Science AMA Series: I'm Martin Gibala, a professor at McMaster University in Hamilton, Ontario. My new book, The One-Minute Workout, considers the new science of time-efficient exercise to promote health and fitness. AMA!

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Abstract

Hi Reddit! I'm Martin Gibala, PhD, professor and chair of the kinesiology department at McMaster University in Hamilton, Ontario. I conduct research on the physiological and health benefits of interval training and how this time-efficient exercise method compares to traditional endurance training. In my decades of study in this field, I've conducted extensive research on the science of ultralow-volume exercise and time-efficient workouts. Inspired by my own struggle to fit regular exercise into a busy schedule, I set out to find the most effective protocols that take up the smallest amount of time, while still offering the benefits of a traditional session at the gym. It became clear that short, intense bursts of exercise are the most potent form of workout available. One of my recent studies, published in PLOS One, found that sedentary people derived the benefits of 50 minutes of traditional continuous exercise with a 10-minute interval workout that involved just one minute of hard exercise. Study participants who trained three times per week for twelve weeks experience the same improvements in key markers of health and fitness, despite a five-fold lower exercise volume and time commitment in the interval group. My new book, The One-Minute Workout, distills complex science into practical tips and strategies that people can incorporate in their everyday lives. It includes twelve interval workouts, all based on scientific studies, that can be applied to a wide range of individuals and starting fitness levels. From elderly and deconditioned people who are just beginning an exercise regimen to athletes and weekend warriors, there is an interval training protocol that can boost health and performance in a time-efficient manner. Ask me anything about the science of exercise and in particular how to incorporate time-efficient training strategies into your day. Signing out for now! Thank you so much for having me and for all your great questions.

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REDDIT

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MARTIN_GIBALA R/SCIENCE

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Which commonly used workout have you found to be the most detrimental and/or useless?

Sequax1

We have not found detrimental or useless workouts. Any exercise is good! But when it comes to boosting cardiovascular fitness, I think a case can be made for higher intensity exercise eliciting superior benefits. See this work: https://www.ncbi.nlm.nih.gov/pubmed/26455890

Hello from U of T Prof. Gibala,

Have you studied the effect of high intensity interval training on cognitive function? There is ample evidence to suggest that long distance running improves hippocampal function and mitochondrial

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biogenesis - has the same been observed with HIIT?

Grannysmitty

We have not studied this directly but some colleagues at McMaster are interested in this specific issue. Generally less is know about the effects of interval-based exercise. This is an interesting review: https://www.ncbi.nlm.nih.gov/pubmed/25833341

Is it possible to get those short, intense bursts of hard exercise while maintaining zero impact or at least low impact on the joints?

drsjsmith

Yes. Many different types of traditional "cardio" exercises can be effective. So, swimming, cycling or rowing are examples of less-weight bearing activities.

What do you recommend students to do in 3 hour long lectures to get some movement in? During break I just try to walk around (sometimes I gotta go run and grab a coffee), but is there anything to do while you're actually sitting? You're awesome by the way, makes me glad to go to Mac when there's incredible stuff like this going on.

yomaster19

Thanks for the Mac shoutout. If you can at least get up from your seat periodically during lectures (or during the breaks), consider a quick set of air squats I do these periodically at my desk all the time!

Hello, when is the best time to do these short excercises and get the most health benefits, morning or evening? And if we can't do it at that time, do we have to do extra work to compensate? Thanks.

mistymountainz

In the big picture, the best time is what works for you. There's some evidence that exercising in the morning, especially after an overnight fast, can result is slightly greater energy expenditure from fat, but generally speaking the effects are subtle and it's more important to just get the exercise in!

With such a short exercise interval, the body doesn't have much time to switch from glycogen to triglycerides as an energy source. Can you explain if and (if it is possible) how someone can lose weight using your approach when triglyceride utilization would be relatively low?

ecophile

Fundamentally it does come down to energy balance. Work from our lab and others have shown that intervals can be a time-efficient approach to burn calories, e.g. https://www.ncbi.nlm.nih.gov/pubmed/24773393 Fuel use changes in recovery, so even though glycogen is a major energy source during the sprints, more energy is derived from fat in recovery.

Hello Dr. Gibala,

I was a participant in another Ontario university's study into high intensity, low volume interval workouts, and I found it very hard to keep up the workout regimen after the study was over, even

though I saw a big increase in my own personal fitness.

The part I found hard to maintain was having the motivation to give maximum effort without coaching. I do, however, wish to try that kind of excercise again.

Where do you, personally or professionally, find the motivation to do these kinds of workouts consistently on your own?

