Sporten met je hart

Is 7216 stappen per dag genoeg en is excessief sporten slecht?



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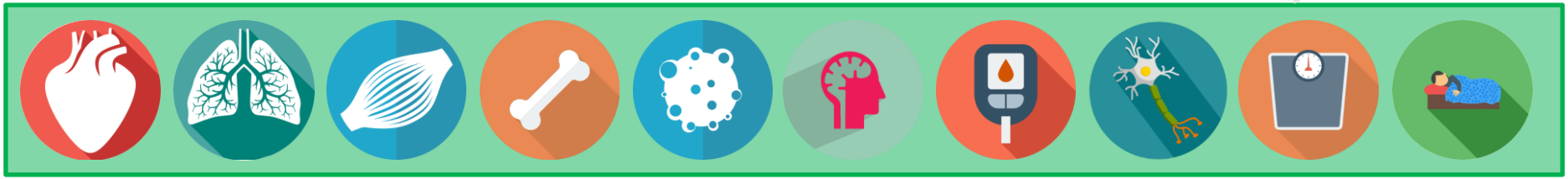
Disclosures

Voor presentatie mogelijk relevante relaties	
Sponsoring of onderzoeksgeld:	Geen
Honorarium of andere (financiële) vergoeding:	Geen
Aandeelhouder:	Geen
Andere relatie, namelijk …	Geen

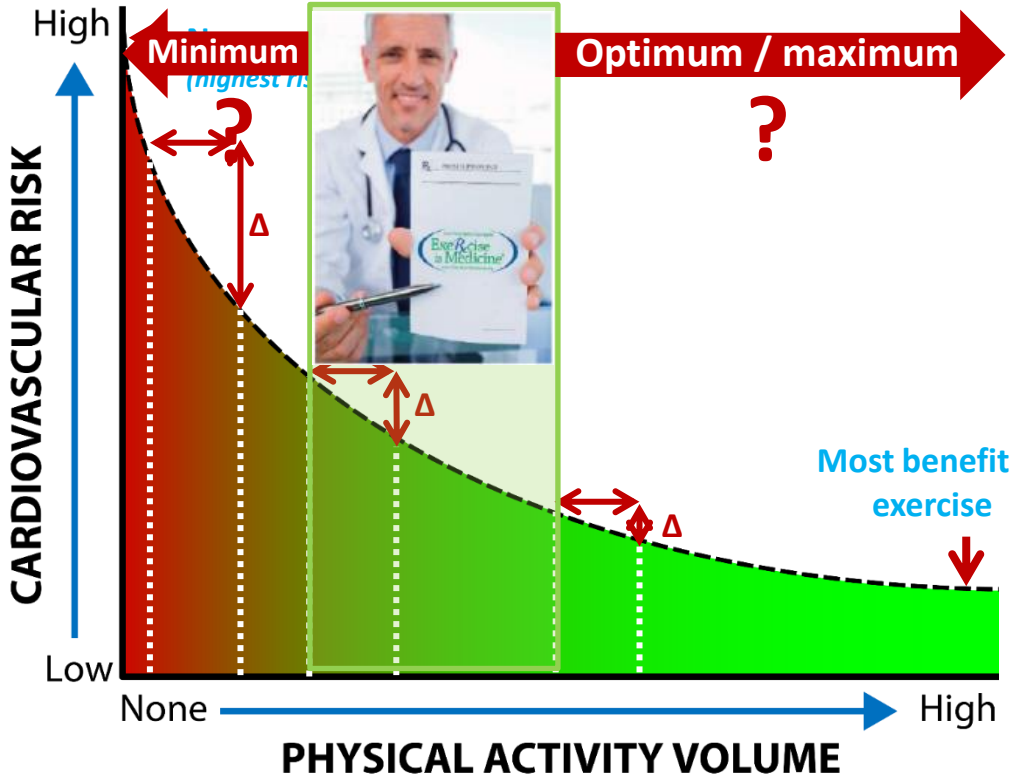
Beweging als medicijn

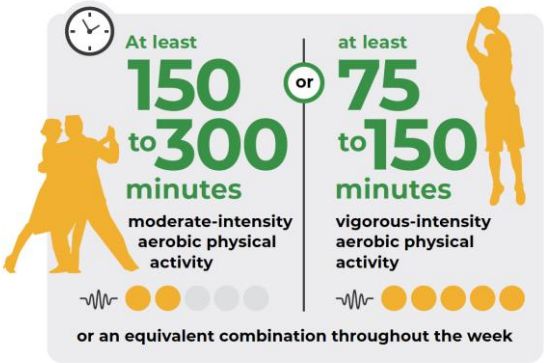


Gezondheidsvoordelen:



De dosis-respons curve



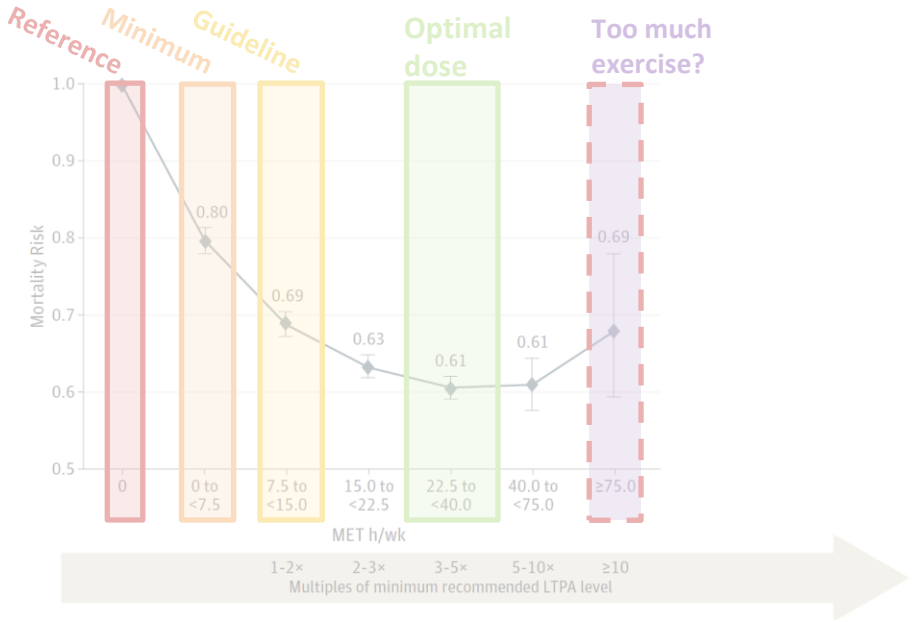


Eijsvogels, JACC 2016

Epidemiologische inzichten

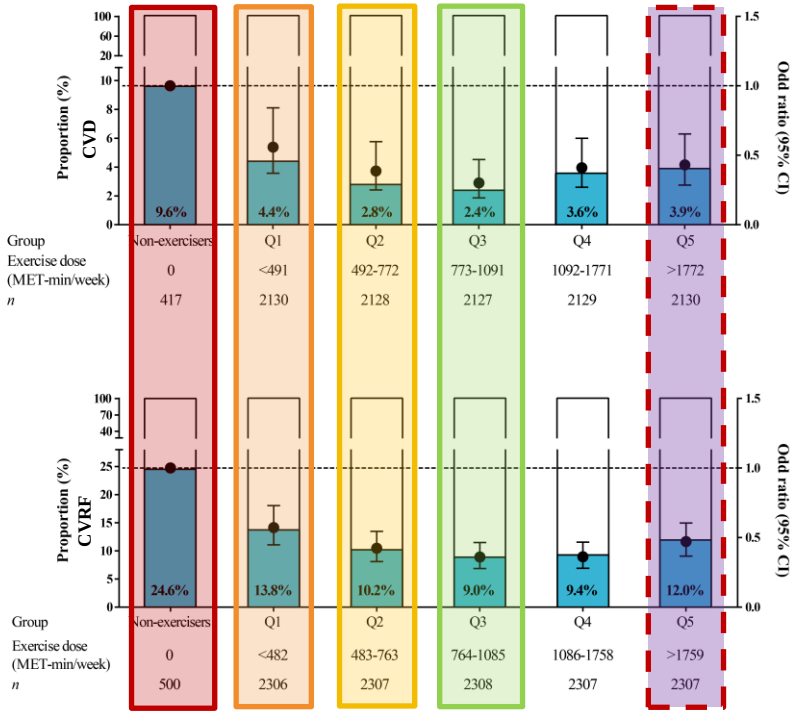
n=661,137

14 years follow-up



n=21,266

32 years follow-up



Arem, JAMA IM 2015 | Maessen, MCP 2015

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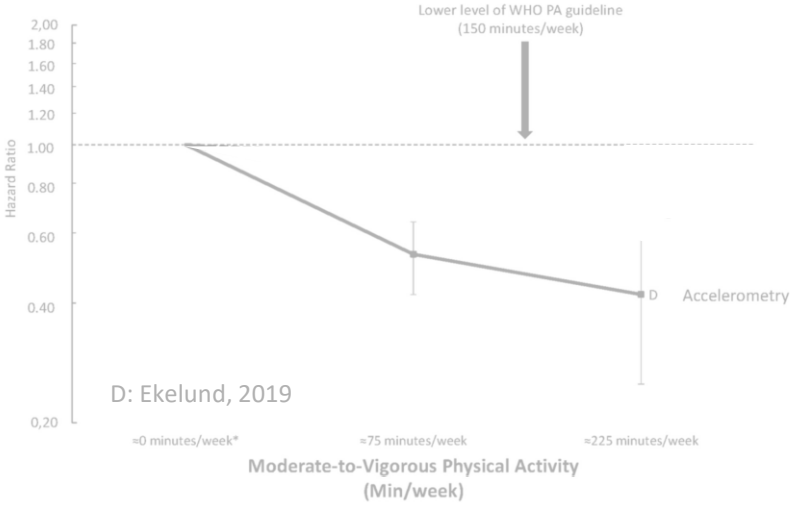
Van vragenlijsten naar wearables

