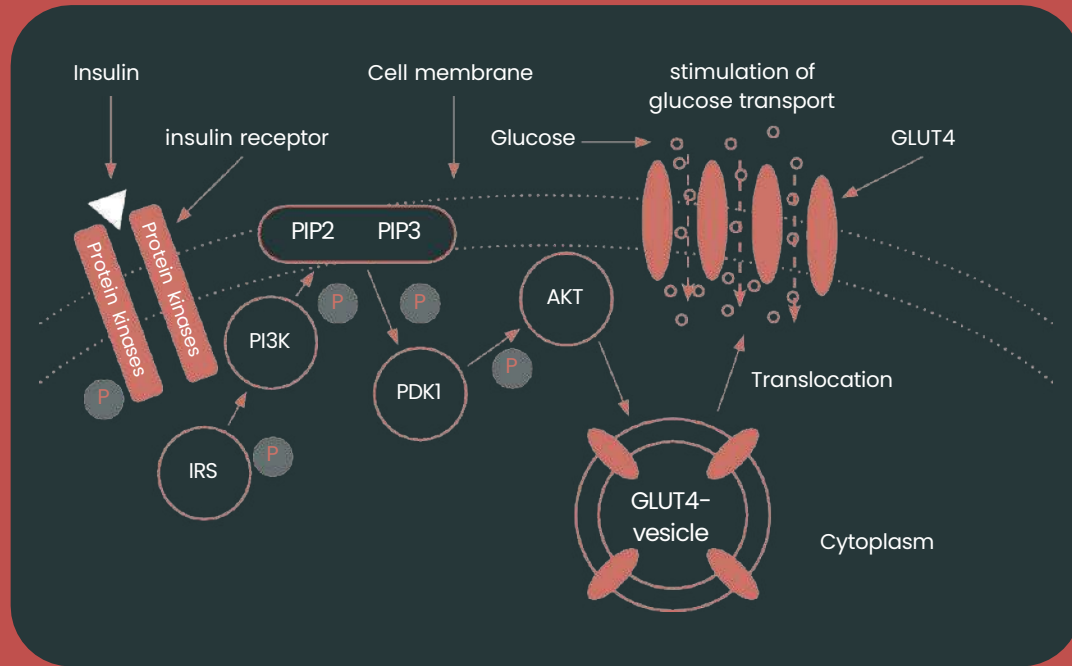


**IMPROVE GLUCOSE CONTROL**

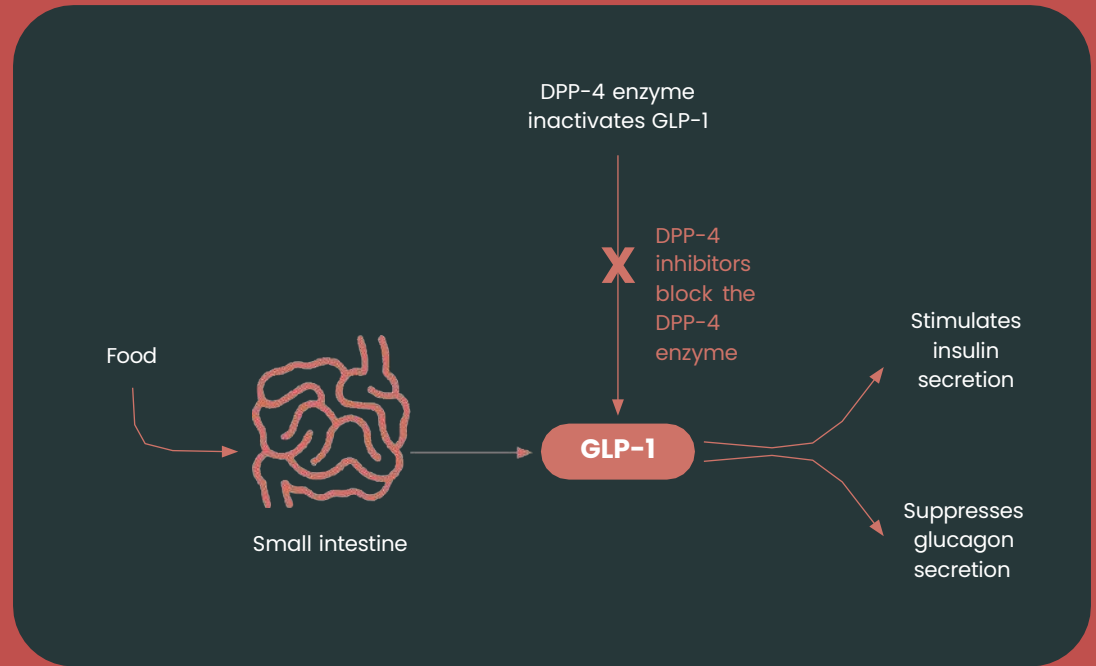


	 By NURITAS	DPP-IV Inhibitor	Berberis aristate	Vitus vinifera	Mulberry Leaf	Fenugreek
<b>Reduce Blood Glucose</b>	✓	✓	✓	✓	✓	✓
<b>Increase Satiety</b>	✓	✗	✗	✗	✗	✗
<b>Clinical Trials</b>	✓	✓	✓	✗	✓	✓
<b>Natural</b>	✓	✗	✓	✓	✓	✓
<b>Mechanism</b>	1. Promotes glucose uptake 2. Increases GLUT4 translocation 3. Inhibits DPP-IV	1. Prolongs GLP-1 activity	1. Decreases glucose-6-phosphatase activity	1. Activates insulin signalling	1. Inhibits alpha-glucosidase	1. Activates insulin signalling

