#242 - AMA #44: Peter's historical changes in body composition with his evolving dietary, fasting, and training protocols

PA peterattiamd.com/ama44

Peter Attia   February 13, 2023

Date	Total mass (lb)	Lean mass (lb)	Fat mass (lb)	BMC (lb)	Fat Free mass (lb)	% body fat	VAT (g)	FMI (kg/m2)	ALMI (kg/m2)	FFMI (kg/m2)
12/6/22	196.3	155.1	34.2	6.9	162.1	17.4%	476	4.92	10.21	23.3
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8/17/21	176.3	144.4	24.9	6.9	151.3	14.1%	290	3.58	9.50	21.8
12/1/20	171.8	137.5	27.6	6.7	144.2	16.1%	113	3.97	8.79	20.7
2/13/14	171.0	149.9	14.3	6.8	156.7	8.4%		2.06	9.51	22.5
10/22/12	167.5	144.8	15.8	6.8	151.6	9.5%		2.28		21.8
5/21/12	173.7	149.1	17.6	7.0	156.1	10.1%		2.53		22.4
11/23/11	174.6	149.8	17.7	7.1	156.8	10.2%		2.55		22.5
8/15/11	172.6	152.6	13.0	7.0	159.7	7.5%		1.87		23.0
5/3/11	179.6	155.9	16.8	7.0	162.9	9.3%		2.41		23.4

In this "Ask Me Anything" (AMA) episode, Peter reviews the last 12+ years of his DEXA scan results revealing the changes to his body composition, lean muscle mass, visceral adipose tissue, and more. He explains how his body composition and blood biomarkers were impacted by the various dietary approaches (ketosis, fasting, high protein, etc.) and training protocols (primarily endurance, primarily strength training, etc.) he has undertaken over the years. Furthermore, Peter explains his planned approach moving forward following his most recent DEXA scan in late 2022.

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We discuss:

- DEXA scans and other methods for tracking body composition [2:30];
- Importance of tracking data over time to see trends [10:15];
- DEXA scans in 2011: swimming, lifting, and a carb-restricted diet [12:45];
- DEXA scans 2012-2014 during Peter's time on a strict ketogenic diet [18:30];
- Blood biomarkers for evaluating metabolic health [25:15];
- DEXA scan in 2020 after several years of regularly engaging in time-restricted feeding and prolonged fasting protocols [28:45];
- DEXA scan in 2021: shifting focus to adding muscle, high-protein diet, and more strength training [40:00];
- DEXA scan in early 2022: eating additional calories and adding blood flow restriction (BFR) to his workouts [44:45];
- DEXA scan in late 2022: a dramatic change following shoulder surgery, and the impact of stress [48:30];

- Peter's approach moving forward following his most recent DEXA scan [59:15];
- A rundown of the various nutritional methods of energy restriction [1:06:15];
- Current thoughts on fasting and key takeaways [1:09:45]; and
- More.

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Peter's historical changes in body composition with his evolving dietary, fasting, and training protocols

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Show Notes

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DEXA scans and other methods for tracking body composition [2:30]

In this conversation, Peter will review the last 12+ years of his personal DEXA results

- See [AMA #40](#) for more on DEXA scans and how Peter goes through results with patients
- During the last 12 years, Peter's nutritional and training approach has varied pretty drastically
- For instance, growing up, his main thing was boxing – a very, very weight driven sport – Every ounce of non-essential tissue you carry into the ring is problematic

Calipers

- Back in his younger, boxing days, he relied on calipers for body composition
- It's not the most objective standard and it's highly dependent on the skill of the individual doing the test
- That said, a person who really knows what they're doing with caliper's is awfully good and pretty accurate

Hydrostatic testing

- Fast forward to Peter's thirties, he was monitoring body composition using hydrostatic testing
- This is where you're weighed while dry and then weighed again underwater under the conditions of full exhalation
- The ratio of those two weights, and the use of [Archimedes' principle](#), would basically allow them to deduce how much of your weight was fat
- That turned out to be a pretty inaccurate way to go about doing things
- For no other issue, highly dependent on basically how much air is left in your lungs at the point of exhalation

DEXA scanning

- Late 2011, Peter switched over to DEXA scanning

- For all intents and purposes, DEXA is the gold standard
- It's a type of x-ray that scans your body that effectively divides tissue into the following buckets very accurately; bone, fat, "other"
- The "other" is mostly muscle, but of course it's also your organs

What DEXA is looking at:

- It's very good at giving total body fat because it's very accurate at measuring fat
- Total body fat divided by total body weight is your body fat percentage
- Peter is adamant that his patients get DEXAs scans at least once a year

When going through the results with them, he explains basically the same four things

- First, the *least* interesting metric is your body fat percentage (which is what most people care about)
- Secondly, visceral adipose tissue (VAT), which is one of the compartments of fat that is outside of the subcutaneous stores
    - If we're going to put excess energy away, we want it to be in subcutaneous pockets of fat.
    - As our capacity to store fat there get stretched, we begin to spill over into other places
    - Peter writes in his [book](#) that you can think of this like a bathtub
        - Everybody has sort of a different size bathtub—their genetic capacity to store fat in the safe subcutaneous space
        - The water coming in the bathtub is what you're eating
        - The water leaving the bathtub through the drain is the energy expenditure
        - You will either be net accumulating or net losing water in that bathtub
        - But if you get to the point where you exceed your bathtub's capacity to hold water and you start to spill over, really bad things happen.
        - Nobody likes to have even a small amount of water on their floors and God forbid, in their drains and heating ducts
        - And that's basically happening when you start to see visceral fat, when you start to see intra hepatic fat (NAFLD is the earliest stage of that)
        - When you start to see peri pancreatic fat, perinephric fat, pericardial fat, all of these things are really problematic, highly inflammatory and effectively what Peter would call the fourth pillar of disease.
        - For example, if you're talking about ASCVD, we talk a lot about apoB, blood pressure, smoking, but we don't want to forget the **inflammatory effect of those fat sources**

