



5 SCIENCE-BASED TESTS TO MEASURE YOUR VITALITY AT HOME

THE MORE VITALITY YOU HAVE, THE YOUNGER YOUR BODY IS.

Vitality: it's a state of strength, of youthfulness, and of energy. A 12-year-old can have low vitality and a 60-year-old can have high vitality.

Your chronological age—the age you are that starts ticking since the moment you were born—is not the same as your biological age. Your biological age is how old your body seems. While blood tests and other physician-administered assessments like an epigenetic or DNA-methylation clock are the most robust methods for determining your biological age, there are still some easy, at-home tests you can use to see if maybe you're a little older (or younger) than the number on your birth certificate. We'll be using vitality in these tests as a good proxy for biological age.

All the tests we've included have rigorous, peer-reviewed studies backing up their accuracy. They can be done in your own home with no specialized equipment. The tests are ordered by ease of assessment.



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Medical Note: While all of these tests have studies showing their results correlate with predicted mortality, that's usually because they measure some other general aspect of health like cardiovascular fitness, skeletal muscle density, or flexibility. Make sure to consult a doctor before making any life changes based on the results of these tests, especially if you're over 40 or have any chronic or pre-existing health conditions.



TEST 1: RESTING HEART RATE

While mainstream health recommendations consider anything within the 60-100 BPM range as "healthy" the actual science is more nuanced.

Take this test ideally early in the day, before any strenuous exercise, caffeine, or stressful events.

1. Get a stopwatch, watch with a second hand, or use the stopwatch functionality on your smartphone.
2. Find your radial artery on your wrist, just below the thumb, or your carotid artery in your neck, just below your jaw and to the side of your windpipe.
3. Place your index and middle fingers together over the artery (don't use your thumb as it has its own artery that can screw up your count) so that you can feel your pulse.
4. Start the stopwatch and count the number of beats you feel in a 15 second period.
5. Multiply this number by 4 to get your resting heart rate in beats per minute (BPM).
6. Repeat this test another 2-3 times and take the average of the results for a more accurate BPM reading.

HOW TO INTERPRET YOUR RESTING HEART RATE RESULTS

According to a 2015 meta-analysis:

"[T]he risk of all-cause and cardiovascular mortality increased by 9% and 8% for every 10 beats/min increment of resting heart rate. Compared with 45 beats/min, the risk of all-cause mortality increased significantly with increasing resting heart rate in a linear relation, but a significantly increased risk of cardiovascular mortality was observed at 90 beats/min."

Other studies, including a 2012 study of 2,798 middle-aged men in Copenhagen confirm this, finding that:

"[R]esting heart rate in the range 51–80 bpm was associated with about a 40–50% increase in [mortality] risk, a resting heart rate in the range 81–90 bpm conferred a twofold increase in risk, and resting heart rates above 90 bpm conferred a threefold increase in risk compared to subjects in the lowest heart rate category (<50 bpm)."

While too-low a resting heart rate can be an indication of problems like certain heart conditions, high levels of potassium in your blood, or taking medications like beta blockers, generally lower is better, and healthy athletes have been known to have resting heart rates as low as 40.

Research sources:

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4754196>

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6519434/>

<https://link.springer.com/article/10.1007/s00392-019-01572-1>

<https://onlinelibrary.wiley.com/doi/full/10.1002/ejhf.670>

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4754196/>

<https://heart.bmj.com/content/99/12/882>

https://www.researchgate.net/publication/51081788_Resting_heart_rate_is_associated_with_cardiovascular_and_all-cause_mortality_after_adjusting_for_inflammatory_markers_The_Copenhagen_City_Heart_Study



RESTING HEART RATE RESULTS CHART

Women

Age	18-25	26-35	36-45	46-55	56-65
Exceptional	< 60	< 59	< 59	< 60	< 59
Great	61-65	60-64	60-64	60-64	60-64
Good	66-69	65-68	65-69	65-68	65-68
Okay	70-73	69-72	70-73	69-73	69-72
Mediocre	74-78	73-76	74-78	74-77	73-76
Worrisome	89-84	77-82	79-84	78-83	77-84
Poor	85+	83+	85+	84+	85+

Men

Age	18-25	26-35	36-45	46-55	56-65
Exceptional	< 55	< 54	< 56	< 57	< 55
Great	56-61	56-61	57-62	58-63	56-61
Good	62-65	62-65	63-66	64-67	62-65
Okay	66-69	66-70	67-70	68-71	66-69
Mediocre	70-73	71-74	71-75	72-75	70-73
Worrisome	74-81	75-81	76-82	76-81	74-79
Poor	82+	82+	83+	82+	80+

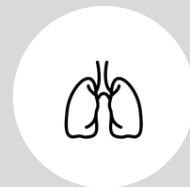
REDUCE YOUR RESTING HEART RATE



Get going! Regular exercise can make your heart stronger and more efficient.