↓ Meetfount (i.v.m. overrapportage)
↑ Informatie over intensiteit, frequency and duur
\+ Meten van (on)gestructureerde fysieke (in)activiteit





Stap karakteristieken

- ✓ Eenvoudig te begrijpen
- ✓ Eenvoudig te meten
- ✓ Eenvoudig voor te schrijven

Ekelund, BJSM 2020

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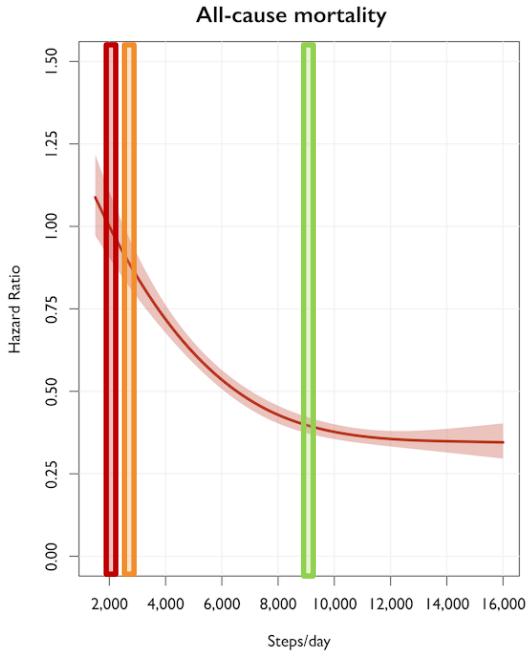
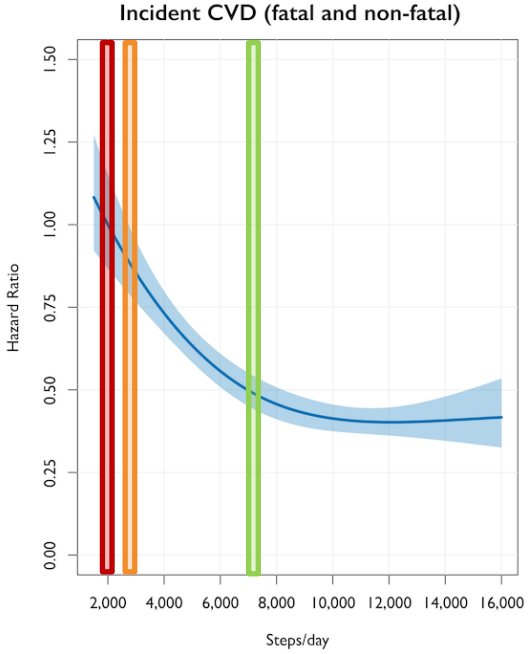
Stappen en gezondheidsuitkomsten

12 cohorts

N = 111,309

6.8 years follow-up





	Steps/day	Hazard ratio (95% CI)
Minimum dose	2,517	0.92 (0.84, 1.00)
Optimum dose	8,763	0.40 (0.38, 0.43)
Risk reduction at 16,000 steps	16,000	0.35 (0.30, 0.40)

	Steps/day	Hazard ratio (95% CI)
Minimum dose	2,735	0.89 (0.79, 1.00)
Optimum dose	7,126	0.49 (0.45, 0.55)
Risk reduction at 16,000 steps	16,000	0.42 (0.33, 0.53)

Stens, JACC 2023

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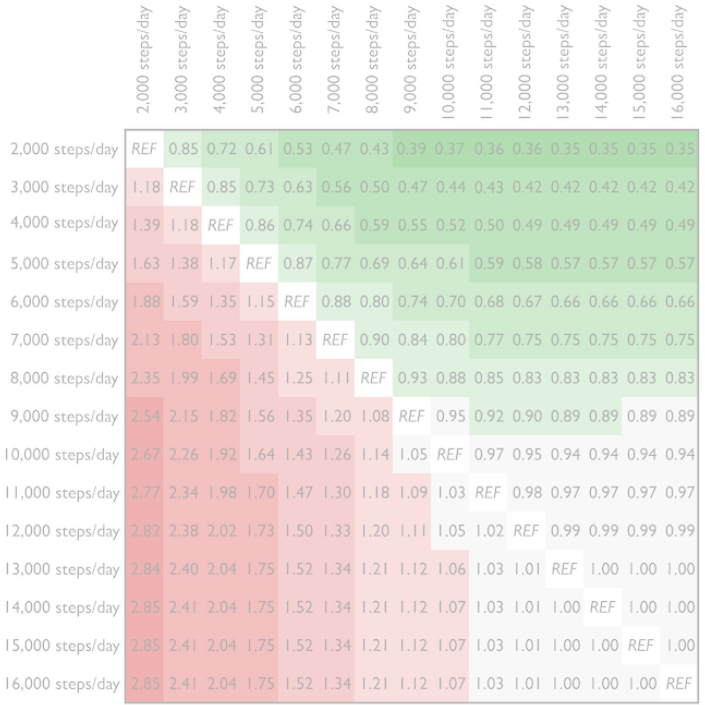
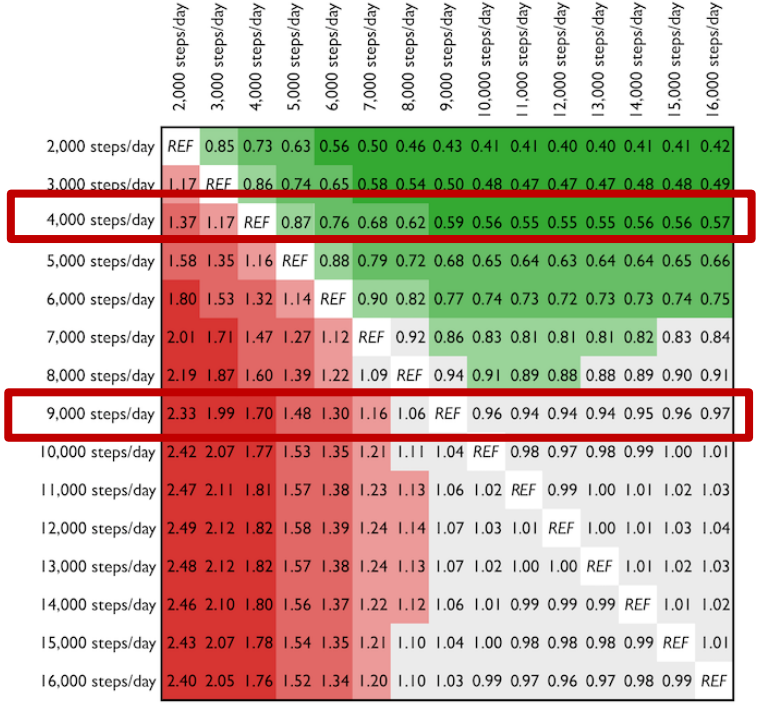
Stappen en gezondheidsuitkomsten

All-cause mortality



	2,000 steps/day	3,000 steps/day	4,000 steps/day	5,000 steps/day	6,000 steps/day	7,000 steps/day	8,000 steps/day	9,000 steps/day	10,000 steps/day	11,000 steps/day	12,000 steps/day	13,000 steps/day	14,000 steps/day	15,000 steps/day	16,000 steps/day
2,000 steps/day	REF	0.85	0.72	0.61	0.53	0.47	0.43	0.39	0.37	0.36	0.36	0.35	0.35	0.35	0.35
3,000 steps/day	1.18	REF	0.85	0.73	0.63	0.56	0.50	0.47	0.44	0.43	0.42	0.42	0.42	0.42	0.42
4,000 steps/day	1.39	1.18	REF	0.86	0.74	0.66	0.59	0.55	0.52	0.50	0.49	0.49	0.49	0.49	0.49
5,000 steps/day	1.63	1.38	1.17	REF	0.87	0.77	0.69	0.64	0.61	0.59	0.58	0.57	0.57	0.57	0.57
6,000 steps/day	1.88	1.59	1.35	1.15	REF	0.88	0.80	0.74	0.70	0.68	0.67	0.66	0.66	0.66	0.66
7,000 steps/day	2.13	1.80	1.53	1.31	1.13	REF	0.90	0.84	0.80	0.77	0.75	0.75	0.75	0.75	0.75
8,000 steps/day	2.35	1.99	1.69	1.45	1.25	1.11	REF	0.93	0.88	0.85	0.83	0.83	0.83	0.83	0.83
9,000 steps/day	2.54	2.15	1.82	1.56	1.35	1.20	1.08	REF	0.95	0.92	0.90	0.89	0.89	0.89	0.89
10,000 steps/day	2.67	2.26	1.92	1.64	1.43	1.26	1.14	1.05	REF	0.97	0.95	0.94	0.94	0.94	0.94
11,000 steps/day	2.77	2.34	1.98	1.70	1.47	1.30	1.18	1.09	1.03	REF	0.98	0.97	0.97	0.97	0.97
12,000 steps/day	2.82	2.38	2.02	1.73	1.50	1.33	1.20	1.11	1.05	1.02	REF	0.99	0.99	0.99	0.99
13,000 steps/day	2.84	2.40	2.04	1.75	1.52	1.34	1.21	1.12	1.06	1.03	1.01	REF	1.00	1.00	1.00
14,000 steps/day	2.85	2.41	2.04	1.75	1.52	1.34	1.21	1.12	1.07	1.03	1.01	1.00	REF	1.00	1.00
15,000 steps/day	2.85	2.41	2.04	1.75	1.52	1.34	1.21	1.12	1.07	1.03	1.01	1.00	1.00	REF	1.00
16,000 steps/day	2.85	2.41	2.04	1.75	1.52	1.34	1.21	1.12	1.07	1.03	1.01	1.00	1.00	1.00	REF