# How does PeptiControl work?

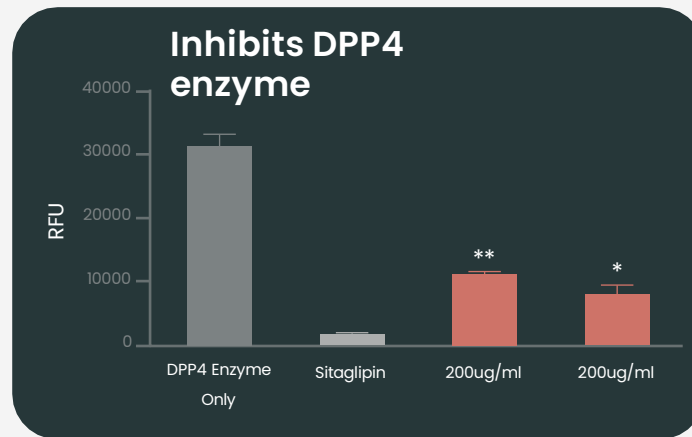
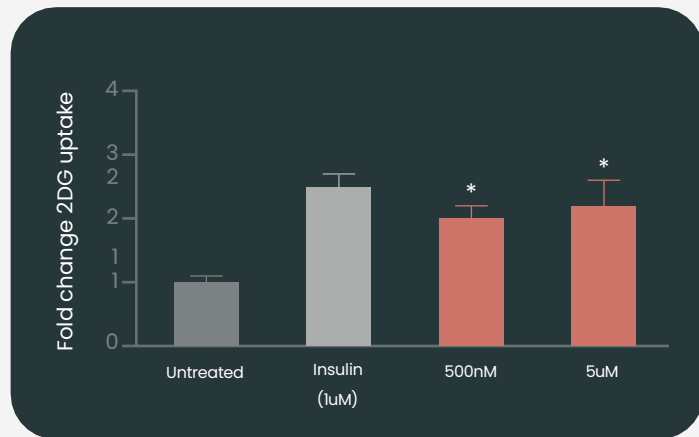
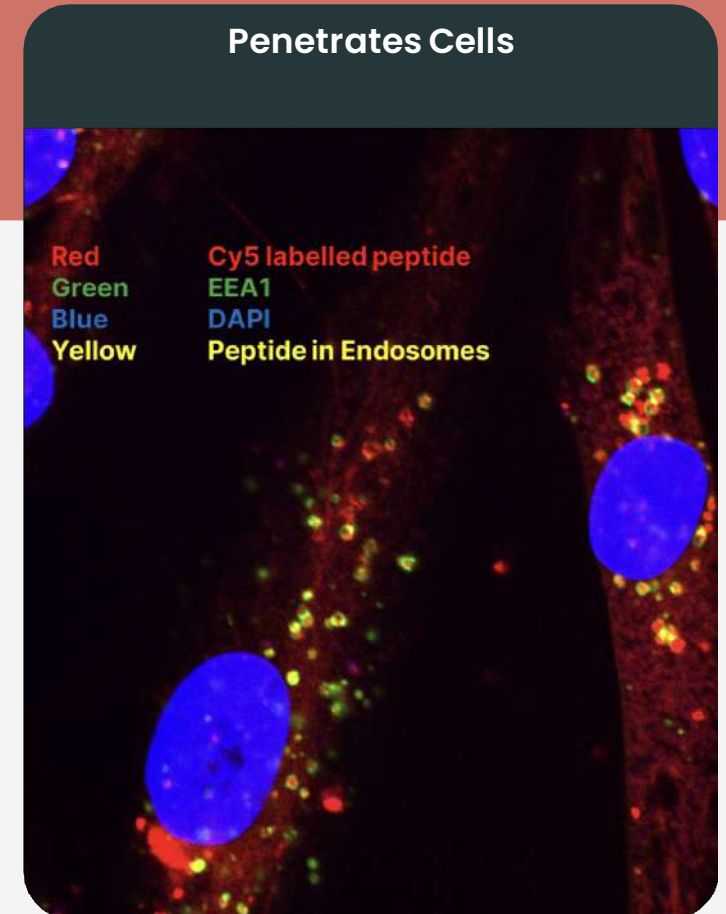
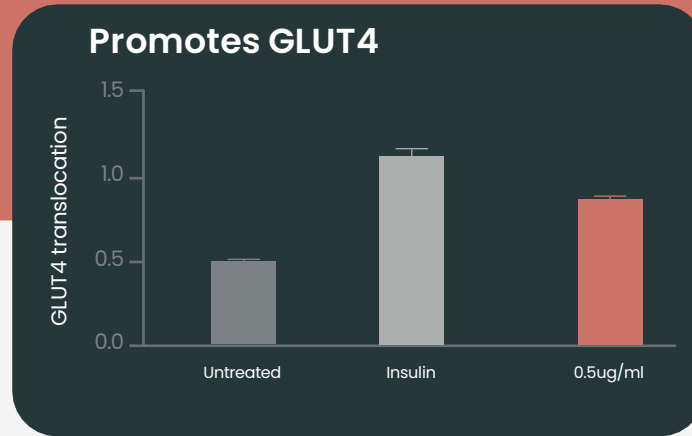
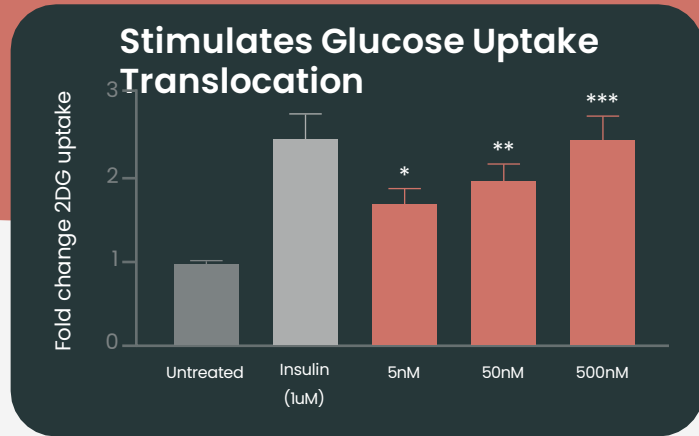


**Glucose Uptake:** At the cellular level, glucose transport into skeletal muscle is the rate-limiting step for whole body glucose uptake and a primary site of insulin resistance.

