Dr Emmanouil Georgiadis

FITNESS OVER FATNESS – SEDENTARY BEHAVIOURS



IMPORTANT PARAMETER: PHYSICAL FITNESS



Fitness and mortality levels





Xuemei Sui et al. 2007; JAMA.;298(21):2507-2516.

Fitness and mortality levels





Xuemei Sui et al. 2007; JAMA.; 298(21):2507-2516.

Physical inactivity and health...

"Physical inactivity and low fitness is perhaps the most important predictor of morbidity and mortality that we know of. Low fitness accounts for more sickness and deaths in the population than anything else that we have studied"

- Dr. Steve Blair



Conclusion

- Increased physical activity diminishes the risk of illness in every human being
- For a good level of health we do need to reduce body weight if any individual is sufficiently physically active
- Why does this happen?



Interleukins IL – 4,6,7,10 & 15







Interleukin – 4,6,7,10 &15

- Proteins secreted during physical activity
- Powerful antiinflammation action
- Reducing metabolic risk factors
- Better health





Ropelle, et al., 2010

Muscles, exercise and obesity: skeletal muscle as a secretory organ



Muscles, exercise and obesity: skeletal muscle as a secretory organ

Bente K. Pedersen and Mark A. Febbraio





The role of IL-6



Figure 3 Comparison of sepsis-induced verses exercise-induced increases in circulating cytokines. During sepsis, there is a marked and rapid increase in circulating tumor necrosis factor-alpha (TNF- α), which is followed by an increase in interleukin-6 (IL-6). In contrast, during exercise, the marked increase in IL-6 is not preceded by elevated TNF- α . Adapted, with permission, from (175).



Unive Muscle as a Secretory Organ

Bente K. Pedersen^{*1} Compr Physiol 3:1337-1362, 2013.

DOI: 10.1002/cphy.c120033

Biological role of Muscle



Figure 7 Biological role of contraction-induced interleukin-6 (IL-6). Skeletal muscle expresses and releases myokines into the circulation. In response to muscle contractions, both type I and type II muscle fibers express the myokine IL-6, which subsequently exerts its effects both locally within the muscle (e.g., through activation of AMPK) and—when released into the circulation—peripherally in several organs in a hormone-like fashion. Specifically in skeletal muscle, IL-6 acts in an autocrine or paracrine manner to signal through a gp130R β /IL-6R α homodimer resulting in activation of AMP-kinase and/or PI3-kinase to increase glucose uptake and fat oxidation. IL-6 is also known to increase hepatic glucose production during exercise or lipolysis in adipose tissue. Modified, with permission, from (173).





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White fat cells to Brite fat cells



Figure 8 Exercise increases the intramuscular expression of peroxisome proliferator activated receptor γ coactivator 1 α (PGC-1 α). Boström and colleagues recently reported that PGC-1 α , a transcriptional coactivator, stimulates the expression of the membrane protein fibronectin type III domain containing 5 (FNDC5), which is proteolytically cleaved to form irisin, a myokine. Irisin drives the transformation of white fat cells into brite cells—white fat cells with a phenotype similar to that of brown fat cells, as indicated by a marked increase in the expression of uncoupling protein 1 (UCP1) in white adipose tissue. The investigators also showed that an elevated level of plasma irisin, achieved through gene replacement, is followed by a reduction in body weight and an improvement in metabolic homeostasis in obese mice. Adapted, with permission, from (168).

Unive Muscle as a Secretory Organ





DOI: 10.1002/cphy.c120033

Hypothesis of Inactivity-Disease links



What do we need to know as practitioners?

- A need for a new public message: from losing weight to move more and get fitter!
- When it comes to physical activity: anything is better than nothing!
- Human system knows its best and just needs the opportunity to achieve it!
- Creating an excuse to walk further can have a long list of positive impacts



SEDENTARY BEHAVIOUR AND HEALTH



'Sitting is the new smoking': Sedentary behavior linked to increased all-cause mortality

September 13, 2017 | Anicka Slachta



NEWS MA





For years, medical professionals and media personalities alike have warned against sitting for prolonged periods, coining the phrase "sitting is the new smoking" to describe the health risks of a sedentary lifestyle. But how much is too much? Keith M. Diaz, MD, and a team of researchers spent more than four years trying to objectively answer that question.