Incident CVD (fatal and non-fatal)



	2,000 steps/day	3,000 steps/day	4,000 steps/day	5,000 steps/day	6,000 steps/day	7,000 steps/day	8,000 steps/day	9,000 steps/day	10,000 steps/day	11,000 steps/day	12,000 steps/day	13,000 steps/day	14,000 steps/day	15,000 steps/day	16,000 steps/day
2,000 steps/day	REF	0.85	0.73	0.63	0.56	0.50	0.46	0.43	0.41	0.41	0.40	0.40	0.41	0.41	0.42
3,000 steps/day	1.17	REF	0.86	0.74	0.65	0.58	0.54	0.50	0.48	0.47	0.47	0.47	0.48	0.48	0.49
4,000 steps/day	1.37	1.17	REF	0.87	0.76	0.68	0.62	0.59	0.56	0.55	0.55	0.55	0.56	0.56	0.57
5,000 steps/day	1.58	1.35	1.16	REF	0.88	0.79	0.72	0.68	0.65	0.64	0.63	0.64	0.64	0.65	0.66
6,000 steps/day	1.80	1.53	1.32	1.14	REF	0.90	0.82	0.77	0.74	0.73	0.72	0.73	0.73	0.74	0.75
7,000 steps/day	2.01	1.71	1.47	1.27	1.12	REF	0.92	0.86	0.83	0.81	0.81	0.81	0.82	0.83	0.84
8,000 steps/day	2.19	1.87	1.60	1.39	1.22	1.09	REF	0.94	0.91	0.89	0.88	0.88	0.89	0.90	0.91
9,000 steps/day	2.33	1.99	1.70	1.48	1.30	1.16	1.06	REF	0.96	0.94	0.94	0.94	0.95	0.96	0.97
10,000 steps/day	2.42	2.07	1.77	1.53	1.35	1.21	1.11	1.04	REF	0.98	0.97	0.98	0.99	1.00	1.01
11,000 steps/day	2.47	2.11	1.81	1.57	1.38	1.23	1.13	1.06	1.02	REF	0.99	1.00	1.01	1.02	1.03
12,000 steps/day	2.49	2.12	1.82	1.58	1.39	1.24	1.14	1.07	1.03	1.01	REF	1.00	1.01	1.03	1.04
13,000 steps/day	2.48	2.12	1.82	1.57	1.38	1.24	1.13	1.07	1.02	1.00	1.00	REF	1.01	1.02	1.03
14,000 steps/day	2.46	2.10	1.80	1.56	1.37	1.22	1.12	1.06	1.01	0.99	0.99	0.99	REF	1.01	1.02
15,000 steps/day	2.43	2.07	1.78	1.54	1.35	1.21	1.10	1.04	1.00	0.98	0.98	0.98	0.99	REF	1.01
16,000 steps/day	2.40	2.05	1.76	1.52	1.34	1.20	1.10	1.03	0.99	0.97	0.96	0.97	0.98	0.99	REF

Stens, JACC 2023

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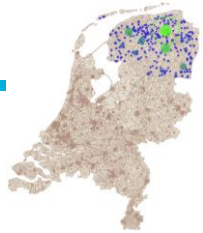
De invloed van hart- en vaatgezondheid



lifelines

n=142,493

6.8 years follow-up

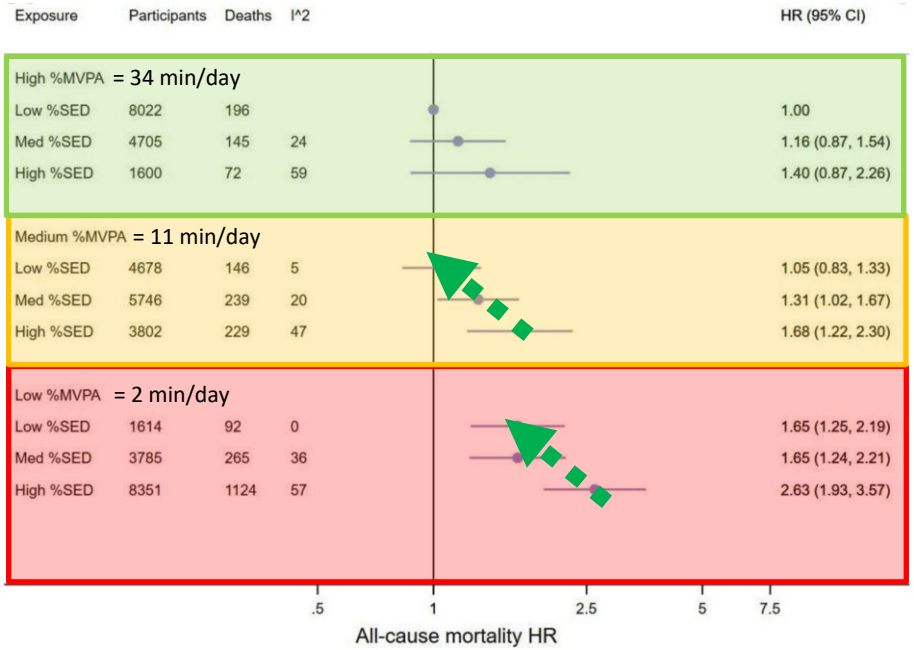
Healthy	Cardiovascular risk factors	Cardiovascular disease

De gezondheidsvoordelen van bewegen zijn afhankelijk van de cardiovasculaire gezondheidsstatus.

Minder zitten of meer bewegen?

n=44,370

6 years follow-up



Low = 8.5 hrs/day
Med = 9.5 hrs/day
High = 10.7 hrs/day

Low = 8.5 hrs/day
Med = 9.5 hrs/day
High = 10.7 hrs/day

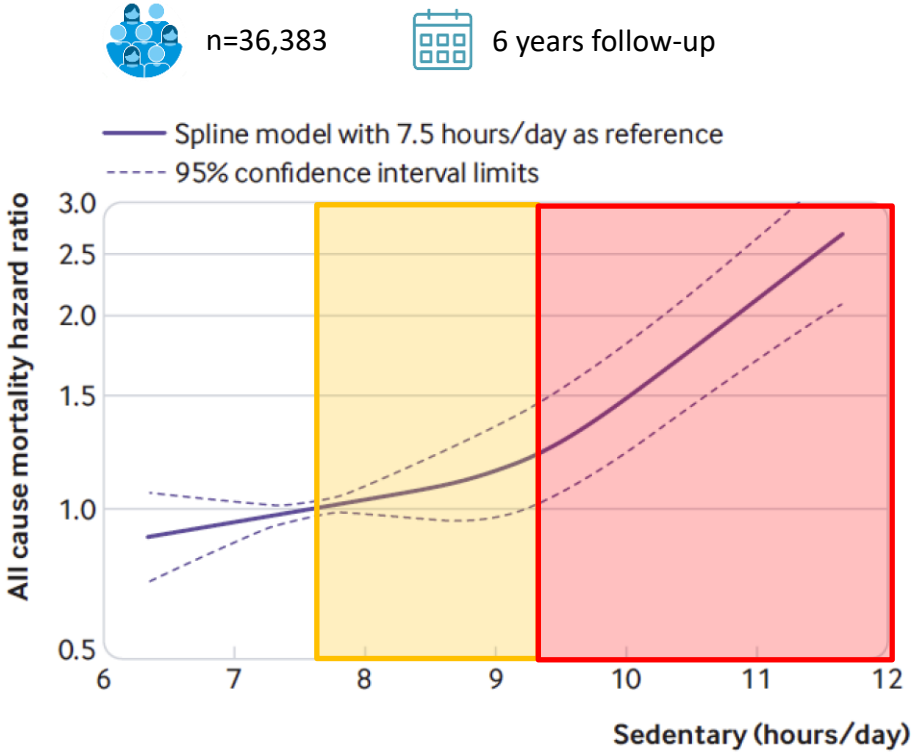
Ekelund, BMJ 2020

Radboudumc

Wat zijn zitgedrag adviezen?