Thank you!

theartfulbadger

Personally I just know how important exercise is for "healthspan" in addition to "lifespan" so I'm motivated to fight the aging process as much as possible. The issue of motivation is a big one though. Keep in mind that intervals come in many different "flavours" and a varied approach to fitness is usually best.

Hey Dr. Gibala, what are your thoughts on isometric exercise? Would it not (theoretically) be possible to exercise purely by tensing against yourself, say in an office chair?

IdiotOnInternet

Isometric exercise can certainly be beneficial for strength but I think it would be difficult to sufficiently challenge the cardiovascular system using this approach to derive a training benefit.

Chiming in from University of Toronto.

I am a cyclist and have benefited a lot by intervals workouts esp in winter months when I can't ride outside. Short intense intervals provides benefits in fitness and power but my question is about weight loss and maintaining weight. I personally have found that unless I go on long rides I slowly gain weight, intervals slow it down but cannot reduce it.

So my question is, how are interval works outs for weight loss?

My second question is about those people who do regular 30 min to 1 hour exercise. Would they benefit extra if they incorporate workouts without their regimen or just replace their long exercise time with short workout bouts?

mechatak

As alluded to in response to another post, it does come down to energy balance at the end of the day, and it's much easier to try and regulate the energy "in" side of the equation by regulating food intake. Exercise-induced energy expenditure can play a role of course in the overall equation.

did you establish the effectiveness of ultra-low volume workouts in intermediate and advanced athletes or extrapolate data gathered from beginners?

triplehelix_

Interval training has been practiced by Olympians and world champions for over 100 years and I think this is one area where the scientists have taken clues from the athletes and coaches. Our initial work was influenced by studies such as this https://www.ncbi.nlm.nih.gov/pubmed/10848646

What kind of exercise is the minute compared to?

MrXian

Others posts have generally addressed this but see our comparison study here https://www.ncbi.nlm.nih.gov/pubmed/27115137

Thanks for doing this AMA Dr. Gibala. Really enjoyed your podcast interview with Tim Ferris. My question is VO2 Max seems to be the standard when it comes to measuring cardiorespiratory health and capabilities. Do you see any new advancements or technology on the horizon that would make it easier for the lay person to be tested concerning their VO2 Max?

wyattbequiet

See responses to other comment above regarding the online calculator option https://www.worldfitnesslevel.org/#/ or ways to estimate VO2max based on the HR response to submaximal exercise

Can this type of exercise be dangerous for people with high cholesterol? When is this type of exercise not recommended?

DorfeyKong

Interval training comes in many different forms. Even interval walking has been shown to be more beneficial than steady-state continuous walking in people with T2D https://www.ncbi.nlm.nih.gov/pubmed/23002086 This review also offers some insight https://www.ncbi.nlm.nih.gov/pubmed/24144531

Dr. Gibala, thanks for your AMA. I'm also a kinesiologist (in the US Midwest), but my research is in a different field than yours. I'm curious:

Can you speak specifically to which aspects of fitness were affected, and how, by your interval method? Specifically, I'm curious about muscular strength and endurance, as well as cardiovascular fitness (I'm a little interested in flexibility as well). What measures did you use to assess and determine health benefits?

Did you examine loading of joints and structures with your method? Would you recommend this method for pathological populations, or only healthy young adults?

What are your thoughts on training under extreme conditions (heat, cold, hypoxic and/or hypobaric conditions)? There seems to be a large body of literature concerning these, but I've (admittedly) not delved into it. How would you adapt your method for use in these conditions?

Nothing-Casual

Our key measures have typically been cardiorespiratory fitness measured with a VO2max test, skeletal muscle mitochondrial content using a needle biopsy, and various markers of blood sugar control. See this recent study https://www.ncbi.nlm.nih.gov/pubmed/27115137 We have not assessed joint loading not influence of extreme conditions.

Hey! Love your work. What would you suggest as the best measure of fitness to help people know

they're actually improving that can be done at home?

afro-harry

There are some decent online calculators that provide a reasonable estimate of cardiovascular fitness such as https://www.worldfitnesslevel.org/#/ Direct measures are better, but at least it provides a way to try and track changes over time. Changes in average heart rate for a given exercise challenge is another way to track improvement, e.g., ride an exercise bike at a given workload setting for 15 min, and see if the average number goes down after a period of training to see if fitness is improving. There are other predictive tests based on the HR response to a given bout of submaximal exercise, e.g., "The Astrand Test"

Hi Dr. Gibala,

What is your opinion on Dr. Izumi Tabata's program? Is it similar to what you are developing?

RollSavingThrow

Tabata's work is certainly a classic example of the potential for short, hard bursts of exercise for boost cardiorespiratory fitness, and it has influenced our research.

Hello.