Based on various epidemiological data

Meta-analysis

(Chastin et al. BJSM 2018)

study or subgroup	Mean Difference	SE	Weight	IV. Random, 95% CI	IV. Random, 95% Cl
1.1.1 Normal					
Bailey 2014	-15.9	42	10.4%	-15 90 1-24 13 -7 671	
Duvivier 2013	5.5	4.8	10.1%	5.50 (-3.91, 14.91)	
McCarthy 2017	-35.4	3.1	10.8%	-35.40 [-41.48, -29.32]	
Pulsford 2017	-9	22	11.1%	-9.00 [-13.31, -4.69]	
Subtotal (95% CI)			42.3%	-13.90 [-29.70, 1.89]	-
Heterogeneity: Tau ²	= 246.30; Chi ² = 69.0	2, df	= 3 (P < 0	0.00001); l² = 96%	
rest for overall enect	L Z = 1.72 (F = 0.06)				
1.1.2 Impaired					
Crespo 2016	-24.3	9.5	7.5%	-24.30 [-42.92, -5.68]	
Dempsey 2016	-38.8	7.9	8.4%	-38.80 [-54.28, -23.32]	
Dunstan 2012	-24.6	7.6	8.6%	-24.60 [-39.50, -9.70]	
Duvivier 2017	-0.81	1	11.3%	-0.81 [-2.77, 1.15]	-
Duvivier 2017b	-11.1	2.2	11.1%	-11.10 [-15.41, -6.79]	-
Henson 2016	-28.3	3.2	10.8%	-28.30 [-34.57, -22.03]	
Subtotal (95% CI)			57.7%	-20.08 [-31.74, -8.42]	-
Heterogeneity: Tau ²	= 179.93; Chi ² = 107.	20, d	f = 5 (P <	0.00001); l ² = 95%	
Test for overall effect	: Z = 3.37 (P = 0.000	7)			
Total (95% CI)			100.0%	-17.48 [-26.23, -8.73]	•
Heterogeneity: Tau ²	= 175.00: Chi ² = 206.	35. d	f=9(P<	0.00001): (* = 96%	
	trates and see			0.0000 · // · · · · · · · ·	-50 -25 0 25
Test for overall effect	: Z = 3.91 (P < 0.000	1)			Environ Investmentall Environ Investor
Test for overall effect Test for subgroup dif	t: Z = 3.91 (P < 0.000 ferences: Chi ² = 0.38	1) df =	1 (P = 0.	54), 1 ² = 0%	Favours [experimental] Favours [contro
Test for overall effect Test for subgroup dif	I: Z = 3.91 (P < 0.000 ferences: Chi ² = 0.38	1) , df =	1 (P = 0.	54), I ² = 0%	Favours [experimental] Favours [contro
Test for overall effect Test for subgroup dif	t: Z = 3.91 (P < 0.000 ferences: Chi ² = 0.38	1) . df =	1 (P = 0.	54), I² = 0% Mean Difference	Favours (experimental) Favours (contro Mean Difference
Test for overall effect Test for subgroup dif Study or Subgroup	t: Z = 3.91 (P < 0.000 ferences: Chi ² = 0.38 Mean Difference	1) . df = 	1 (P = 0. Weight	54), I ² = 0% Mean Difference IV, Random, 95% CI	Favours [experimental] Favours [contro Mean Difference IV, Random, 95% CI
Test for overall effect Test for subgroup dif Study or Subgroup 2.1.1 Normals	t: Z = 3.91 (P < 0.000 ferences: Chi ² = 0.38 Mean Difference	1) . df = SE	1 (P = 0. Weight	54), I ² = 0% Mean Difference IV, Random, 95% Cl	Favours [experimental] Favours [contro Mean Difference IV, Random, 95% Cl
Test for overall effect Test for subgroup dif Study or Subgroup 2.1.1 Normals Duvivier 2013	: Z = 3.91 (P < 0.000 ferences: Chi ² = 0.38 Mean Difference -13.3	1) . df = SE 9.2	1 (P = 0. Weight 7.3%	54), I ² = 0% Mean Difference IV, Random, 95% Cl -13.30 [-31.33, 4.73]	Favours [experimental] Favours [contro Mean Difference IV, Random, 95% Cl
Test for overall effect Test for subgroup dif Study or Subgroup 2.1.1 Normals Duvivier 2013 McCarthy 2017	: Z = 3.91 (P < 0.000 ferences: Chi ² = 0.38 Mean Difference -13.3 -35.3	1) , df = <u>SE</u> 9.2 3.3	1 (P = 0. Weight 7.3% 13.6%	54), I ² = 0% Mean Difference IV, Random, 95% CI -13.30 [-31.33, 4.73] -35.30 [-41.77, -28.83]	Favours [experimenta] Favours [contro Mean Difference IV, Random, 95% Cl