'There is insufficient evidence to set quantified (time-based) recommendations on sedentary behaviours'

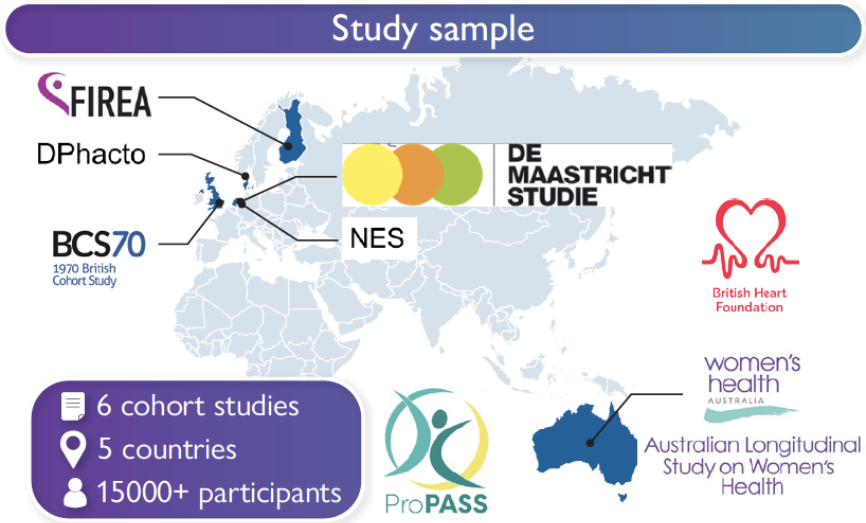


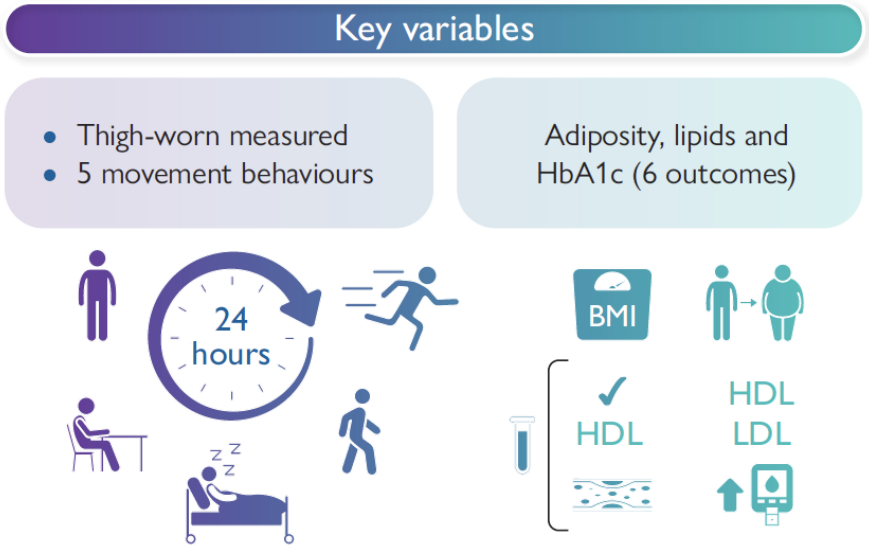
Increased risk at ± 9.5 hrs/day

Ekelund, BMJ 2019

Vervangen van zittijd voor fysieke activiteit

n=15,253

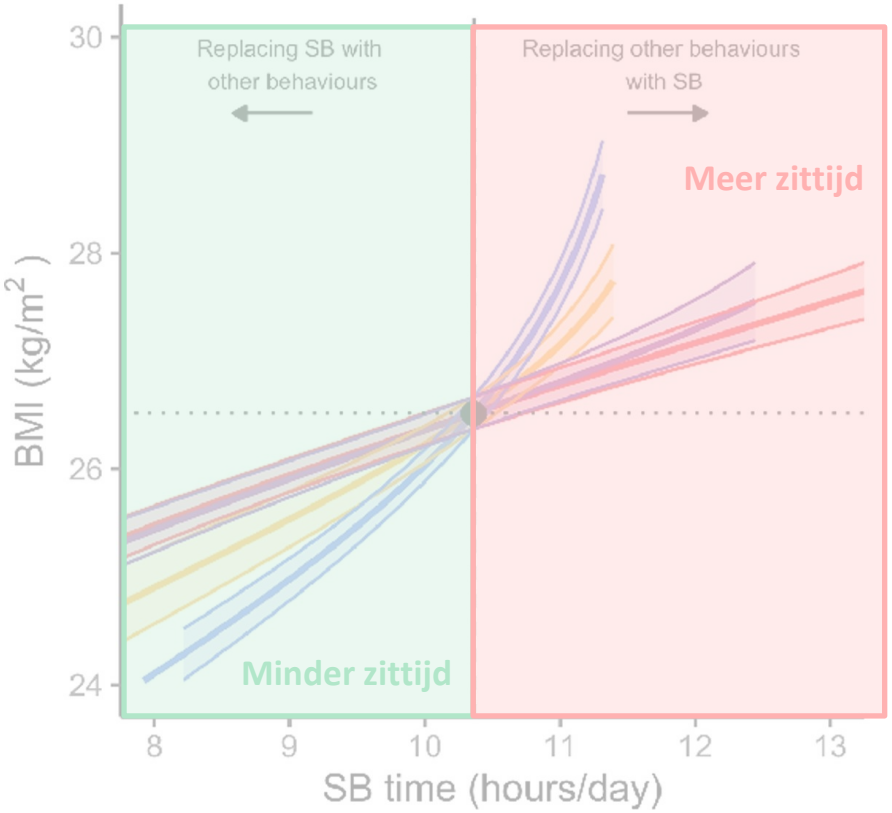




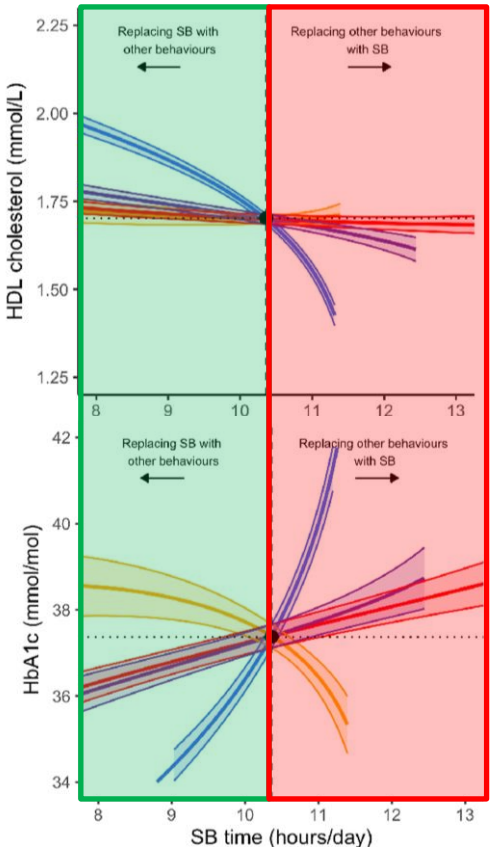
Blodget, EHJ 2023

Radboudumc

Vervangen van zittijd voor fysieke activiteit







Blodget, EHJ 2023

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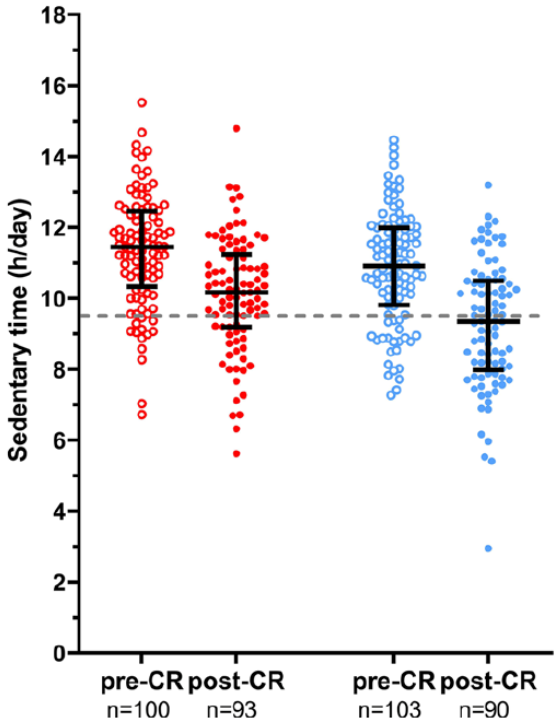
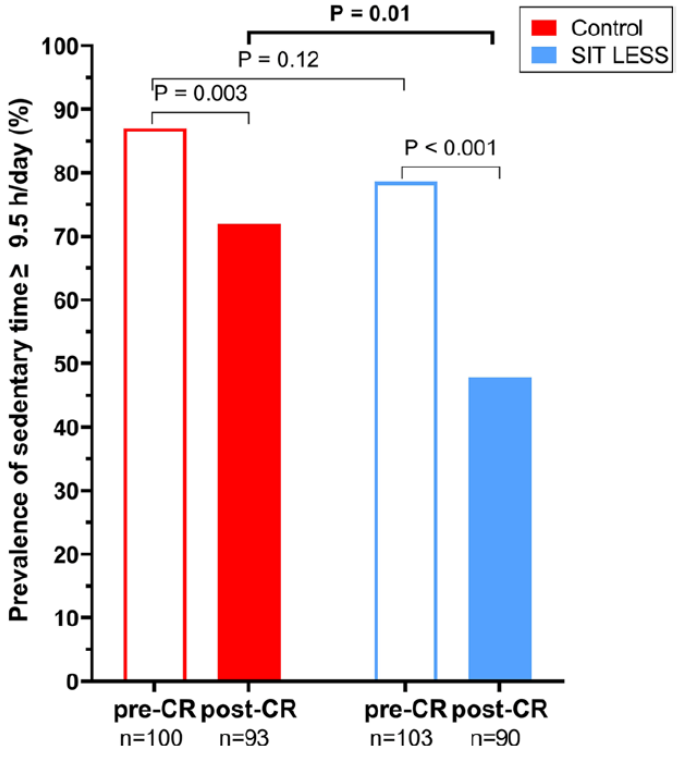
SIT LESS trial

212 CAD patients

Dutch hospitals

Cardiac rehab
vs
Cardiac rehab
+ SIT LESS





Te weinig of te veel beweging?