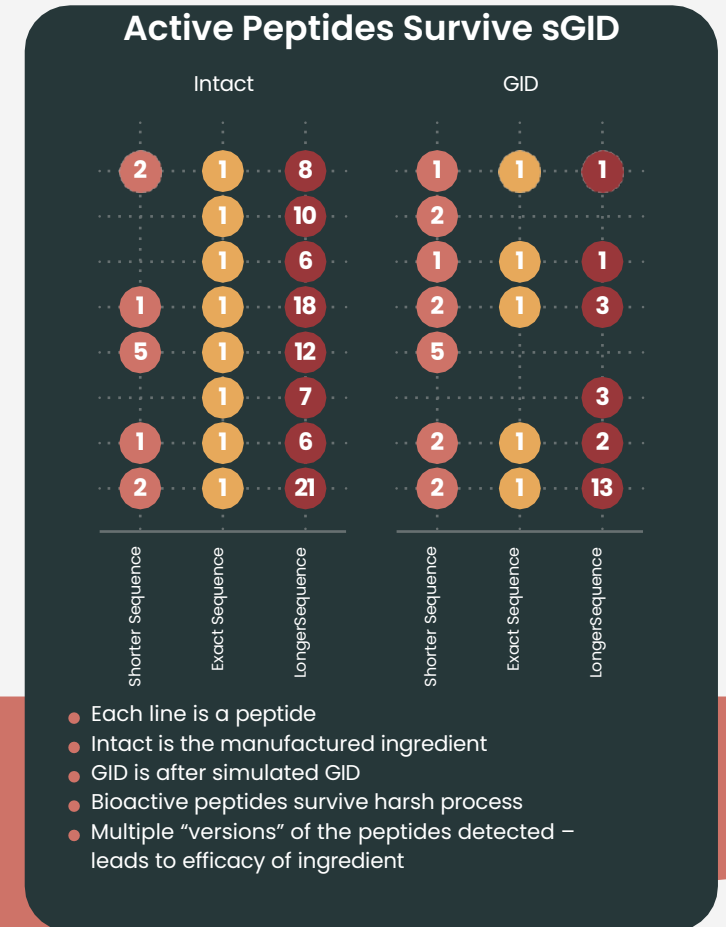
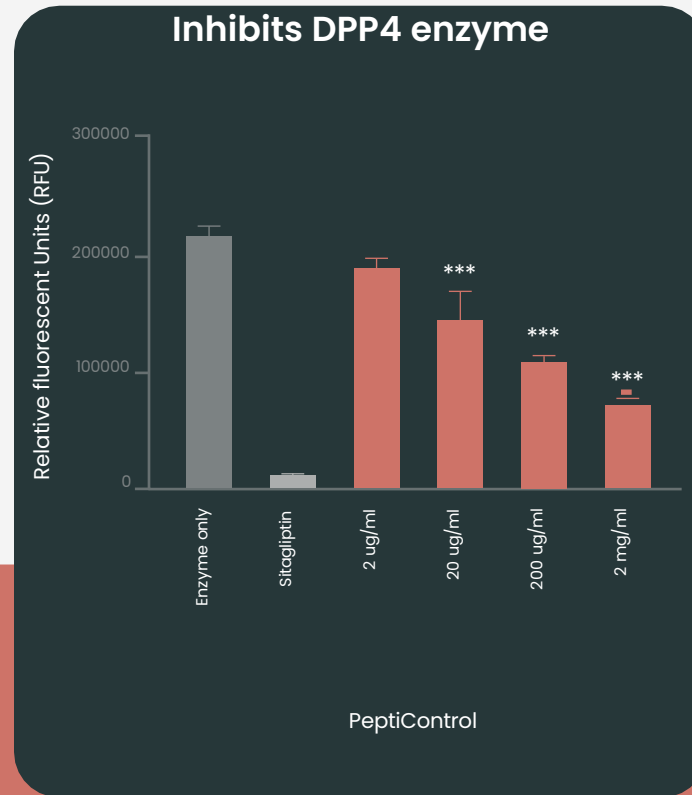
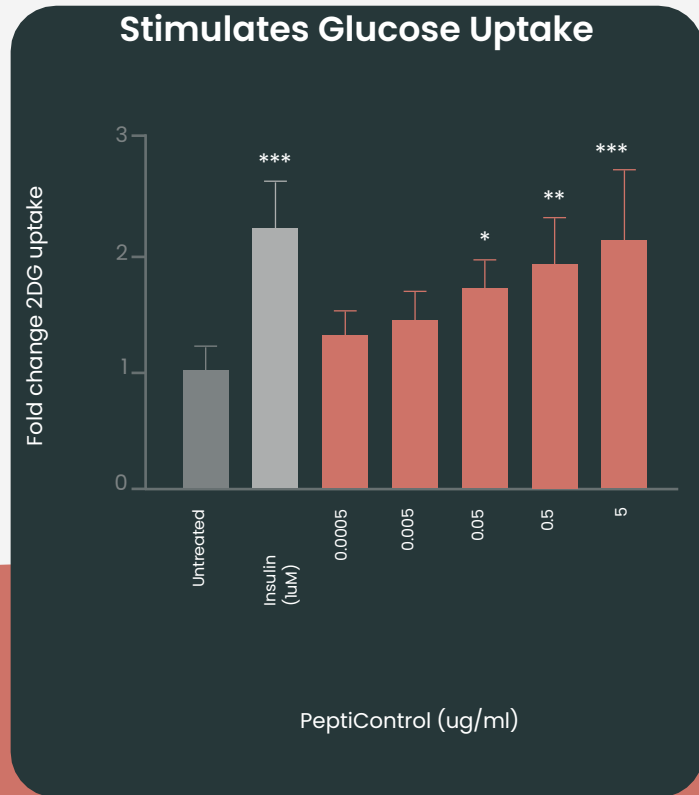