- Third thing we care a lot about is bone mineral density (see [AMA #37](#))
  - So we care about a person's Z scores and T scores
  - The Z-score is your age sex matched
  - BMD for your lumbar spine and your hips
  - The T-score is comparing you to a 30-year-old
    - We use the T-score to make the diagnosis of osteopenia
    - One standard deviation both below the mean or osteoporosis
    - Two and a half standard deviations below the mean it's osteopenia
- The fourth thing we look at are the two metrics of muscle mass: appendicular lean mass index (ALMI) and fat-free mass index (FFMI)
  - These are two different methods, to triangulate on the same sort of thing, which is basically how much muscle mass do you have for your height
  - The ALMI is calculated by looking at the lean mass in your arms and legs in kilograms, dividing that by your height in meter squared
  - The FFMI takes the total fat-free mass in your body and divides that by your height in meter square
  - FFMI is a much bigger number than ALMI
  - The absolute numbers aren't what matters, what matters is where do you show up on the nomogram for your age and your sex
  - Peter wants his patients to be north of the 75th percentile for ALMI and FFMI

Importance of tracking data over time to see trends [10:15]

- Peter has kept a spreadsheet for better part of 12 years where he logs his DEXA data
- He keeps track of the various things happening in his life during those phases
- There's a bunch of variables, such as:
  - There's the passage of time
  - Many changes in nutrition from very strict types of diets to fasting to completely unrestricted eating
  - There's dramatic changes in the type of exercise he's been doing
  - Those are really the fundamental three changes
- Tracking trends
  - Not only does Peter track his DEXA data, but he does the same with his blood labs
  - He wants to see how does this number compare historically as opposed to looking at this number in isolation
  - It might be a pain to do this, but there's high value in being able to look at stuff historically to monitor changes
  - Ideally you can take your raw data and present it in graphical form and then include that along with all the historical data in tabular form

> "Trends matter. You're treating what you see, but you're mindful of the trends." —Peter Attia

DEXA scans in 2011: swimming, lifting, and a carb-restricted diet [12:45]

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Figure 1. Peter's historical DEXA scan data.

- What you're looking at is a relatively straightforward spreadsheet that simply records the data going back to May of 2011
- The first DEXA scan Peter ever has was the same day that he did a hydrostatic dunk test
- On that particular day, Peter completed a hydrostatic dunk test and it said he was 16% body fat which didn't seem correct
- He decided to go and pay the extra cost for a DEXA which showed is body fat to be 9.3% which was more in line with what he felt
- W*hy was there such a discordance between them*?
  - Unclear, but perhaps he's someone who can't get a lot of air out of his lungs and therefore wasn't giving a good enough underwater weight relative to above water weight

DEXA scan results from May 2011

-As you can see, when looking at his DEXA on 5/3/11:

- Body weight = just under 179.6 lbs
- Lean mass (muscle and organs) = 155.9 lbs
- Fat mass = 16.8 lbs
- BMC (bone mineral content) = 7.0 lbs
- FFM (Fat Free Mass), aka the sum of lean mass and BMC = 162.9 lbs
- % body fat = 9.3%
- VAT is unknown — unfortunately, this is back when they just didn't have the software to show VAT
  - They probably gave segmental information on their reports, but he wasn't paying attention to it at that time
- A couple years ago Peter started paying attention to ALMI and FFMI, but they didn't have the data back then so all it could tell you was fat mass index
  - again, Peter doesn't really pay much attention to that metric, but he does record it and what my fat free mass index was, and we'll talk about that
  - Anyway, you can see he doesn't have his ALMI data until 2014

–*So, what can we say looking at those May 2011 numbers?*

- At 38 years old, his 9.3% BF put him in below the third percentile (very lean)
- FFMI of 23.4 at that age, it's above the 97th percentile
    - That's the highest line in the nomogram

-The important question here is: *what was he doing at the time?*

- Exercise:
    - Swimming a ton in the pool
    - Lifting weights like crazy
    - He was doing a bit of cycling as kind of cross-training
- Nutrition:
    - He was on a carb-restricted diet but not a ketogenic diet
    - This was actually RIGHT BEFORE he started a ketogenic diet

DEXA scan results from August 2011

*Note: This was 3 months after going on a ketogenic diet

-Changes in the data:

- He lost about 7 lbs (From 180 lbs to 172.5 lbs)
- Lean mass went down about 3.5 lbs
- Total fat went down by about 4 lbs
- BMC doesn't change
- Body fat % went down to 7.5%
- FFMI (Fat-free mass index) has also gone down a little bit to 23
- Just for reference at that age, Peter's goal would be to make sure that his FFMI is above about 19 putting him in the 75th percentile (this is the percentile Peter wants his patients in as well)

*A note about discordance between the ALMI and the FFMI:

- When there is discordance, Peter prefers the ALMI because we actually have more data for ALMI
- ALMI is also a slightly more pure measurement because, in your limbs, you really only have muscle, fat and bone
    - The ALMI truly tells you about what its name suggests, the appendicular lean mass index
    - It is the index of muscle mass in arms and legs
- The FFMIis also true to its name
    - But it is somewhat confounded by the organs
    - So while Peter tracks that data—because it includes the musculature of the torso—you'll sometimes see percentile discordance

- When we get to more recent data you'll see that Peter is slightly discordant between those two—his FFMI tends to represent him at a higher percentile than his ALMI "*probably because I just have scrawny little arms*"

DEXA scans 2012-2014 during Peter's time on a strict ketogenic diet [18:30]

All of the DEXA scans from August 2011 through February 2014 were during Peter's strict keto diet

-So, *what was he doing during this period of time?*

- Exercise:
    - From 2011 to 2012, he transitioned into cycling
    - During this period, his exercise time is about the same (maybe slightly more), but now it's on a bike
    - He was still lifting weights, but not quite as much
    - He was cycling 5 days a week
        - 2 days were r*eally, really* long days
        - 3 days were 90 minutes to 2 hours
- Nutrition: Ketogenic diet
    Not really experiencing any downside of a ketogenic diet, other than the restriction that obviously comes from it

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Figure 2.

-*DEXA results*

- Peter's lowest weight was about 164 pounds, but his lowest weight captured on a DEXA was in October of 2012 and that was 167.5 pounds
- By that point, his lean mass was down to about 145 pounds
    Which is 11 pounds less than the initial test in May of 2011
- His BF % was 9.5%
- FFMI is still about 22

Getting off the ketogenic diet

Peter decided in the middle of 2014 to get off a ketogenic diet

- While all his metrics of health were really good (e.g., blood markers were great, his performance was great, etc.)
- Note about performance on a keto diet: It takes while to adapt
  - It took Peter three months to just even get over the hump of feeling miserable when he exercised
  - It took him 18 months to get to the point where he couldn't distinguish between being on and off carbohydrates
- In the middle of 2014 is when he started to experiment with fasting

What explains Peter's loss of muscle? A lack of protein intake?