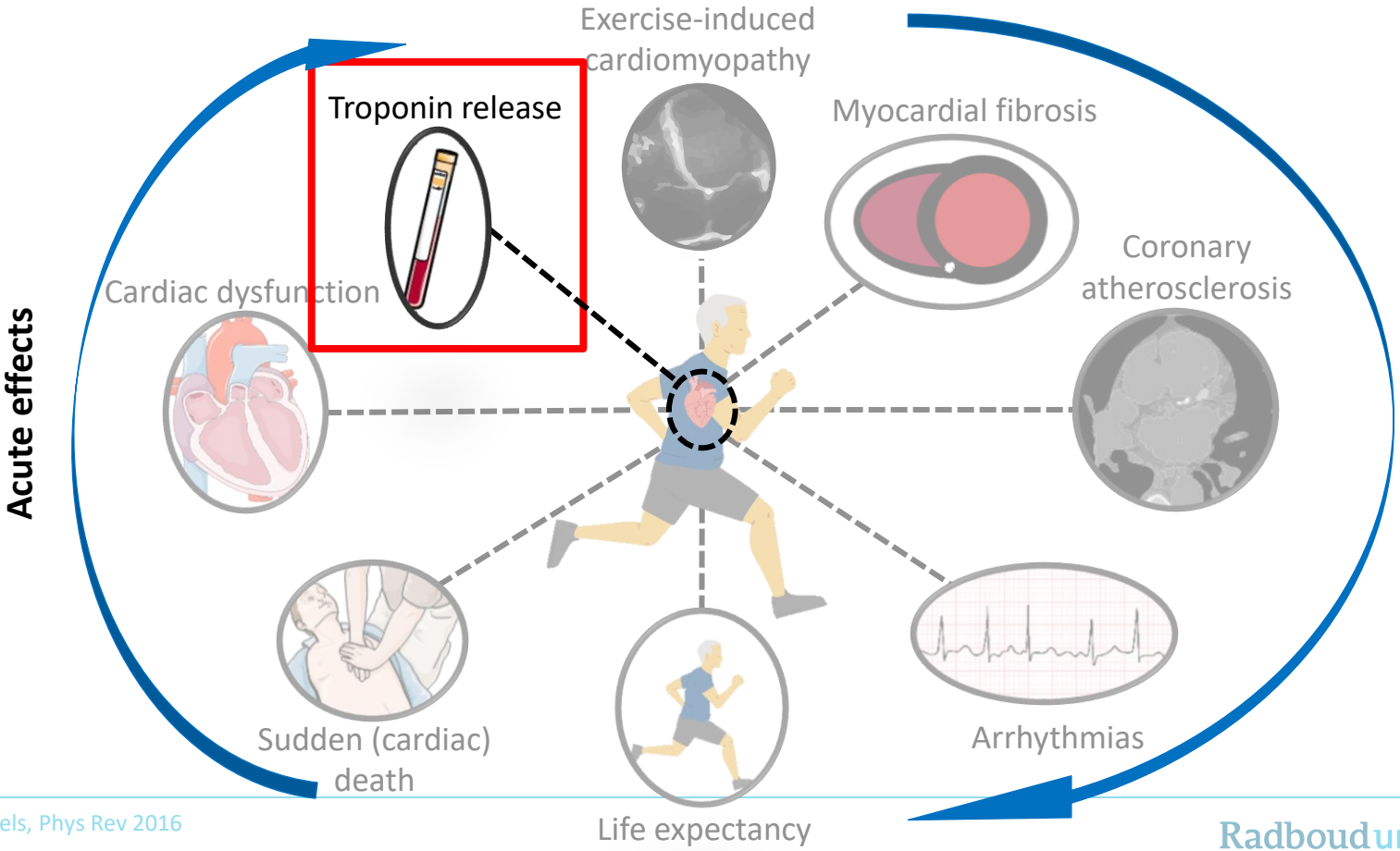




Extreme exercise hypothesis

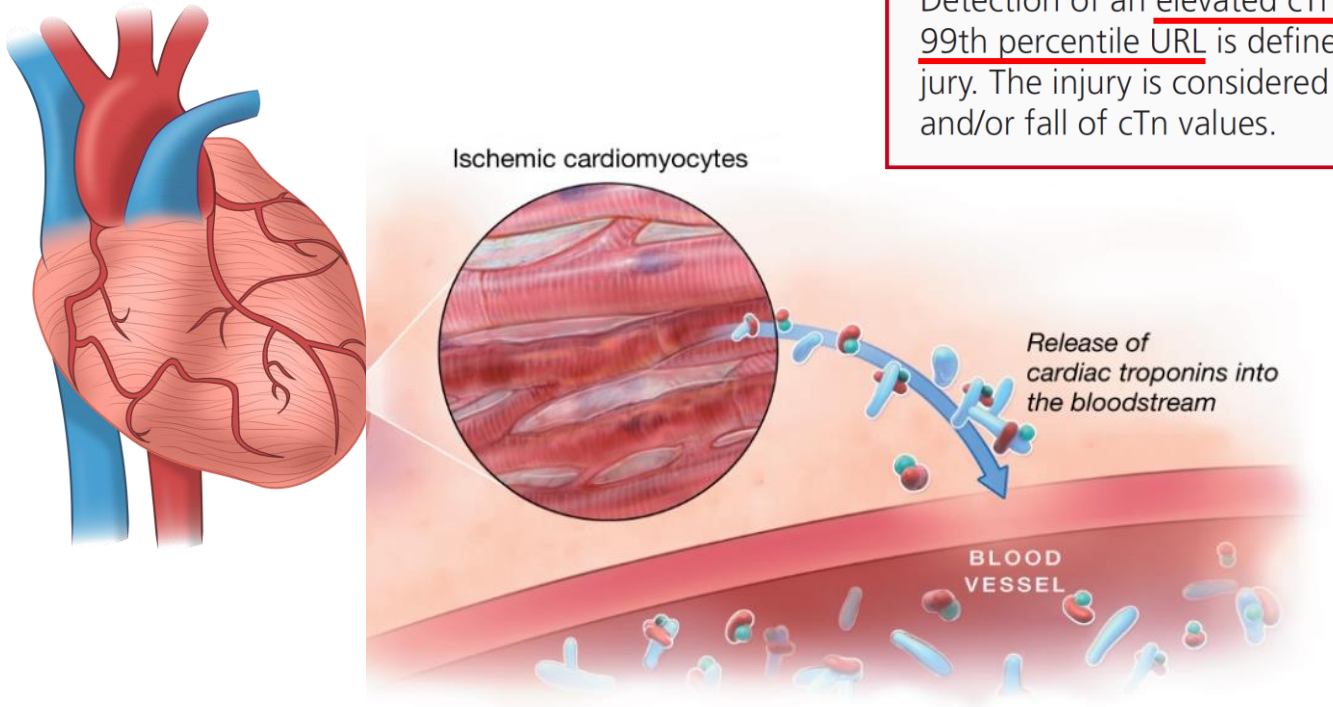
?

“Bijwerkingen” van excessief bewegen



Eijsvogels, Phys Rev 2016

Cardiaal troponine

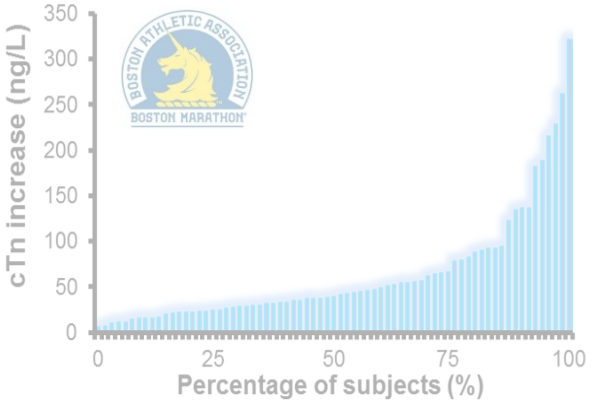


Criteria for Myocardial Injury

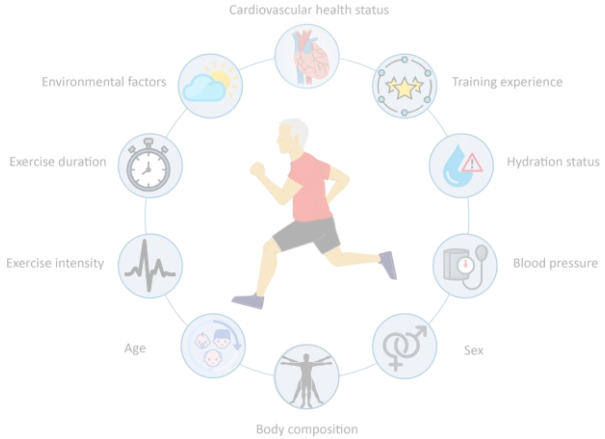
Detection of an elevated cTn value above the 99th percentile URL is defined as myocardial injury. The injury is considered acute if there is a rise and/or fall of cTn values.