**DPP-IV Inhibition:** Inhibition of this enzyme blocks the breakdown of the incretin hormone GLP-1, a key hormone for glucose homeostasis. Prolonged GLP-1 activity suppresses hepatic glucose output, stimulates insulin release, mitigates glucose absorption, and increases peripheral glucose utilisation.

# How does PeptiControl work - Peptides



# How does PeptiControl work - Peptides

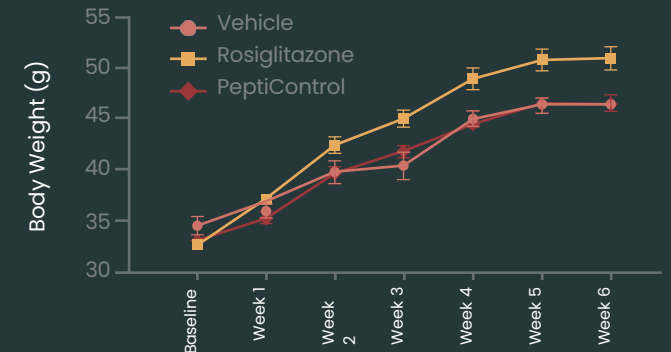
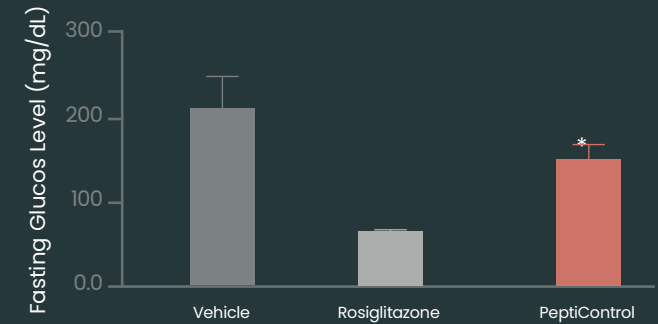
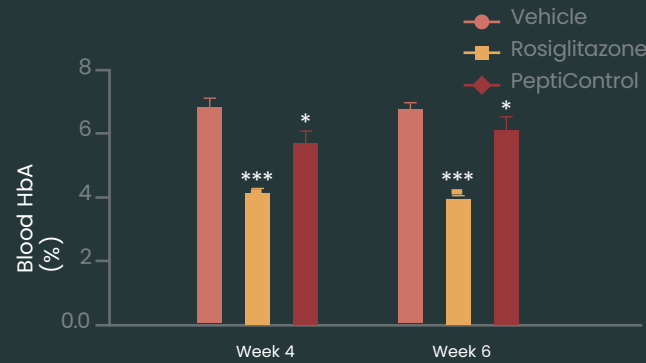
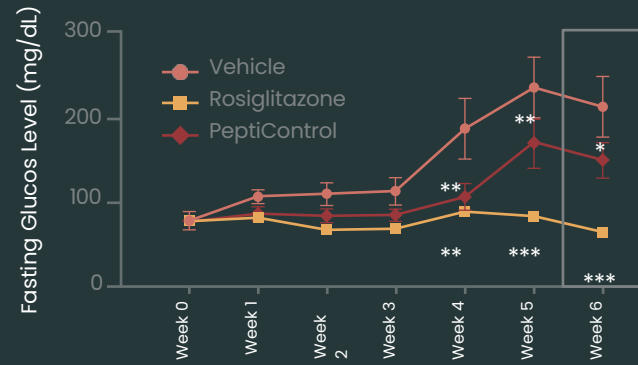


# Preclinical Work

Mice were treated with PeptiControl (400 mg/kg/day), Rosiglitazone (15mg/kg/day) or vehicle by oral gavage.