Consider adding more fish to your diet. Don't like fish? Try fish oil capsules instead.



Breathe in for 5 seconds, release for 15. Practice mindful breathing daily.



TEST 2: WALKING SPEED

Generally, the faster your walking speed, the healthier and "younger" biologically you are.

1. Find a 20 meter long, flat stretch of floor or ground; ideally a finished floor without any obstructions or a flat outdoor paved area.
2. Place some sort of marker at 5 meters, and another at 15 meters from your starting line. This will give you a 5 meter "acceleration zone," a 10 meter zone for the actual test, and a 5 meter "deceleration zone" so you don't subconsciously slow down before the full 10 meters is up.
3. Get a stopwatch, watch with a second hand, or use the stopwatch functionality on your smartphone.
4. At the starting line, start walking as fast as you safely can. Imagine you are trying to reach a bus that is about to pull out.

Continue to the next page.



5. As soon as you cross the first 5 meter marker start your stopwatch.

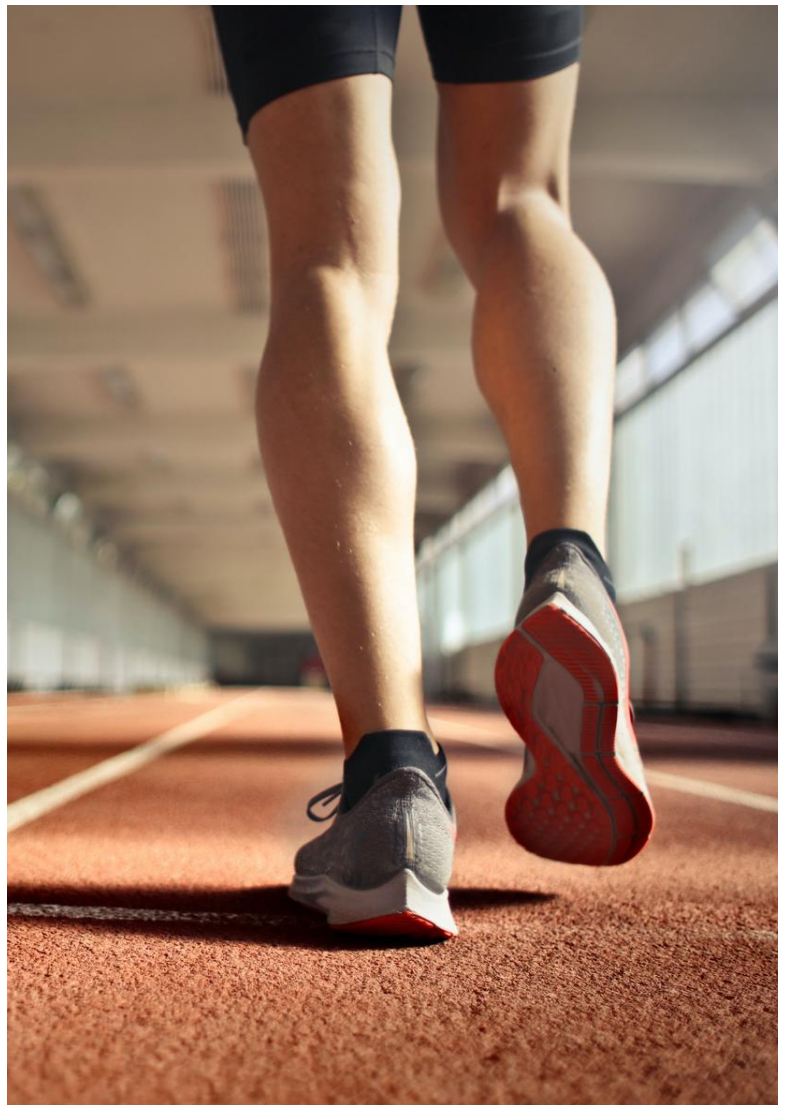
6. Keep walking as fast as you safely can.

7. When you cross the 15 meter mark stop your stopwatch.

8. Slow to a stop in the final 5 meters.

9. Calculate your walking speed by dividing 10 by the number of seconds your stopwatch recorded, to get your walking speed in meters/second.