Test for overall effect Test for subgroup dif Study or Subgroup 2.1.1 Normals Duvivier 2013 McCarthy 2017 Pulsford 2017	: Z = 3.91 (P < 0.000 ferences: Chi ² = 0.38 <u>Mean Difference</u> -13.3 -35.3 -21	1) . df = <u>SE</u> 9.2 3.3 3.4	1 (P = 0. Weight 7.3% 13.6% 13.5%	54), i ² = 0% Mean Difference IV, Random, 95% CI -13.30 [-31.33, 4.73] -35.30 [-41.77, -28.83] -21.00 [-27.66, -14.34]	Favours [experimental] Favours [contro Mean Difference IV, Random, 95% Cl
Test for overall effect Test for subgroup dif Study or Subgroup 2.1.1 Normals Duvivier 2013 McCarthy 2017 Pulsford 2017 Subtotal (95% CI)	: Z = 3.91 (P < 0.000 ferences: Chi ² = 0.38 <u>Mean Difference</u> -13.3 -35.3 -21	9.2 3.3 3.4	1 (P = 0. Weight 7.3% 13.6% 13.5% 34.4%	54), I ² = 0% Mean Difference IV, Random, 95% CI -13.30 [-31.33, 4.73] -35.30 [-41.77, -28.83] -21.00 [-27.66, -14.34] -24.82 [-37.15, -12.49]	Favours [experimental] Favours [contro Mean Difference IV, Random, 95% Cl
Test for overall effect Test for subgroup dif Study or Subgroup 2.1.1 Normals Duvivier 2013 McCarthy 2017 Pulsford 2017 Subtotal (95% Cl) Heterogeneity: Tau ² =	E Z = 3.91 (P < 0.000 ferences: Chi ² = 0.38 <u>Mean Difference</u> -13.3 -35.3 -21 = 91.03; Chi ² = 11.62	1) df = <u>SE</u> 9.2 3.3 3.4 , df =	1 (P = 0. Weight 7.3% 13.6% 13.5% 34.4% 2 (P = 0.0	54), I ² = 0% Mean Difference IV, Random, 95% CI -13.30 [-31.33, 4.73] -35.30 [-41.77, -28.83] -21.00 [-27.66, -14.34] -24.82 [-37.15, -12.49] 303); I ² = 83%	Favours [experimental] Favours [contro Mean Difference IV, Random, 95% Cl
Test for overall effect Test for subgroup dif Study or Subgroup 2.1.1 Normals Duvivier 2013 McCarthy 2017 Pulsford 2017 Subtotal (05% CI) Heterogeneity: Tau ² = Test for overall effect	t: Z = 3.91 (P < 0.000 ferences: Chi ² = 0.38 <u>Mean Difference</u> -13.3 -35.3 -21 = 91.03; Chi ² = 11.62 : Z = 3.94 (P < 0.000	1) , df = 9.2 3.3 3.4 , df = 1)	1 (P = 0. Weight 7.3% 13.6% 13.5% 34.4% 2 (P = 0.0	54), l ² = 0% Mean Difference IV, Random, 95% CI -13.30 [-31.33, 4.73] -35.30 [-41.77, -28.83] -21.00 [-27.66, -14.34] -24.82 [-37.15, -12.49] 003); l ² = 83%	Favours [experimental] Favours [contro Mean Difference IV, Random, 95% Cl
Test for overall effect Test for subgroup 2.1.1 Normals Duvivier 2013 McCarthy 2017 Pulsford 2017 Subtotal (95% CI) Heterogeneity: Tau ² = Test for overall effect 2.1.2 Impaired	: Z = 3.91 (P < 0.000 ferences: Chi ² = 0.38 <u>Mean Difference</u> -13.3 -35.3 -21 = 91.03; Chi ² = 11.62 : Z = 3.94 (P < 0.000	1) , df = 9.2 3.3 3.4 , df = 1)	1 (P = 0. Weight 7.3% 13.6% 13.5% 34.4% 2 (P = 0.0	54), I ² = 0% Mean Difference IV, Random, 95% CI -13.30 [-31.33, 4.73] -35.30 [-41.77, -28.83] -21.00 [-27.66, -14.34] -24.82 [-37.15, -12.49] 003); I ² = 83%	Favours [experimental] Favours [contro Mean Difference IV, Random, 95% Cl
Test for overall effect Test for subgroup 2.1.1 Normals Duvivier 2013 McCarthy 2017 Pulsford 2017 Subtotal (85% CI) Heterogeneity: Tau ² Fiest for overall effect 2.1.2 Impaired Dempsey 2016	Z = 3.91 (P < 0.000 ferences: Chi ² = 0.38 	1) . df = 9.2 3.3 3.4 . df = 1) 6.1	1 (P = 0.) Weight 7.3% 13.6% 34.4% 2 (P = 0.0 10.4%	54), I ² = 0% Mean Difference IV, Random, 95% CI -13.30 [-31.33, 4,73] -25.30 [-41.77, 28.83] -21.00 [-27.66, -14.34] -24.82 [-37.15, -12.49] 1003]; I ² = 83% -36.10 [-48.06, -24.14]	Favours [experimental] Favours [contro Mean Difference IV, Random, 95% Cl
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Risk/hazard ratio (log scale)