- Peter says he was definitely not getting as much protein then as he is now, and that played a factor in the loss of muscle
- In the 3+ years Peter was in ketosis, he was tracking his blood level of beta-hydroxybutyrate every single day
- The mean level over those three years was like 1.73 millimole was the BHB level
- You can loosely say that a BHB level of about 0.5 or greater being the threshold of ketosis so there would be no ambiguity that at 1.73, he was well into the keto zone
- The reality with keto is that it's very difficult to get there if you're consuming sufficient protein
- If you're hitting one gram of protein per pound of body weight, you are invariably kicking off some of that protein into gluconeogenesis, which is effectively raising glucose and kicking you out of ketosis
- In fact, Peter has trouble staying in ketosis in 2011 and it was because his protein intake was too high

More about his keto days:

- 80% of his calories came from fat back in those days
- Peter did not see a rise in your lipid levels or apoB levels—a response that a number of people have with keto
    Some people who get profound inflammation as well, but he didn't have any of those things
- Peter did an oral glucose tolerance test sometime around 2012 or 2013
  - "It was comical how well I disposed of glucose" and it was also "very bizarre"
  - Because in theory when your carbohydrate restricted, you can sometimes have this paradoxically weird OGTT where your muscles become so insulin resistant in a physiologic response to the restriction of carbohydrates
  - They're basically doing that to say, "hey, I want to make sure that every one of those 50 grams or whatever of carbs you eat today is going straight to your brain. I'm not going to let the muscle take any."
  - Despite that, Peter's fasting glucose that day was about 90
  - After taking 75 grams of glucola at 30 minutes, it went from 90 to 110 or something like that
  - His insulin barely went above 10 or something
  - Those would be VERY insulin sensitive numbers

A need for humility

- This is an example of where we need to have a little bit of humility around this
- At the time, Peter says that "I very naively assumed my experience with ketosis is the experience [for everyone]"
- He was crushing his workouts, his body comp is good, his labs are good, everything is good
- So why wouldn't everybody do this?
    - "*Now just even thinking that or saying that just seems so dumb*"
    - The reality is that there's actually people who go on ketogenic diets and their lipids go through the roof or they become actually quite insulin resistant or they just gain weight like crazy
    - "*If you think about the Dunning-Kruger effect, I would argue that this was sort of me at the peak of mount stupid, in terms of relatively little expertise, but a high degree of confidence.*"
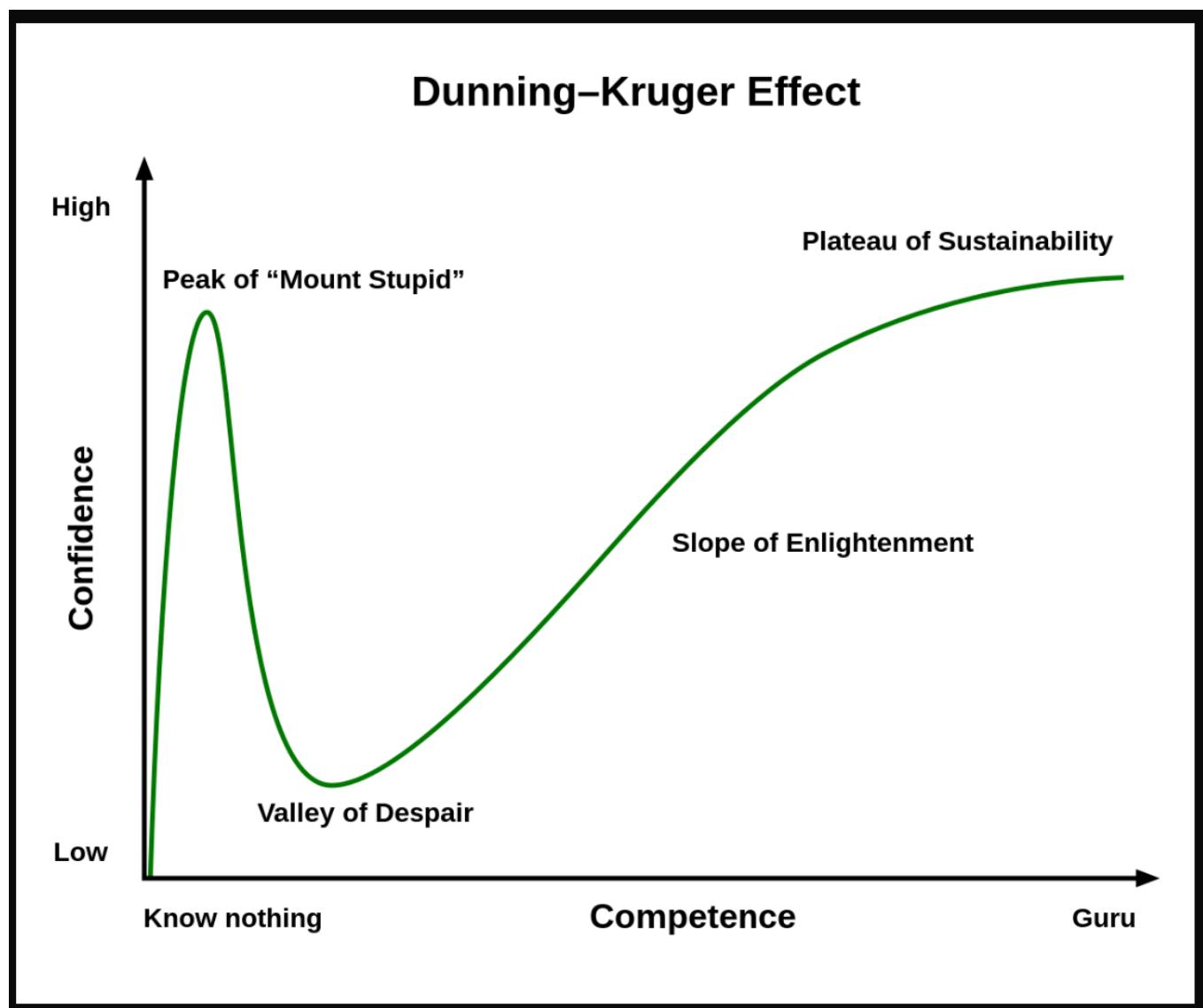

Figure 3. Dunning-Kruger Effect

Blood biomarkers for evaluating metabolic health [25:15]

Metabolic health markers

- Peter mentioned that body fat percentage is very low in importance
- More important is: *How is your metabolic health?*
- Nick asks Peter if he can elaborate on what markers Peter thinks are important in understanding metabolic health
- For instance, if someone is going to try a new nutritional strategy, what can they monitor to see if it's having any other effects potentially that are negative outside of maybe their weight on a scale?