10. Repeat this test another 2-3 times and take the average of the results for a more accurate WS m/s reading.



HOW TO INTERPRET YOUR WALKING PACE RESULTS

A 2011 study found that,

"In our data, predicted life expectancy at the median for age and sex occurs at about 0.8 m/s; faster gait speeds predict life expectancy beyond the median. Perhaps a gait speed faster than 1.0 m/s suggests better than average life expectancy and above 1.2 m/s suggests exceptional life expectancy."

Additionally, according to a 2013 study, "Each additional minute per mile in walking pace was associated with an increased risk of mortality due to all causes" of 1.8% and, "Those reporting a pace slower than a 24-minute mile [about 1.1 m/s] were at increased risk for mortality due to all-causes (44.3% increased risk)."

A slow walking pace may be an indicator of an underlying condition. Please consult your doctor if your findings surprise you.



Research sources:

<https://jamanetwork.com/journals/jama/fullarticle/644554><https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0081098>

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4254896/><https://pubmed.ncbi.nlm.nih.gov/23913931/><https://bjsm.bmj.com/content/52/12/761>

<https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0081098>

<https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0081098>

METERS PER SECOND RESULTS CHART

Women

Age	Exceptional	Healthy	Okay	Worrisome	Poor
20	2.08+	1.86 - 2.07	1.77 - 1.85	1.67 - 1.76	1.66
20-25	2.18+	1.82 - 2.17	1.71 - 1.81	1.58 - 1.70	1.57
26-30	2.00+	1.74 - 1.99	1.63 - 1.73	1.50 - 1.62	1.49
31-35	1.56+	1.50 - 1.55	1.40 - 1.49	1.27 - 1.39	1.26
36-39	1.11+	1.26 - 1.10	1.16 - 1.25	1.04 - 1.15	1.03
40-49	1.94+	1.75 - 1.93	1.50 - 1.74	1.39 - 1.49	1.38
50-59	1.88+	1.67 - 1.87	1.45 - 1.87	1.33 - 1.44	1.32
60-69	1.81+	1.60 - 1.80	1.46 - 1.59	1.33 - 1.45	1.32
70-80	1.60+	1.46 - 1.59	1.28 - 1.45	1.19 - 1.27	1.18

Men

Age	Exceptional	Healthy	Okay	Worrisome	Poor
20	2.17+	2.02 - 2.16	1.88 - 2.15	1.72 - 1.87	< 1.71
20-25	2.05+	1.87 - 2.04	1.71 - 2.03	1.58 - 1.70	< 1.59
26-30	2.18+	1.86 - 2.17	1.66 - 2.16	1.52 - 1.65	< 1.51
31-35	2.10+	1.77 - 2.09	1.65 - 2.08	1.51 - 1.66	< 1.50
36-39	2.02+	1.68 - 2.01	1.63 - 2.00	1.50 - 1.64	< 1.49
40-49	1.94+	1.78 - 1.93	1.58 - 1.92	1.45 - 1.57	< 1.44
50-59	1.89+	1.72 - 1.88	1.47 - 1.46	1.37 - 1.46	< 1.36
60-69	1.75+	1.56 - 1.74	1.46 - 1.73	1.26 - 1.45	< 1.25
70-80	1.61+	1.43 - 1.60	1.28 - 1.59	1.12 - 1.27	< 1.11

INCREASE YOUR WALKING SPEED



Eat foods like spinach, broccoli, and mushrooms to lower your blood pressure.



Practice walking! Keep your legs strong and body moving to build up your speed.



Posture plays a vital role in how quickly you can walk. Stretch daily.



TEST 3: PUSH UPS

The overall fitness of your chest, shoulders, triceps, and core is an excellent proxy for your body's vitality.

1. Find a flat space on the floor to do push ups.

(Optional): Set up a metronome or download a metronome app to your phone or computer and set it to 80 beats per minute.

(Alternately) Get a stopwatch, watch with a second hand, or use the stopwatch functionality on your smartphone and place it on the floor where you will see it while doing your push ups.