I haven't exercised for a long time, and can't even try the easiest exercises from the internet as I get exhausted really easily.

What are some simple exercises that I could do just to increase my stamina so that I can start doing something more demanding?

ThisIsWorldOfHurt

We also advise with checking with a physician before starting or changing an exercise routine, but our common advice to people starting out is to just get out of your comfort zone a bit. So, perhaps start with walking, then try interval walking where you just pick up the pace slightly for 10-20 seconds, then back off, then repeat and build from there.

Hello Dr. Gibala.

I'm a Spanish medical student, and this year I have had a professor that loves your work. He insisted all semester long that we, humans, are animals with Paleolithic genes, so our way of life should reflect that: eating a protein and fiber heavy diet, no cereals, work out all the time, ...

Doing so would help prevent some "first-world diseases", like diabetes or obesity (he really insisted that our genes were designed for a low caloric intake but we messed it up in the last century so now we've got insulin resistance and so on).

Then, if we should adjust to our "paleolithic genes" and try to use our genome as efficiently as possible, we should find the most "paleolithic" way of exercising. But then, in order to justify that HIIT was the best way of exercising, our professor mentioned that animals like lions or tigers hunt (a.k.a. "work out") in short, high-intensity spurts.

However, I believe that humans are "designed" by evolution to be gatherers and hunters that wear their preys out, unlike these hunting animals, so the most "natural" way of exercising would be the more

traditional MICT. HIIT would not be the way of exercising that our genes are suited for, but is then HIIT a way of "cheating" our genes and being even more efficient?

Do you believe that the theory of "paleolithic genome" is correct? If so, do you think that HIIT, especially your "one-minute workout" is the most "paleolithic" way of exercising? Is HIIT/"one-minute workout" the most efficient way of exercising even though it may not be 100% corresponding with our genes?

Thank you for your work in this under-appreciated but extremely important and key subject of physical exercise, and for hosting this AMA.

josematg

I think humans are certainly "designed" to move and the more varied movement, the better. Perhaps both steady-state exercise (which might resemble "gathering"?) and short, hard intervals ("hunting") are both "natural" forms of exercise?

Other than all out sprinting, what are some good exercises you can do for a 'hard minute'?

folksywisdomfromback

If I had to pick one exercise, it would be the burpee http://www.nytimes.com/2011/04/17/magazine/mag-17exercise-t.html And I know someone who has stuck with this approach for 5 years! http://www.inc.com/joshua-spodek/2192-days-of-burpees.html

Which 5 body weight exercise would you include in a routine following your tabata protocols?

caseywbradford

Pushups, pullups and air squats for sure, plus burpees and mountain climbers (but then I'd vary it up over time and insert some others, e.g., lunges for air squats...)

I am reading over your PLOS article "Twelve Weeks of Sprint Interval Training Improves Indices of Cardiometabolic Health Similar to Traditional Endurance Training despite a Five-Fold Lower Exercise Volume and Time Commitment". It looks like all the subjects in your study were men. Do you feel that women will benefit from the regiment as much as men and why were women not included in the study?

cutiefoodie

Our earlier study in PLOS included men and women http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0111489 The results stimulated a separate line of work that is looking at potential sex-specific adaptations https://www.ncbi.nlm.nih.gov/pubmed/28118678 And our recent stair climbing study was conducted exclusively in women http://journals.lww.com/acsm-msse/Fulltext/2017/02000/Brief_Intense_Stair_Climbing_Improves.10.aspx Overall men and women both respond to interval training and there may be some subtle differences.

I find this rather exciting, as my exercise induced asthma makes most traditional interval training impossible. It's very disheartening to be working out and never get to your optimum heart rate, or have to stop running not because your legs are tired, but because your lungs are finished.

I can probably do all-out effort for 20 seconds at a time. Are there plans to evaluate SIT for people with

asthma?

Also, assuming one can get multiple 10-minute slots in the day for SIT, is it likely that multiple workouts will increase effectiveness?

libgeek

I know there is some related work but we need to learn more https://www.ncbi.nlm.nih.gov/pubmed/25191471 There is alsoevidence in support of exercise "snacks" which are smaller bouts of exercise spread throughout the day https://well.blogs.nytimes.com/2014/05/14/exercise-snacks-to-control-blood-sugar/

From your experience, what is the MOST important type of exercise to do if you only have 20 minutes in a day for healthy living?

dthemand

I would recommend a varied approach, so one day, do cardio intervals; on another day, body-weight style intervals; on a third day, a 20-min walk or jog in the trails; on a fourth day, maybe some yoga or flexibility training. Overall, do what you enjoy as you are more likely to stick with it, and ideally mix it up.