Peter's response using himself as an example:

Lipids

>   Pay attention to lipids, both advanced and simple lipids

Triglycerides

- TGs are always something he's paying a lot of attention to
- Back when Peter was an "unhealthy guy" circe 2009 (post residency) his triglycerides were always north of 150 milligrams per deciliter
- During his subsequent keto days, his TGs ranged from as low as 11 or 12 milligrams per deciliter for a fasting triglyceride to maybe as high as 35 or 40

Fasting glucose, fasting insulin, insulin response, homocysteine, C-reactive protein

- Also during keto days, his fasting glucose, fasting insulin, insulin response, homocysteine, C-reactive protein were all in good shape
- He didn't pay too much attention to hormones at that time, but he doesn't recall any issues

Testosterone

- Post residency (before keto days), he has really, really low testosterone (5th percentile)
- After he began his health journey, his free testosterone bounced back in a big way, solidly into the 30th to 40th percentile

Uric acid

- one number that was persistently elevated back in the keto days, was his uric acid which was "through the roof"
    - He didn't really understand why at the time, but today he would argue that that's probably because beta hydroxybutyrate is competing for the same transporter in the kidney that uric acid is
    - And anything that raises ketones is going to probably raise uric acid
    - He would only figure this out many years later when he started doing those really, really prolonged fasts (7-10 water-only fasts)
    - During prolonged fasting, his ketones levels were getting very high and he was also seeing uric acid levels get really high
    - While some of that may be due to DNA and RNA turnover, he thinks more of it just has to do with this substrate mix up problem—basically trying to make room for keto excretion in the place of that and having to hang on to more uric acid
- High uric acid typically suggests less metabolic health, but again, Peter thinks there's an explanation for it that is distinct from the normal reasons why elevated uric acid is a marker for bad metabolic health

Liver enzymes

In terms of his liver enzymes during ketosis, they were at good levels (always in the twenties)

DEXA scan in 2020 after several years of regularly engaging in time-restricted feeding and prolonged fasting protocols [28:45]

A long gap in Peter's DEXA data

- Take a look at the gap between the timing of that February 2014 DEXA and then the December 2020 DEXA
- That's almost a seven-year gap (Peter isn't really sure why he went that long between scans)
- Nevertheless, he finds it to be super interesting to see the Dec 2020 scan compared to the 2011-2014 data

Total body weight change

- Total Body weight only increased 0.8 pounds from 2014 to 2020
- One might see this and say "Wow, this guy barely ages. What a beacon of health!"
- However, let's take a closer look started with what changed over those years

Changes to activity level

- Peter stopped cycling competitively — no more time trials, etc.
- He also had one or two years where he was being "completely aimless and meandering in my exercise" doing everything from bootcamps to running to doing my own workouts
- Bu he never stopped exercising and his training volume only went down slightly

So what really fundamentally changed?

- The answer is he started doing time-restricted feeding (TRF) and prolonged fasting
- From 2014-2016, he was doing a ton of TRF such as OMADs (one meal a day)
- Then from 2017-2020 is when introduced fasting protocols
  - From 2017-2018 do a seven day of water-only fast once a quarter
  - By 2019, he changed to three day water-only fasts once per month

Why did Peter do so much fasting over those years?

- There was the belief that the net benefits of fasting made sense
- A lot of good things happen when you're not eating—
  - Our bodies evolved some remarkable mechanisms by which to be efficient with nutrients in their absence
  - And we're very good at recycling parts
  - We've had several podcasts where we talk about autophagy and what happens when nutrients are scarce
  - So the motivation was "this is a really healthy thing to be doing and this is a great part of my longevity toolkit"
- To be fair, Peter is not trying to totally discount the benefits of fasting, the point Peter is making is that it's possible to take a good thing too far
- In Peter's case, he admits that it was hard to notice changes when they are happening subtly especially when using a crude metric like total body weight
  - I.e., "*My scale says it's all good. My weight hasn't changed in seven years, that's got to be good.*"
- What he needed was better metrics for seeing changes inside his body — this brings us back to the DEXA scan

Peter's DEXA scan from December 2020

Date	Total mass (lb)	Lean mass (lb)	Fat mass (lb)	BMC (lb)	Fat Free mass (lb)	% body fat	VAT (g)	FMI (kg/m2)	ALMI (kg/m2)	FFMI (kg/m2)
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Figure 4.

- First thing you'll notice is total body weight barely budged
- The more important change would be his body composition:
  - Fat mass basically DOUBLED from 14.3 pounds to 27.6 pounds (13.3 lb increase)
  - His lean mass dropped from 150 to 137.5
  - That translated to an increase from 8.4% up to 16.1% in body fat percentage

Peter's wake up call

- Overall, Peter wasn't totally shocked that his BF% increased (he could tell he was a little softer)
- And to be clear, 16.1% BF for a 47 year old is not high (he was still in the 12th percentile aka leaner that 88% of people that age)
- His [visceral adipose tissue](#) (VAT) was 113 grams and that is VERY low (3rd percentile)
- Peter's takeaways would be:
    - Definitely have a higher body fat, but this is a healthy body fat
    - VAT is really low which is great
    - But he was a bit confused as to why his body fat was twice what it was before when I was seemingly not eating anything that much and not eating that often

Here was kind of the wake-up call:

- He had never had less muscle in his entire adult life (137.5 lbs of lean mass)
- To put this in perspective, even when he was 165 pounds as a wiry little cyclist, he still had 145 pounds of lean mass and only 15.8 pounds of fat mass
- Now here he was 7 lbs heavier with LESS lean mass

> "That was the aha moment. That was the, 'What the heck just happened?'" —Peter Attia

ALMI and FFMI from 2014 to 2020:

- Now in 2020 his ALMI is 8.8 putting him in the 65th percentile
- His ALMI in 2014 was 9.51 (85th percentile)
- FFMI in 2020 was 20.7 placing him at the 90th percentile
- Remember, Peter is one of those people that's discordant — he always has a higher percentile for FFMI than ALMI