Muscle and Metabolic Health - Redefining healthspan

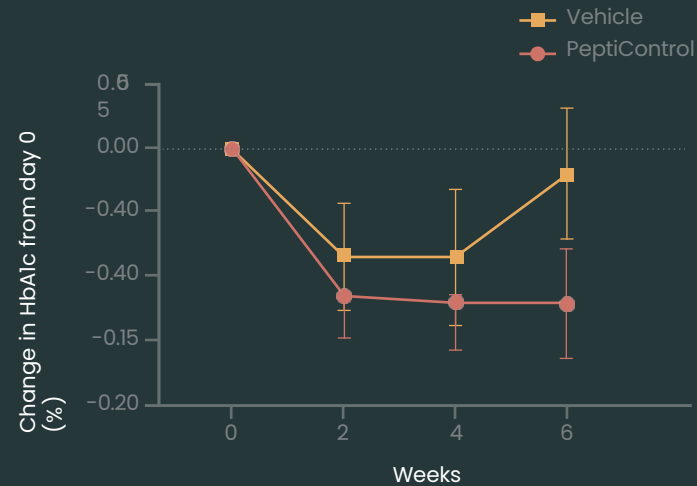


# Initial Clinical Work

## Pilot Trial Summary

- **Trial duration:** 12 weeks
- **Trial cohort:** 63 subjects, between 18 – 75 years old
- **Trial criteria:** HbA1c levels ranging from 5.7 – 6.4 %
- **Sampling frequency:** 1 initial screen visit followed by 4 clinical visits over 12 weeks.
- **Study site:** Clinic of Endocrinology, Riga, Latvia under Prof Valdis Pirags.

## Key Findings



Significant reduction of HbA1c% following PeptiControl treatment (15g/day) compared to control (Mean ± SD; P=0.013)





# New Clinical Study

## Clinical

Screening	Day 0	Day 2	Day 7	Day 10
<p><b>Screening for pre diabetes (Day-10 to 1) Enrolment</b></p> <p>Age, Gender, Height, Weight, BMI</p> <p>Trial information leaflet and informed consent</p> <p>Inclusion and exclusion criteria</p> <p>Screen for Fasting blood glucose</p>	<p><b>Visit 1 Randomisation start CGM Baseline Stroop</b></p> <p>Safety Bloods</p> <p>Continuous glucose monitoring</p> <p>Stroop 1: selective attention capacity and skills</p>	<p><b>Visit 2 PeptiForce administration OGTT</b></p> <p>Adverse event reporting</p> <p>Continuous glucose monitoring</p> <p>Stroop 2: selective attention capacity and skills</p> <p>PeptiControl 425 mg 870 mg 2610 mg Placebo</p> <p>Safety bloods</p>	<p><b>Visit 3 Complete CGM</b></p> <p>Adverse event reporting</p> <p>Continuous glucose monitoring</p> <p>Stroop 3: selective attention capacity and skills</p> <p>Safety bloods</p>	<p><b>Visit 4 Complete AE reporting End of Trial</b></p> <p>Adverse event reporting</p>



### Three Doses

- 435mg
- 870mg
- 2610mg

### Endpoints

- Flattening of glucose spike
- Satiety
- Time in range
- Insulin levels
- Selective attention capacity
- Fasting blood glucose