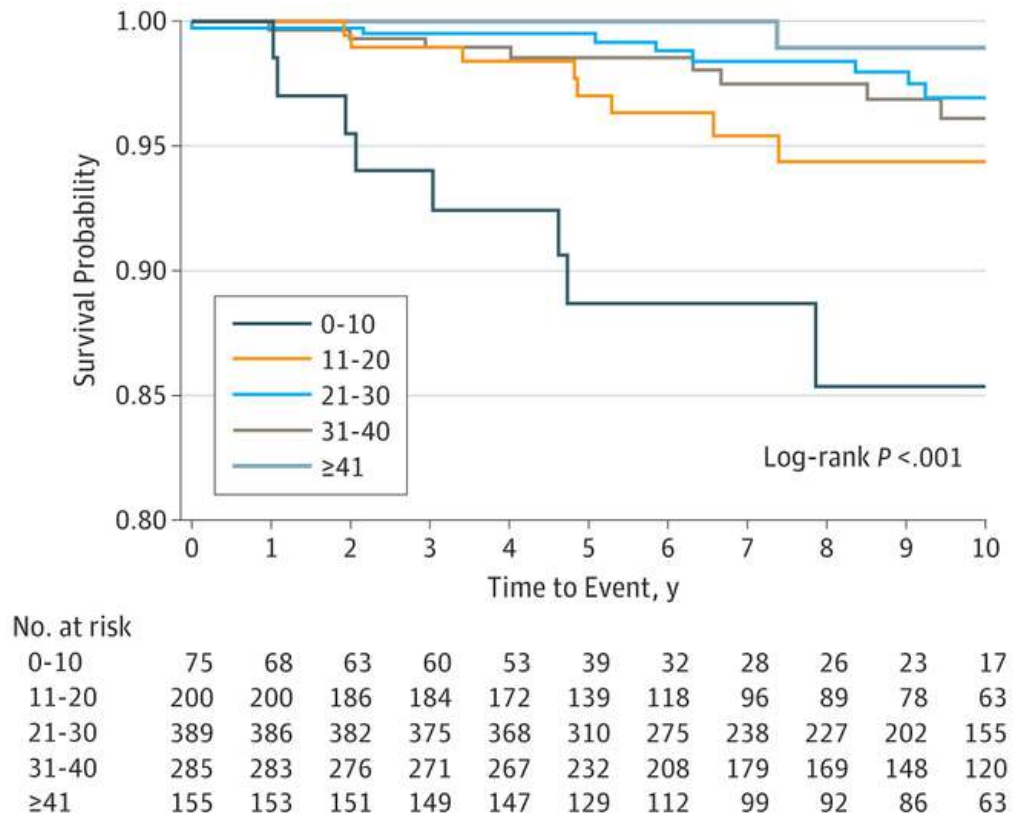
2. Get in a push up position (hands on the floor shoulder-width apart, body flat like a plank, elbows at a 45 degree angle to your body).
3. In time to the beat of the metronome or the count of the seconds on your stopwatch try to do as many good-form push ups as you can, counting them as you go (lower yourself until your chest touches the ground or your elbows are in line with your shoulders, and remember to keep your lower back flat, not sagging or rounded!).
4. Keep going until you either reach 80, miss 3 or more beats, or are simply too exhausted to continue.
5. Record your total number of pushups.

HOW TO INTERPRET YOUR PUSH UPS RESULTS

A 2019 study of 1,104 middle-aged firefighters found that higher push up capacity was correlated with a lower risk of mortality and adverse cardiovascular events. Here are the exact study methods

"For push-ups, the firefighter was instructed to begin push-ups in time with a metronome set at 80 beats per minute. Clinic staff counted the number of push-ups completed until the participant reached 80, missed 3 or more beats of the metronome, or stopped owing to exhaustion or other symptoms (dizziness, lightheadedness, chest pain, or shortness of breath)."

"We observed significantly lower [cardiovascular disease risk rates] in all groups with higher push-up capacity compared with the group with the lowest baseline push-up capacity. Participants able to complete more than 40 push-ups had a 96% reduction in incident [cardiovascular disease] events compared with those completing fewer than 10 push-ups."



Firefighters who did fewer than 10 push ups had an almost 15% chance of experiencing an adverse cardiovascular "event" (like a heart attack) within 8 years, compared to those who were able to do over 40 push ups, who had a less than 3% chance of a negative cardiovascular event.

Use the table on the next page to determine your vitality based on the number of push ups you can do during this test.

PUSH UPS

RESULTS CHART

Number of Push Ups	Likelihood of a Cardiovascular Event in the Next 10 Years	Rough Equivalent Age (Men)*	Rough Equivalent Age (Women)*
0 - 10	14%	90.5	71
11 - 20	6%	53	58
21 - 30	3%	33	45
31 - 40	4%	48	53
41 +	< 1%	17	28

* Based on death rate information available at <https://www.ssa.gov/oact/STATS/table4c6.html>

HOW TO IMPROVE YOUR CARDIOVASCULAR HEALTH



Use a wall to modify your push ups and gradually work to the full movement.