More about Peter's nutritional approach during 2015-2020

- His fasting was once a quarter, seven days or once a month, three day fast
- He was restricting junk food
- But he wasn't deliberately restricting macronutrients of any sort
- He was mostly mindful of not eating crap, but he was never really restricting intake
- Remember, Peter's three strategies for energy reduction would be:
    - i) Calorie restriction (CR), ii) dietary restriction (DR), and iii) time-restriction (TR)
    - He was doing lots of CR but he was bracketing it to these windows (fasting) — "*I was going to the most extreme form of CR you could do and doing it periodically*"
    - You could argue there was DR in the form of not having crap food

DEXA scan in 2021: shifting focus to adding muscle, high-protein diet, and more strength training [40:00]

Going back to December of 2020…

- Peter's trainer, [Beth Lewis](), was really riding him about needing to add muscle, "*Dude, we need to bulk you up. You are wasting away.*"
- And combining Beth's advice with Peter's 2020 DEXA results, he decided to *shift all of his focus towards putting muscle back on*

Three fundamental changes for Peter between Dec 2020 and Feb 2022

- 1 – He stopped fasting altogether
  Between December of 2020 and February, 2022, there was not one single day he went without eating
- 2 – Protein consumption became the only macronutrient in consideration when it came to his nutrition
  - He adopted the goal of hitting one gram per pound of body weight
  - So at the time he's eating 170 to 180 grams per day spaced out throughout the day to where he's getting no more than 40 or 50 grams in a single sitting in order to get the maximal utilization in muscle protein synthesis (see [AMA #40]())
  - This basically meant Peter was eating a lot and eating often (at least 2 good sized meals and pure protein snacks mixed in throughout the day)
  - In terms of getting protein in isolation, Peter prefers eating [venison jerky](), [Carnivore Crisps](), and pure protein shakes
- 3 – He added a day of lifting weights (more on this below)

Fast forward to August of 2021 for his next DEXA scan…

- Total body weight is up from 172 to 176 (4 lbs)
- Lean mass, however, has gone up 7 lbs
- Fat mass has gone down 2.5 lbs
- Body fat % has actually gone down from 16.1% to 14.1%
- He has a bit more VAT but still really low (about the 3rd percentile)
- And a "big recovery" on ALMI and FFMI
  - ALMI is back to 9.5 (85th percentile)
  - FFMI is now 21.8 (97th percentile)
  - For Peter, there's always a discordance there but he considers ALMI to be the more valuable indicator for him

More about Peter's third fundamental change — more lifting

- He went from lifting three days a week, Monday, Wednesday, Friday; where each day was a whole body workout
- To going four days a week; Monday, Wednesday, Friday, Sunday; where two days upper body, two days lower body
- So he increased volume of lifting and he probably even pushed progressive overload even further
  I.e., greater load, greater sets, greater reps—mixing and matching all those things

Changes in blood biomarkers?

- From 2014 to 2020, Peter was doing a lot of TRF and fasting
- During 2020-2021, he dropped fasting and pivoted to focusing on protein intake

Did anything change (good or bad) in terms of his blood biomarkers?

- No appreciable change in biomarkers is the short answer
- Keep in mind there are certain biomarkers that are now no longer really amenable to measuring change as it pertains to nutrition (For example, lipids)
  - By 2021, Peter is on a maximally suppressive lipid regimen
    - He's taking a PCSK9 inhibitor and a statin, effectively obliterating his apoB levels
  - There would undoubtedly be some fluctuation in apoB as a result of dietary changes, but it's not really showing up
- And the lipid markers that are a better indicator of fuel partitioning—HDL-C, triglycerides —are not really changing
- Free testosterone levels are pretty consistently in the 9 to 11 nanograms per deciliter or 90 to 110 picograms per milliliter
- So from a biomarker perspective, things are fine

DEXA scan in early 2022: eating additional calories and adding blood flow restriction (BFR) to his workouts [44:45]

Now looking at the time period between August 2021 and February 2022

Changes Peter made during this window of time:

- He's staying the course in terms of he's still not fasting, focusing on protein consumption, and he still training a lot
- But in the summer of 2021, he added blood flow restriction (BFR) to his workouts (see [episode #179 with Jeremy Loenneke](#))
- For nutrition, he really started to eat even more calories with the idea that he's going to allow himself to gain weight and hope the majority of that will be lean muscle
- Then in February 2022, he realizes he's going to need shoulder surgery the next month (March)
  - So he's actually now doing prehab for shoulder surgery—still exercising just as hard, but he's preparing himself to have that surgery

Prior to surgery, he gets another DEXA scan on 2/10/22

- Total body weight: 187 pounds
  - Heaviest he's been in a long, long time
- His lean mass has gone up to 152.9 lbs (increase of 8.5 lbs)
- His fat mass increased by about 2 lbs
- Even though he's gained 10 pounds, his body fat % stayed about the same—the reason is, of course, his fat mass and lean mass increased in proportion to each other at the same body fat

- Interestingly, his VAT is now up to 500 grams (now a little bit below the 10th percentile)
  - So VAT went from basically being undetectable (3rd percentile) to the 10th percentile
  - Note that Peter's goal for his patients is for VAT to be at or below the 10th percentile
- Peter's ALMI is 95th to 97th percentile and FFMI is above the 97th line
  For ALMI and FFMI, he wants to see at or above the 75th percentile

DEXA scan in late 2022: a dramatic change following shoulder surgery, and the impact of stress [48:30]

Shoulder surgery

- A month after his February 2020 DEXA scan, Peter has shoulder surgery on March 21st
- He entered surgery at about 187 lbs, and by the end of April (one month later), Peter's body weight dropped down to about 172 lbs — "insanely quick" drop
- He was only inactive for a total of two days
  - A couple days after surgery, he was on a stationary bike
  - He was in the gym doing leg workouts and lifting with his left arm
  - So it's not like he lost that muscle mass because he was bedridden
- "This to me was a really sobering wake-up call"

Couple of things happened around this time:

1 – This is a confounder here, he got sick right after surgery

   The net effect of that bug was it really suppressed his appetite, but also his intense training went down and that has an appetite suppressing effect

2 – But the other big thing that happened was he couldn't carry heavy things

- Couldn't pick up anything heavy or do a pull-up or do any of these things
- Peter regrets that he didn't get a DXA scan at that time, because he's really curious as to what it would've looked like and it would've been a great thing to have compared
- But nevertheless, weight gets down to 172 and then he basically just began this "insane recovery of eating"

Additional changes Peter made during the months after his shoulder surgery

- Around the summer of 2022, Peter was under more stress than he's ever felt (discussed on AMA #41)
- Writing his book, Outlive, was a big factor in the stress — "*The irony of writing this book on longevity is killing my longevity*"

- At this time, Peter made a conscious decision:
    - His sleep is going to stay good
    - He was not going to sacrifice exercise
    - He's not going to sacrifice time with family
    - He's not going to drink more
    - But the one thing he consciously relaxed on was eating — "*I'm going to make zero restrictions on what I eat, like zip and zero. If it's in front of me and I want to eat it, I'm eating it. There's no consideration. That was it*."