Inspanning en troponine

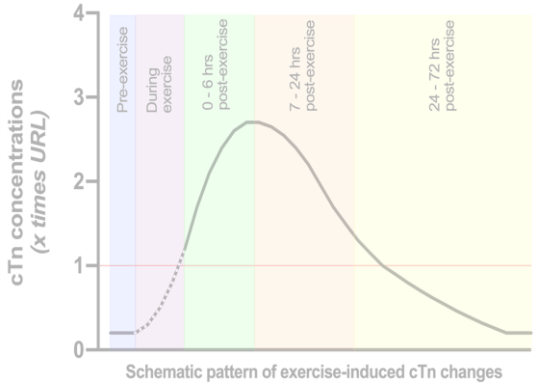
✔ Toename in iedereen



✔ Associatie met diverse factoren

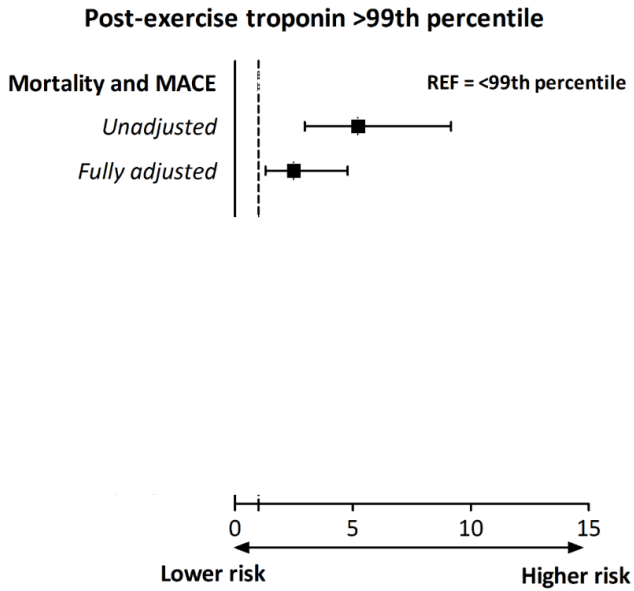


✔ Snelle normalisatie



✘ Geen fysieke of klinische klachten

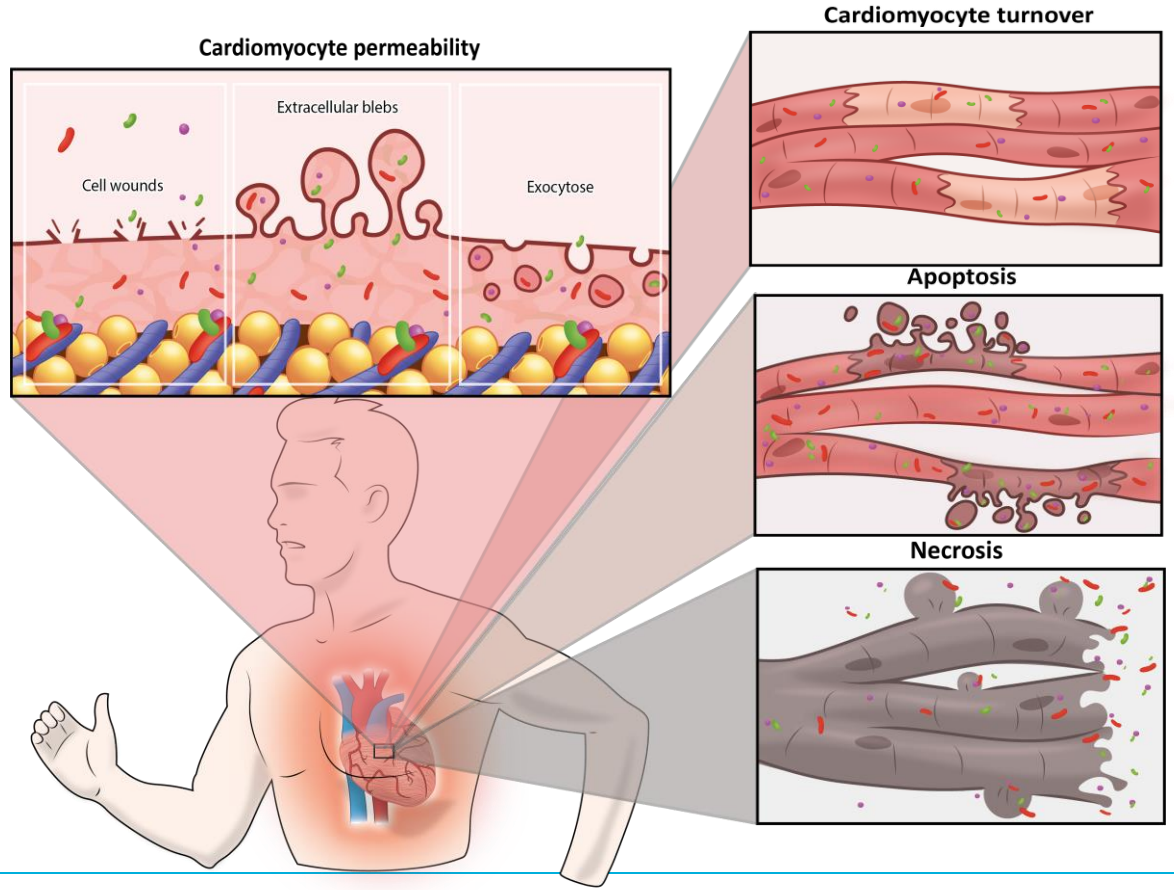
Inspanning en troponine



Aengevaeren, Circ 2019

Radboudumc

Onderliggende mechanismen

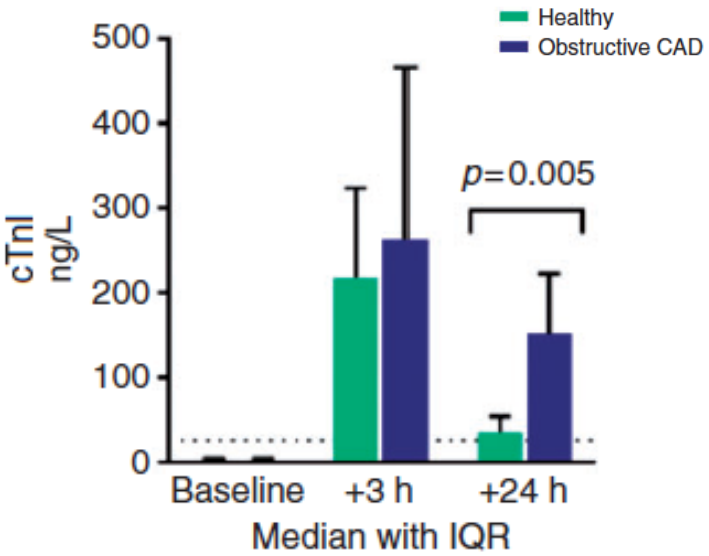


Een biomarker van sub-klinische ziekte?