# Potential Claims

Supports healthier glucose homeostasis

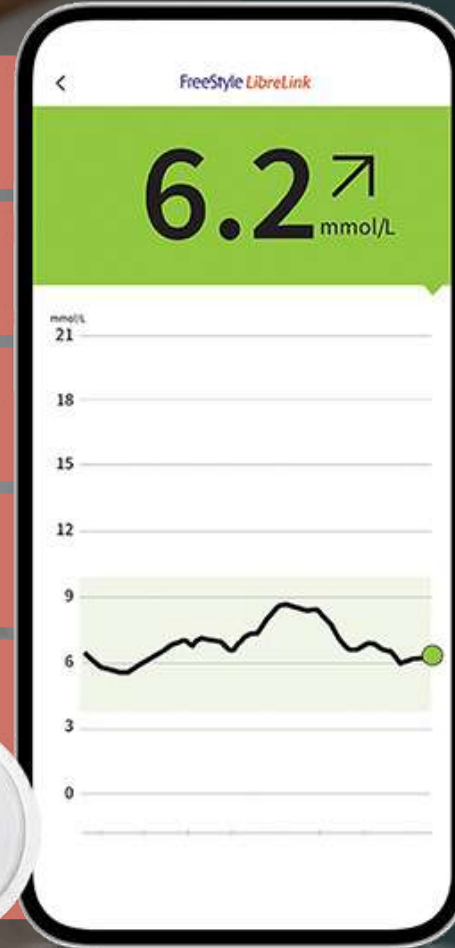
Reduce area under the curve of glucose

Sharpen post-meal cognition

Reduce the impact of carbohydrates on your diet

Helps sustained energy throughout the day

Create a feeling of fullness



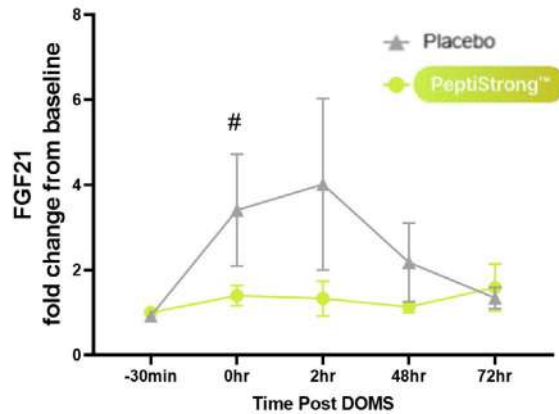
nuritas.com

PeptiControl  
By NURITAS

by NURITAS

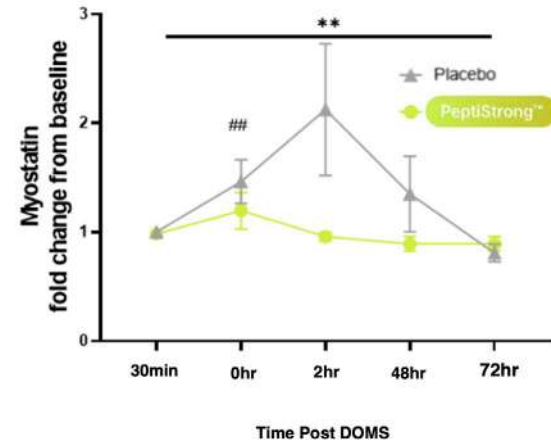
# Myostatin suppression: keep what you have

## FGF21 Regulates protein synthesis Increased under muscle stress and mitochondrial dysfunction



Effect of PeptiStrong on leg press strength compared to baseline following two week recovery period after one week immobilization. Males aged 18-35 were treated with 20g/day of PeptiStrong or MPC over 23 days.

## MYOSTATIN Inhibits protein synthesis



Effect of PeptiStrong on knee extension strength recovery compared to baseline after a muscle injury protocol at 48hours and 72 hours. Males aged 30-45 were treated with 2.4g/day of PeptiStrong or MCC (Placebo) over 17 days.

✚ **Strength and Muscle** are the optimal Biohack right now

✚ **Longevity and grip strength** can be correlated

✚ Multiple ways of influencing the **MTor Pathway**

✚ Sarcopenia is more than **muscle loss > 30** hold on to what you have

✚ **Leucine** is the leading BCAA, with the best evidence

✚ **Keep what you have** when it comes to muscle and strength for life

✚ AI discovered **PeptiStrong** a plant based peptide network

✚ Four **clinically proven claims** in one ingredient

**NURITAS**  
See nature differently



**Andrew Franklyn-Miller**  
Chief Medical and Innovation Officer