*Quick question from Nick:

What have you seen with patients who maybe haven't had surgery and maybe let's say they don't work out as much as you, but they are in the gym three days a week. But then summer rolls around and they're traveling and they aren't able to work out for two or three weeks. *Do you see the same amount of muscle loss in a short period of time, even for people who maybe aren't at your exercise level?*

- No, it's definitely a function of lean mass because remember a lot of that you're losing is glycogen and water as well
- It's a bit misleading to say we lose that much muscle mass — in the early days of that, it's a ton of water weight
- So the more lean mass you're starting with, the more you can lose
- And the more inactive you are at a baseline, the less of a delta there will be
- That said, Peter has a patient who had the identical surgery to him about two months later and he had the exact same experience weight wise
    - Roughly speaking, he lost 10 pounds and he hit his nader six weeks post-op
    - Peter's not aware of literature that makes that case, but it would be a very interesting topic to look at what's the average weight loss and then regain in body comp change, status post hip surgery, knee surgery, shoulder surgery, et cetera

Back to Peter's temporary "zero restriction" diet

Referring to the months between his March 2022 surgery and his next DEXA scan in December 2022…

- Peter says it's strange to go deep into his own weird psychology
- But there's a part of him that knows that he's not going to eat this way for the rest of his life, so he made the decision to just enjoy this period of time
- And he could really sense the stress eating
- For instance, he'd be overwhelmed at his desk with 100s of emails and getting "peppered by book edits"
- He could just feel his anxiety rising
- In those moments of late-night stress he would would walk down to the pantry and get himself a bowl of mini-wheats and "inhale them"
- "It's sort of funny to think back at what I was doing" says Peter

Date	Total mass (lb)	Lean mass (lb)	Fat mass (lb)	BMC (lb)	Fat Free mass (lb)	% body fat	VAT (g)	FMI (kg/m2)	ALMI (kg/m2)	FFMI (kg/m2)
12/6/22	196.3	155.1	34.2	6.9	162.1	17.4%	476	4.92	10.21	23.3
2/10/22	186.8	152.9	26.9	6.7	159.8	14.4%	508	3.87	10.22	23.0
8/17/21	176.3	144.4	24.9	6.9	151.3	14.1%	290	3.58	9.50	21.8
12/1/20	171.8	137.5	27.6	6.7	144.2	16.1%	113	3.97	8.79	20.7
2/13/14	171.0	149.9	14.3	6.8	156.7	8.4%		2.06	9.51	22.5
10/22/12	167.5	144.8	15.8	6.8	151.6	9.5%		2.28		21.8
5/21/12	173.7	149.1	17.6	7.0	156.1	10.1%		2.53		22.4
11/23/11	174.6	149.8	17.7	7.1	156.8	10.2%		2.55		22.5
8/15/11	172.6	152.6	13.0	7.0	159.7	7.5%		1.87		23.0
5/3/11	179.6	155.9	16.8	7.0	162.9	9.3%		2.41		23.4

Figure 5. DEXA from 12/6/22.

DEXA scan results in December 2022

Changes to total body weight:
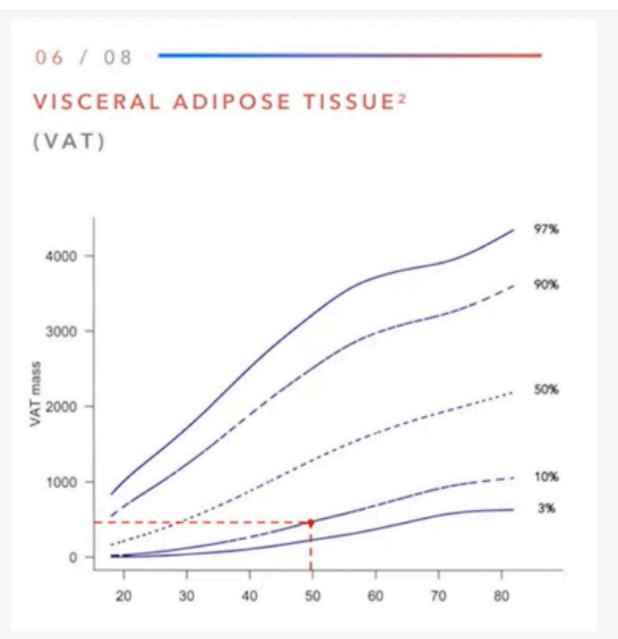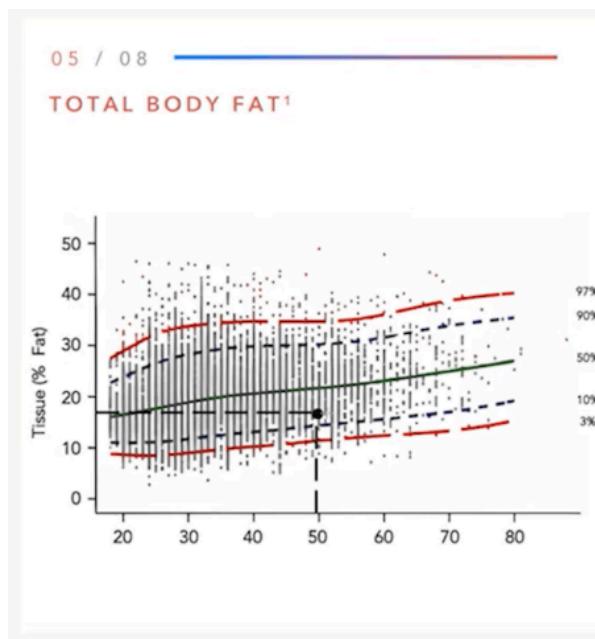
- Nine months post-surgery and six months post weighing 172 pounds, Peter now weighed 196.3 lbs
- That is 10 pounds more than he weighed preoperatively (Feb 2022)
- And that's about 23 lbs more than he weighed at his absolute low point post-op

Two pieces of good news:

- 1 – Of all that 10 pounds that he gained since February, two of them were muscle
- 2 – His VAT was unchanged (down slightly, but within the margin of error and still under the 10th percentile)
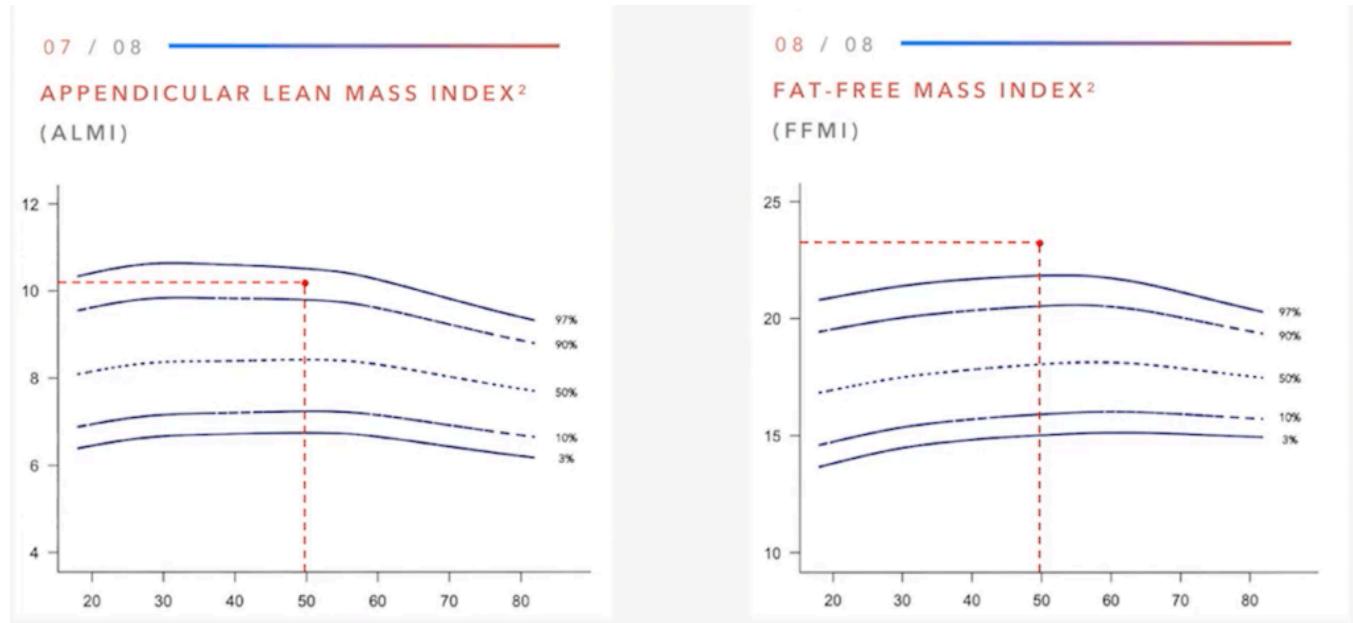
Body comp changes:

- Lean mass went up slightly
- Fat mass went up a lot (from 27 to 34 lbs)
- Body fat increased from 14.4 to 17.4%

Figure 6.

- Total body fat as you can see based on age, Peter is now about at the 20th percentile
- But here's what's interesting: It's a very fine line to go from where he is now to being at the 50th percentile, which would be about 20 to 21% body fat
- Visceral fat, about 500, is at the 10th percentile

Figure 7.

- ALMI is like 10.2 kilograms per meter squared is sort of between the 90th and 97th percentile
- FFMI was about 23.3 — But as he's mentioned, in the case of discordance bt ALMI and FFMI, he generally refers to the ALMI

Were you surprised that body fat increased that much but your VAT stayed the same?

- It was a pleasant surprise, says Peter, "truthfully, I thought my body fat would be north of 20%. I was very pleasantly surprised that it was only 17%."
- Remember, this is all relative: Peter has patients who live at 25, 30% BF and they'd give anything to be at 17%.
- The whole purpose of this discussion was to talk about the trajectory over a decade plus time and how changes in diet, fasting, protein, training and let's not forget underneath all of this is age
- For Peter, "age doesn't explain what happened in the last six months. Let's make no mistake about it. The last six months is clearly in an experiment in 'eat as much as you want and see what happens'."

Recent blood work for Peter:

- Peter was pleasantly surprised at the results
- Triglycerides were about 45
- Fasting insulin was about 7 – he'd prefer to be a 5 or 6 at the most

- His testosterone remains normal at 11 nanograms per deciliter for free testosterone
- What about the liver enzymes? Did that go up at all with added fat?
  - They did go up a little bit, but he had switched to a different statin (from Pravastatin to Crestor), so it's hard for him
  - One of the biggest drawbacks of statins is they're so commonly interfere with liver enzymes at a low normal level that sometimes it makes it a little bit harder to interpret if there's anything else going on

Peter's nutritional and training approach following his most recent DEXA scan [59:15]

BFR

Peter mentioned earlier that he added blood flow restriction to his training: *Does he think BFR has been hugely helpful in gaining more muscle mass?*

- It does make a difference
- If you go back to **December of 2020** when Peter was "rock bottom" in terms of his muscle mass, and fast forward to **February 2022**…
  - He gained 15 pounds and all of it was muscle
  - Fat mass went from 27.6 down to 27
  - Lean mass went from 137.5 to 153
  - Body weight went from 172 to 187
  - 15 pounds up and a little more than 15 of that was lean mass
- So how did that happen?
  - That was a lot of training
  - A lot of protein
  - A lot of BFR
  - And he did dial back his zone 2 time from about 4.5 hours per week to 3.5 hours per week (though he probably added some zone 5 time)

What is Peter's plan going forward after his latest DEXA scan in December 2022?