Breaks in Sedentary Time

Beneficial associations with metabolic risk





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The Joint Associations of Sedentary Time and Physical -Activity With Mobility Disability in Older People: The NIH-AARP Diet and Health Study

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How much is too much?

European Journal of Epidemiology https://doi.org/10.1007/s10654-018-0380-1

META-ANALYSIS



Sedentary behaviour and risk of all-cause, cardiovascular and cancer mortality, and incident type 2 diabetes: a systematic review and dose response meta-analysis

Richard Patterson¹ : Eoin McNamara² · Marko Tainio² · Thiago Hérick de Sá³ · Andrea D. Smith⁴ · Stephen J. Sharp² · Phil Edwards⁵ · James Woodcock² · Søren Brage² · Katrien Wijndaele²





How much is too much?

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META-ANALYSIS



Sedentary behaviour and risk of all-cause, cardiovascular and cancer mortality, and incident type 2 diabetes: a systematic review and dose response meta-analysis



Bacrania et al.2017







Does exercise make a difference?



Does physical activity attenuate, or even eliminate, the detrimental association of sitting time with mortality?
A harmonised meta-analysis of data from more than
1 million men and women

Ulf Ekelund, Jostein Steene-Johannessen, Wendy J Brown, Morten Wang Fagerland, Neville Owen, Kenneth E Powell, Adrian Bauman, I-Min Lee, for the Lancet Physical Activity Series 2 Executive Committe* and the Lancet Sedentary Behaviour Working Group*



What do we need to know as practitioners?

- We need to inform the public about the toxic effects of sedentary behaviours especially when they are combined with lack of exercise and inactivity;
- At least: 5' break every 60' of sedentary behaviour;
- Creating opportunities for more active endeavours and reducing TV viewing can be an important step forward;
- Frequent brakes and increased fitness levels can have an important impact for improving health at all ages!