Hart- en vaatziekten

Myocardiale fibrose

Coronaire atherosclerose



Aengevaeren, Circ 2019 | Mohlenkamp, BRC 2014 | Kleiven, EJPC 2020

TREAT studie

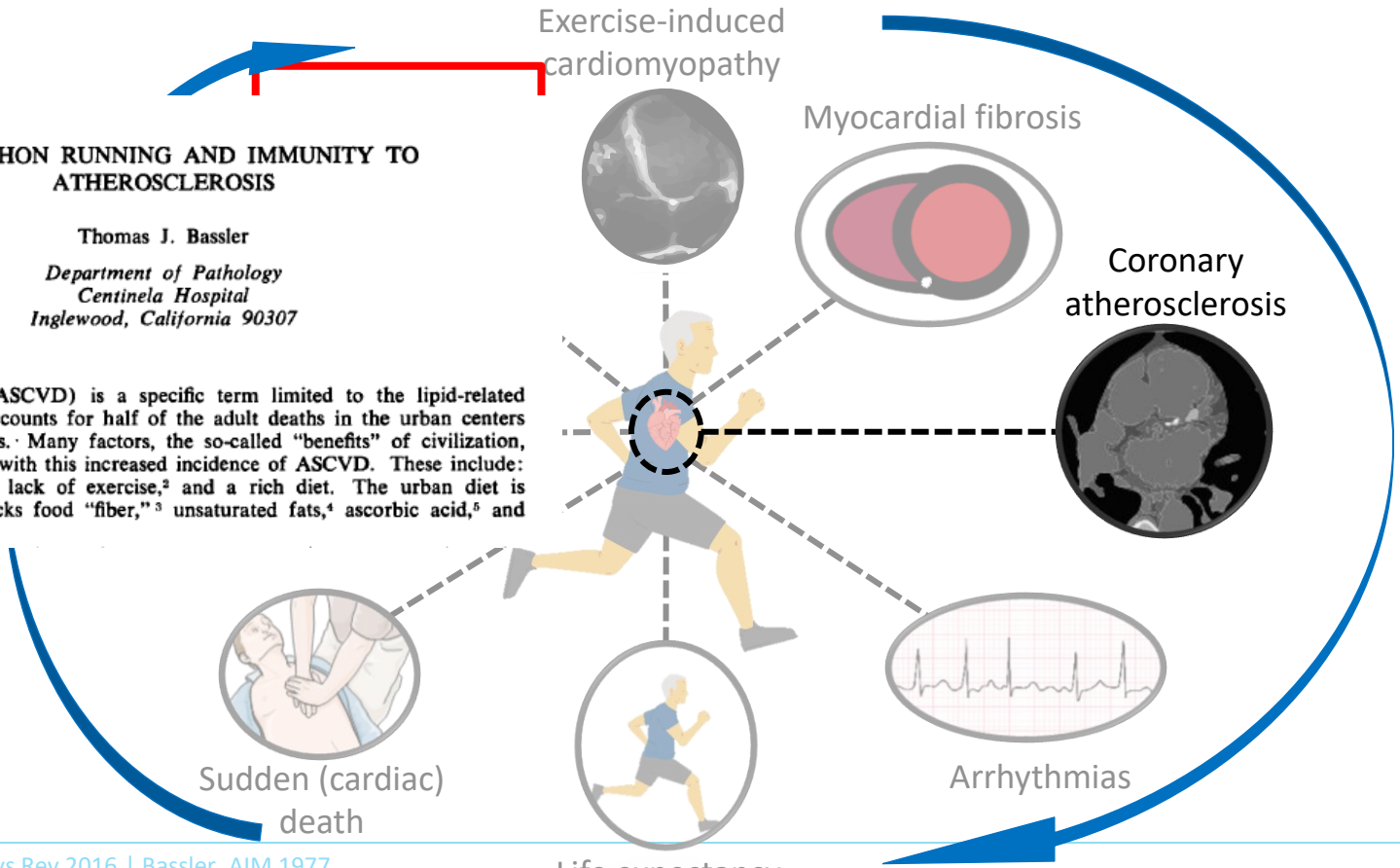
TRoponin concentrations following Exercise And Their clinical significance

1. Referentiewaarden opstellen

2. Vroegdetectie coronaire atherosclerose

3. Voorspellen van cardiovasculaire events

“Bijwerkingen” van excessief bewegen



MARATHON RUNNING AND IMMUNITY TO ATHEROSCLEROSIS

Thomas J. Bassler

Department of Pathology
Centinela Hospital
Inglewood, California 90307

Atherosclerosis (ASCVD) is a specific term limited to the lipid-related arterial lesion that accounts for half of the adult deaths in the urban centers of advanced countries. Many factors, the so-called “benefits” of civilization, have been associated with this increased incidence of ASCVD. These include: refined tobacco use,[1] lack of exercise,[2] and a rich diet. The urban diet is suspect because it lacks food “fiber,”[3] unsaturated fats,[4] ascorbic acid,[5] and tocopherols.[6]

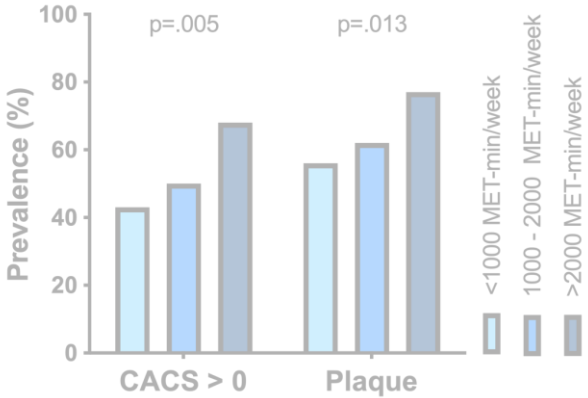
MARC: Inspanning & coronaire atherosclerose

n=318 ♂ sporters (≥45 jaar oud)

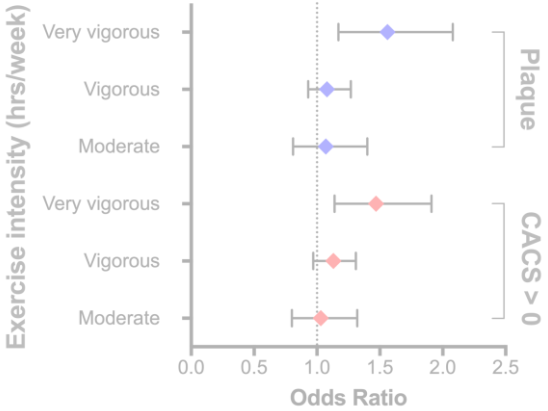
- Non-contrast CT (CAC scores)
- Coronary CT angiography (plaques)

Measuring Athlete's Risk of Cardiovascular events
MARC

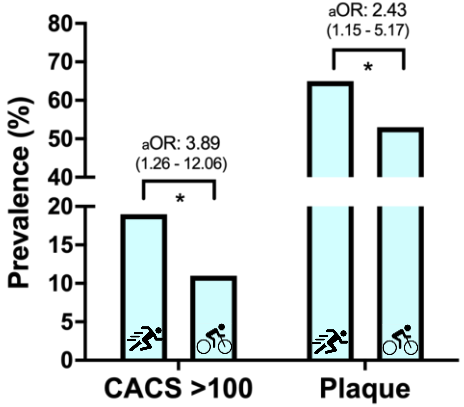
✓ Vaker atherosclerose in meest actieve sporters