- Peter is going to try something nutritionally for the next four months that he's never done before
- Up til now, he has done it all in terms of calorie restriction (CR), dietary restriction (DR), and time-restriction (TR)
- Peter has done CR in the extreme version (i.e., 7 day water fasting), but he's never done straight calorie macro tracking as a form of CR – which is his plan for the next 4 months
- Peter sent [Layne Norton](#) his latest DEXA results and ask for Layne's help
- Peter's goal is to lose 10 lbs and have all of it be in the form of fat
- Layne's view is that this is possible if done slow enough and with proper macro tracking

Tracking macros with Carbon app

- Peter is going to use the app called [Carbon](#) (Layne's app)
- it's a great database in terms of foods

- has a built-in coach
- You plug in your body weight, your goal (lose 10 lbs), and the timeframe (4 months), and that you want to preserve muscle mass
- The app then spits out calorie targets and it's asking questions like:
- Do you want to be low carb? Low fat? Balanced? Keto?
- Peter selected balance and protein as the biggest goal
- The app has Peter at 184 grams a day for his protein target
- Total calorie goal is about 2700 to 2800 a day
- It also gave him fat and carb goals but within the first four days, he realized he was always under his carb goal and over his fat goal (Peter was defaulting to 30% protein, 35% carb, and 35% fat)
- Peter just told the app that that's what was happening and it adjusted it
- To be clear, the only thing Peter is paying attention to is calories and protein
- He enters my body weight every day and every week the app is making adjustments

Overall, Peter says…

- "I'm happy to be doing this is its good for me to have an experience with this because this is one of the three strategic levers that we want to use with our patients"
- "I want to be able to say, guys, I have experience with all of them, I can speak to the challenges of them"
- And not to be overlooked is how much the technology today is better than it was a long time ago

So your protein hasn't changed now doing CR compared to six months ago?

- It's the same says Peter
- He's still trying to get 45 to 50 grams of protein four times a day
- Breakfast is usually 8 eggs (4 whole, 4 egg whites) with toast and butter
- He supplements with a shake comprised of 24 ounces of almond milk, 50 grams of protein, and frozen strawberries
- Salad recipe is typically chicken, olive oil and balsamic vinegar (and other veggies)
- Dinner is where Peter has the most variability but tracking it in the app is easier than he thought it would be

A rundown of the various nutritional methods of energy restriction [1:06:15]

For more on this, check out [AMA #40](AMA #40)

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3 Nutritional methods of energy restriction

1 – caloric restriction

- Which means if you're consuming 3,000 calories a day right now, we're going to cut that down to 2,500 calories per day. We're not going to pay attention to when you eat those calorie
- We're not even really paying attention to what those calories are, but there's going to be an energy deficit.
- So that has the advantage of being agnostic to when you eat and agnostic to what you eat
- It has the challenge of being more complicated with monitoring all your intake

2 – dietary restriction

- This basically means "make something a bogeyman, and never eat it"
- The dietary restriction approach effectively means: we're going to restrict something but we're not going to limit when you eat or even explicitly talk about how much you can eat
- But by restricting something that you can eat, you're going to default in to eating less.

3 – The final way is time restricted feeding (TRF)

- This means we're not going to ask you to count how many calories you're eating and we're not even going to tell you what not to eat
- We're just going make the window in which you eat narrower and narrower
- And if we make that window small enough for most people, they will probably eat less

Pros and cons of each method:

CR is restricting energy deliberately

- what's the advantage of this?
  - the most direct way to solve the problem
  - other advantage is it is the one that is completely agnostic to what you eat and when you eat it
- what's the downside?
  - it requires work, you have to actually do the tracking

When it comes to DR

- depending on what you pick to demonize, i.e, whatever you make your boogeyman, that's going to determine how easy or how hard it is and also how effective it is
- the more restrictive the diet, the more likely it is to be effective at reducing energy intake
- the danger of DR is its pretty easy to still gain weight, still take on excess energy because you can still overeat through it
- it can be somewhat socially restricting depending on what you pick

TR is conceptually the easiest

- TR is basically just don't eat anything outside of your designated eating window

- the big drawback is you can really get into a problem pattern around protein
  - Peter he "I can tell you almost without exception, people who go on long-term time restricted feeding, lose insane amounts of muscle mass and they often gain fat mass while their weight goes up or down slightly."
- The other thing, and this is less common, you can still gain weight on time restricted feeding if your window isn't quite narrow enough or you force yourself to eat a lot during that window
- The bigger problem is just poor health choices, poor food choices that leads to poor health, leads to poor muscle mass
- Therefore Peter is not a huge proponent of TRF except for patients in whom it's just the only instructions that they can follow

Current thoughts on fasting and key takeaways [1:09:45]

Do you have any plans to incorporate the longer term fasting back in your life?

- Peter says possibly but not at the same frequency he used to (for the reasons mentioned above)
- For another reason, his schedule and work environment makes it more of a challenge
- He's not traveling to NY and staying alone, he's mostly home with his family now

Parting thoughts and key takeaways:

- Don't lose sight of the fact that you want to index health over weight
- This case study focused heavily on weight, but in it, you're seeing some of the effects that go beyond that, visceral, fat, lean mass
- above all else, the most interesting insight here was how much the effect of fasting, long consistent fasting had on body composition in a negative way

A glib example of looking at things in context:

> If the only metric you ever cared about was body weight, you'd be a smoker b/c smokers are going to weigh less — but that's foolish

The same is true for DEXA

> If you only relied on DEXA for your metric of health, that would be insane because you would load yourself up with every possible megadose of anabolic steroids, growth hormone, diuretics

It sounds trite and obvious, but you have to look at this stuff in the broader context of everything you're doing:

- How is your sleep?
- Your overall state of your nutrition?
- You blood biomarkers?
- Your functional metrics look like your VO2 max, your Zone 2, etc.

- All these things have to be kind of blended together in your assessment

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Selected Links / Related Material

Episode of The Drive about body composition and DEXA scans: [#227 – AMA #40: Body composition, protein, time-restricted feeding, fasting, DEXA scans, and more](#)

Episode of The Drive about bone health: [#214 – AMA #37: Bone health—everything you need to know](#)

Episode of The Drive discussing autophagy and what happens when nutrients are scarce: [#114 – Eileen White, Ph.D.: Autophagy, fasting, and promising new cancer therapies](#)

Episode of The Driver where Peter explains how he spreads his protein out throughout the day: [#227 – AMA #40: Body composition, protein, time-restricted feeding, fasting, DEXA scans, and more](#)

Peter snacks Peter likes: [41:45]

- [Maui Nui Venison Sticks](#) | (Mauinuivenison.com)
- [Carnivore Crisps](#) | (carnivorecrips.com)

Episode of The Driver where Peter elaborates how he manages his health even through stressful times of life: [#231 – AMA #41: Medicine 3.0, developments in the field of aging, healthy habits in times of stress, and more](#)

Carbon app for tracking nutrition that Peter is using to track his macronutrient intake: [Carbon](#) | (joincarbon.com) [1:02:00]

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People Mentioned

- [Stephen Phinney](#) [22:30]
- [Jeff Volek](#) [22:30]
- [Beth Lewis](#) [40:00]
- [Layne Norton](#) [1:01:30]

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