Don't overeat. It pulls blood from the heart to the digestive system and correlates with heart failure.



Reduce the amount of stress in your life with scheduled relaxation rituals.



TEST 4: SITTING- RISING TEST (SRT)

“Fitness is like marriage. You can’t cheat on it and expect it to work.” – Bonnie Pfister

Make sure you're barefoot and wearing comfortable clothing that will not restrict movement.

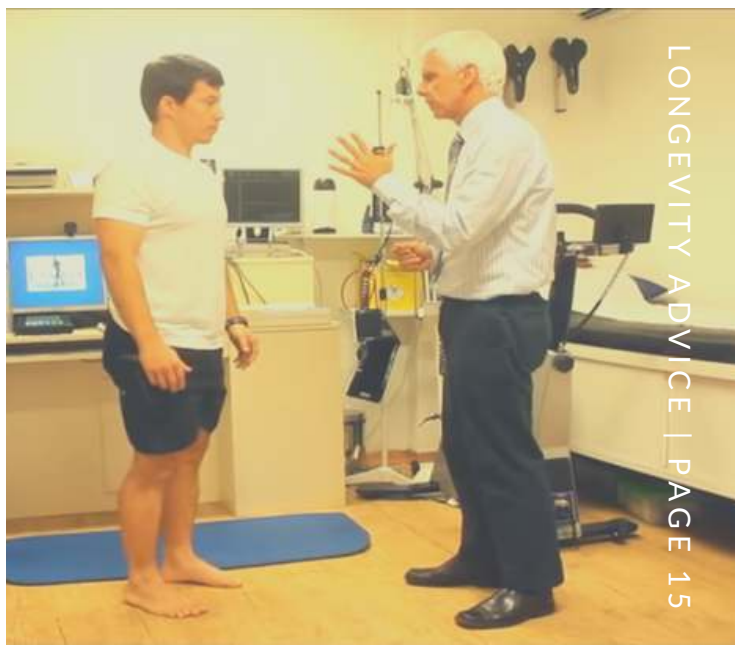
1. Locate a flat, non-slippery surface in your house that's at least 2 meters x 2 meters square.
2. Start by standing and crossing your ankles. Then, without worrying about the speed of movement, try to sit and then rise from the floor, using the minimum support that you believe is needed.
3. Try to get all the way down, and then back up, without touching the floor with your hands, knees, or elbows for support, or pushing on one knee with a hand etc. Try to also do the motion in a smooth, controlled fashion (you lose points if you partially lose your balance or plop down unsteadily on your butt!). An example of the method is here: <https://www.youtube.com/watch?v=MCQ2WA2T2oA>
4. Starting with a score of 5 for the down motion, and 5 for the up motion (10 total), subtract 1 point for each support utilized, that is, hand, forearm, knee, or side of leg, and an additional 0.5 points if you had an unsteady execution (partial loss of balance). Additionally, subtract 1 point if you placed one hand on the knee in order to sit or rise.
5. Add up your total score out of 10 for your final SRT score. You can try the test a couple times before settling on a final score.

HOW TO INTERPRET YOUR SRT RESULTS

The original Brazilian study on the SRT found that the Sitting-Rising Test (SRT) was a good measure for scoring their subjects' musculoskeletal fitness and likelihood of mortality in the following six years.

Notably, the researchers found that "Each unit increase in SRT score conferred a 21% improvement in survival."

Musculoskeletal fitness has three components: muscular strength, endurance, and flexibility. In older adults, it directly indicates how functionally independent and mobile an individual can be. This study also found that loss of strength starts at around 35 years of age for both men and women.



SITTING-RISING TEST RESULTS CHART

SRT Score	14-year all-cause fatality probability (after age 51)	76- to 80-year-olds that score in this range	51- to 55-year-olds that score in this range
8 - 10	8%	About 10%	About 75%
6 - 7.5	12%	About 15%	About 15%
3.5 - 5.5	33%	About 20%	About 5%
0 - 3	40%	About 55%	About 5%

HOW TO IMPROVE YOUR MUSCULOSKELETAL FITNESS



Play outside. Get vitamin D from the sun and enjoy moving your body naturally.



Water carries oxygen to your cells and lubricates your joints, so drink up!