✓ Associatie met sportintensiteit



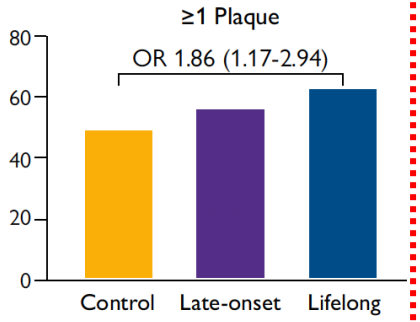
✓ Sporttype afhankelijk

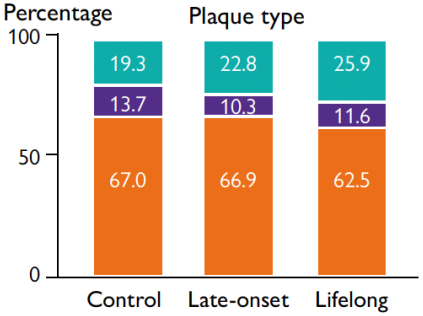


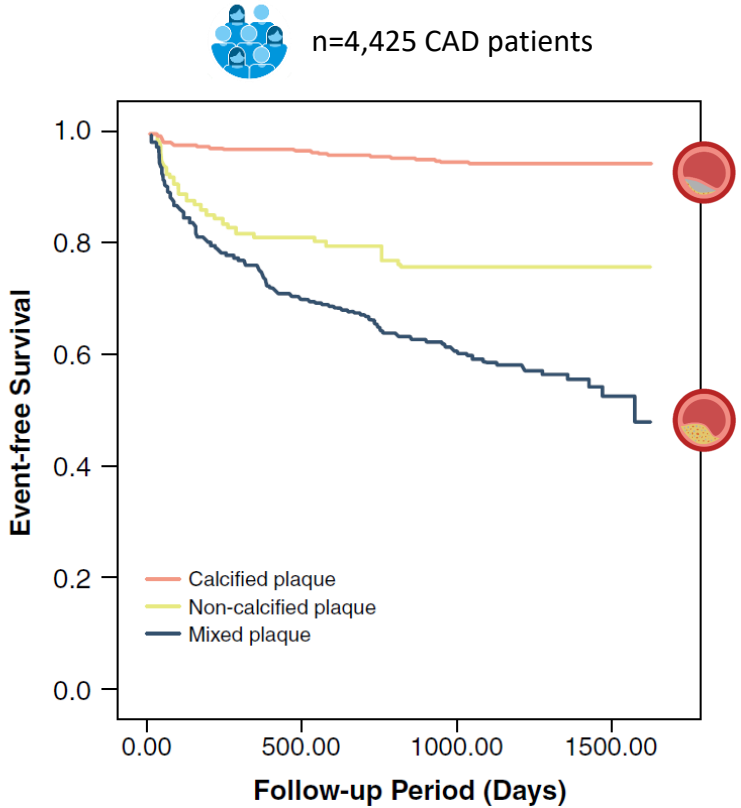
Plaque fenotype en klinische relevantie



Plaque burden and plaque composition by endurance exercise group



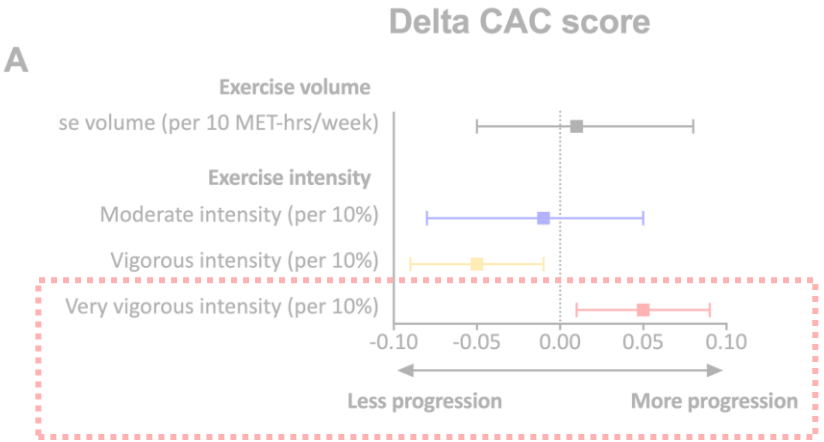




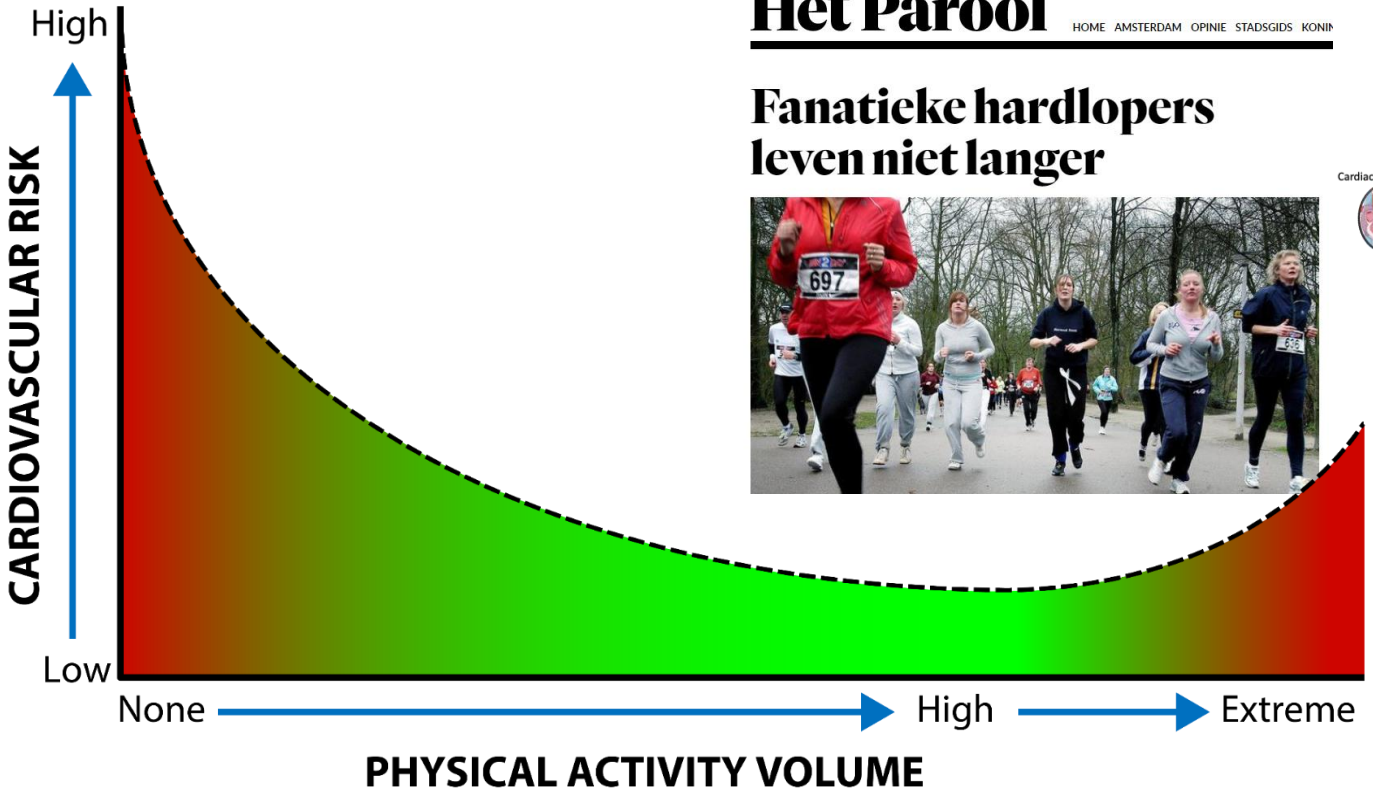
MARC-2: Progressie van atherosclerosis

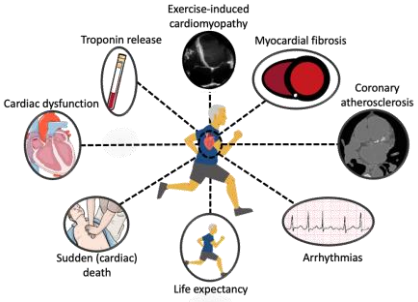


We weten het (nog) niet...



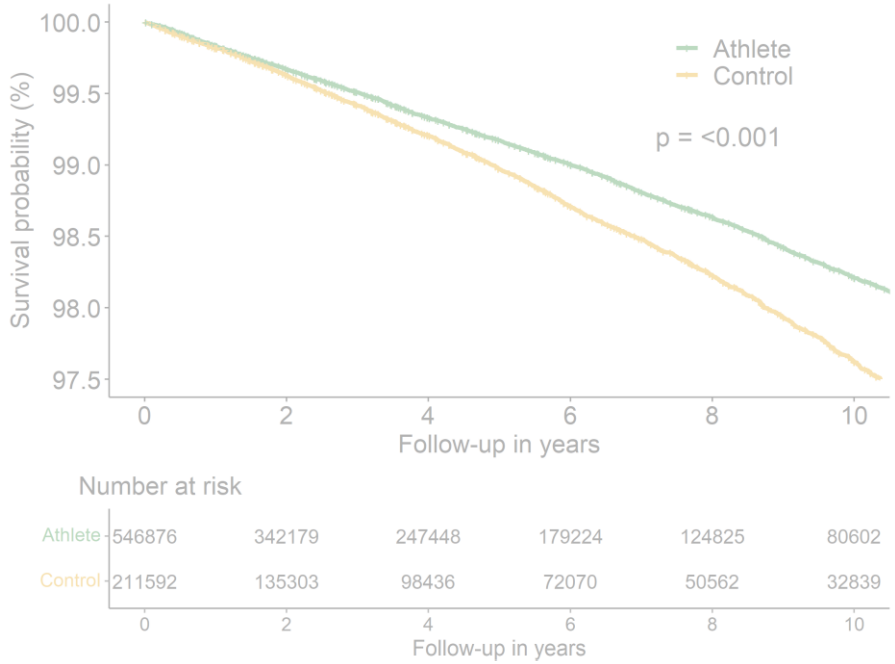
Moeten we ons zorgen maken?

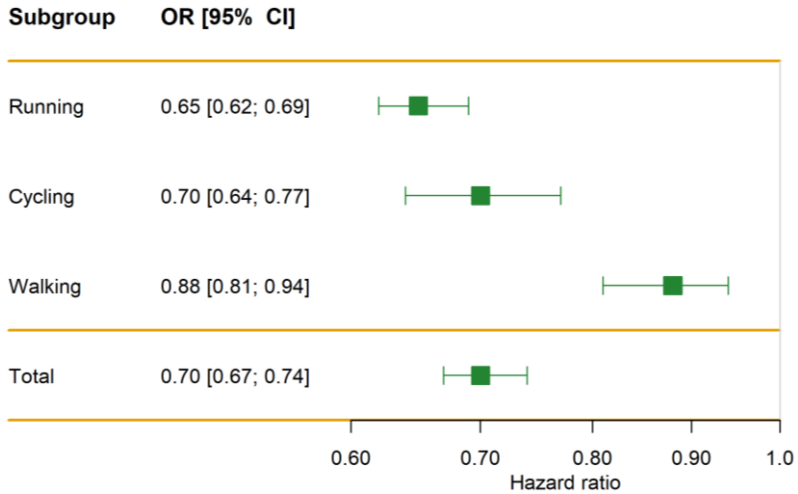




Sporters leven langer!

N=394,981 N=60,586 N=91,309 N=211,592 non-athletes





Bakker 2023, in revision

Radboudumc

Samenvattend:

1. Een beetje bewegen (~15 min/dag of ~3000 stappen/dag) en minder zitten verlaagt het risico op hart- en vaatziekten en vroegtijdige sterfte.

2. Meer bewegen zorgt voor meer gezondheidswinst, met optimale risico reducties bij 7100 stappen/dag voor hart- en vaatziekten en 8800 stappen voor vroegtijdige sterfte.

3. Acute en langdurige inspanning met een hoog volume en hoge intensiteit is geassocieerd met cardiale gezondheidsproblemen, zoals troponine stijging en coronaire atheroslerose.

4. Sporters hebben een betere levensverwachting dan niet-sporters.

Samenvattend:



De gevolgen van excessief sporten voor hart en bloedvaten



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