Your body recovers while you're sleeping. Get adequate rest every night.



TEST 5: HAND-GRIP STRENGTH

This test does require a piece of special equipment but, thankfully, it's something that's pretty standard in most homes: an analog bathroom scale.

1. Locate either an analog bathroom scale or purchase a hand dynamometer (these can be bought online for as little as \$25, and many gyms have them for members to use for free).
2. Holding your arms at your side with your elbows at a right angle, grip the bathroom scale on either side with both hands. Make sure to always grip the scale in the same location so your measurements over time are consistent.
3. Using one hand at a time, squeeze the scale as hard as you possibly can.
4. For each hand, note the highest consistent weight level you achieve by squeezing as hard as you can. This is your grip strength for that hand.
5. Repeat this test another 2-3 times and take the average of the results for a more accurate grip strength reading (in pounds or kilograms).
6. Combine the results of each hand and divide by 2 for a general grip strength number.

HOW TO INTERPRET YOUR HAND-GRIP STRENGTH RESULTS

A 2007 study in middle-aged and elderly persons (<https://pubmed.ncbi.nlm.nih.gov/17398228/>) found that, "Grip strength is an accurate and consistent predictor of all causes of mortality in middle-aged and elderly persons."

Further, a 2015 study concluded that, "Grip strength was inversely associated with all-cause mortality" and that for every 5kg reduction in grip strength, the risk of all-cause mortality increased by 16%.

In other words, your grip strength is strongly indicative of your overall health.



HAND-GRIP STRENGTH RESULTS CHART

Age	Women's Grip Strength (In lbs)				
35-44	49.17	61.08	72.99	84.89	96.80
Relative risk*	40%	10%	0%	-10.0%	-10%
45-54	45.20	56.89	68.58	80.26	91.95
Relative risk*	40%	10%	0%	-10.0%	-10%
55-64	35.50	47.85	60.20	72.54	84.89
Relative risk*	20%	10%	0%	-10%	-15%
65-74	30.65	42.12	53.58	65.05	76.51
Relative risk*	60%	10%	0%	-10%	-10%

* Chances of developing cancer, coronary heart disease, a stroke, or pneumonia relative to other people in your age group over the next 20 years.

Age	Men's Grip Strength (In lbs)				
35-44	< 80.24	80.25 - 96.34	96.35 - 128.52	128.53 - 144.61	144.62 +
Relative risk*	30%	0%	0%	-0.5%	-50%
45-54	< 73.63	73.64 - 92.59	92.60 - 130.50	130.51 - 149.46	149.47 +
Relative risk*	30%	0%	0%	-0.5%	-50%
55-64	< 65.26	65.26 - 82.89	82.90 - 118.15	118.16 - 135.79	135.80 +
Relative risk*	40%	-10%	0%	-15%	-25%
65-74	< 53.57	53.58 - 70.77	70.78 - 105.15	105.16 - 122.35	122.36 +
Relative risk*	40%	10%	0%	-10%	-25%

* Chances of developing cancer, coronary heart disease, a stroke, or pneumonia, relative to other people in your age group over the next 20 years.

HOW TO IMPROVE YOUR MUSCULAR STRENGTH



Do two resistance-training sessions a week to reduce and reverse cell damage.



Be sure to get enough protein throughout the day so you can build muscle.



Limit your alcohol. It can lead to dehydration, poor sleep, and limited gym gains.



BONUS

THE SINGLE QUESTION TEST

While all the above tests can give you a decent idea of how well you're doing physically in relation to other people your age, none of them is as precise or accurate as more invasive health tests like blood work, biopsies, and urine samples.

But hopefully you can use one or more of these tests as a starting point to see if any lifestyle or health changes (in consultation with your doctor!) are in order.

As a bonus, here's a final test you can do that is scientifically-backed and can be used as an indicator of biological age and mortality risk.

Here's how to do it: Simply answer the question, "In general, how would you rate your health?"

Pick one answer from the following options: "excellent," "good," "fair," or "poor."

That's it. That's the test.





BONUS

INTERPRET YOUR BONUS TEST RESULTS

According to the 2006 meta-analysis (<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1828094/>) that came up with this test for predicting mortality:

"Persons with "poor" self-rated health had a 2-fold higher mortality risk compared with persons with "excellent" self-rated health."

A variety of factors may be at play here, including "depression, poor cognitive health, functional status, and socioeconomic status." If you rated yourself poorly, consider investing time in improving not just your body, but your confidence and your mind as well.

