



Effectively aging...or aging effectively?

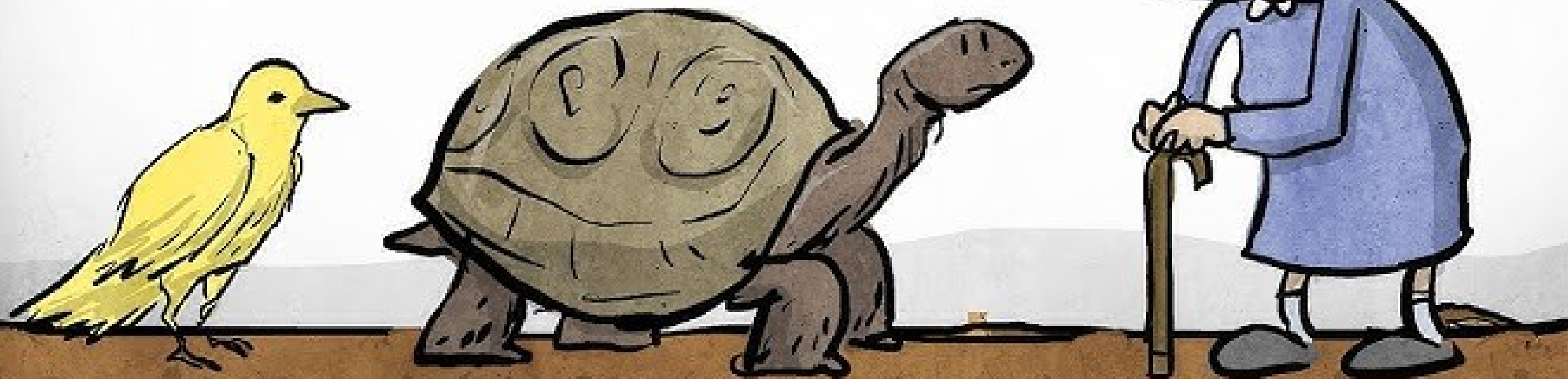
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What is AGING?



AGING:

BIOLOGICAL — vs PHYSIOLOGICAL



BIOLOGICAL AGING

(Cellular & Molecular)

- **DNA & cellular damage**—accumulated mutations, telomere shortening, and impaired repair.
- **Mitochondrial + metabolic decline**—lower energy production, more oxidative stress.
- **Senescence & reduced regeneration**—buildup of non-dividing “zombie cells” and fewer stem cells.



PHYSIOLOGICAL AGING

(Organ Systems & Function)

- **Muscle & bone loss**—sarcopenia, decreased bone density, reduced strength and mobility.
- **Cardio-metabolic slowing**—stiffer arteries, higher blood pressure, lower insulin sensitivity.
- **Immune & cognitive decline**—weaker immune responses, slower processing, reduced balance.

As we age ...

- **Lower activity levels:** People generally move less as they age.
- **Hormonal changes:** Growth hormone and testosterone gradually decrease.
- **Reduced protein synthesis:** Muscles become less efficient at building new tissue.
- **Neuromuscular changes:** Motor neurons decline, weakening the connection between brain and muscle.

Muscle and bone loss

- Typical decline after 60: **up to 1–2% muscle mass lost per year** and **3% strength lost per year** if inactive
- Lower muscle mass → less calorie burn → easier to gain weight.
- Without adjusting diet or increasing activity, fat gain becomes more likely.
- This is why many people gain weight in their 40s, 50s, and 60s even if they're “eating the same.”

Loss Accelerates After Age 60

- **Increased inflammation** (“inflammaging”) that breaks down tissue.
- **Lower physical activity** due to joint pain, mobility limitations, or lifestyle changes.
- **Nutritional challenges**, including inadequate protein intake.
- **Faster decline in nerve-muscle communication**, leading to quicker atrophy.

What happens if you stick to your old ways ?

Health risks include

- **Insulin resistance**, which raises blood sugar levels.
- Higher chance of **type 2 diabetes**.
- Increased risk of **heart disease**, hypertension, and abnormal cholesterol levels.
- More abdominal fat → more inflammation → faster aging.

Muscle loss + overeating = a metabolic environment that accelerates disease.



What else could go wrong ...

- Reduced ability to climb stairs, or get up from chairs
- Higher risk of fractures and hospitalization
- Loss of independence in later life



What is the solution ?

#1

Diet and exercise

Is eating more veggies and walking a good enough solution ???



Is 10,000 steps enough?

- 10,000 steps is a marketing myth, not a medical guideline
- Real benefits begin around 6,000–7,500 steps
- Higher intensity matters more than step *count*:
Combining steps + strength training = best outcomes



Strength & Resistance training is key

- As people age, bone mass naturally declines —> especially after age 50. Strength training applies mechanical stress to bone, which stimulates **osteoblast activity** (bone-building cells).
- Increases **bone mineral density** in hips, spine, and wrists
- Reduces risk of **osteoporosis and osteopenia**
- Strengthens surrounding muscles → better balance & stability



Strength & Resistance training is key

- Strength training increases the muscle's ability to take up glucose, making it one of the most effective non-medication strategies for metabolic health.
- Improved ability of muscles to **absorb glucose without requiring as much insulin**
- Increased muscle mass → larger glucose “storage tank” → better long-term control

Training Reverses Muscle Decline

- **Stimulates muscle protein synthesis**, even in older adults whose muscles typically respond more slowly.
- **Increases fast-twitch fibers**, which are the first to decline with age.
- **Improves neuromuscular function**, helping muscles and nerves “reconnect.”
- **Builds bone density**, reducing osteoporosis risk.

Exercise Recommendations: How Much is Enough?

	Flexibility	Resistance Training	Aerobic Training
Frequency	Before and after each activity or exercise session (or 3 days per week)	Two or more times per week	Moderate intensity exercises 5 times per week, or vigorous intensity 3 times per week
Mode	Static stretches for major muscle groups	Resistance bands and free weights if multi station machines are not available	Walking, cycling, seated recumbent, pool activity, and seated aerobics
Volume	Hold stretch 10-15 seconds, two times per stretch	1-3 sets of 8-12 repetitions for each muscle group	Moderate intensity exercise for 30-60 minute intervals; targeting 150-300min per week
Intensity	Mild tension or slight muscular discomfort	5-6 (moderate) or 7-8 (vigorous) on a 10 point scale	Moderate intensity at 50%-70% HRR or 5-6 on the 10 point exertion scale



Benefits

- Reduces sarcopenia (muscle loss)
- Improves balance and coordination
- Enhances independence

Resistance training offers versatility and is great for beginners as it helps build a foundation of proper form and endurance using various methods.

Strength training is a specific, high-intensity application of resistance training best suited for those aiming to significantly increase their one-rep maximum or develop raw power

Types of Beneficial Exercise



Resistance Training

- Builds and maintains muscle mass and strength
- Directly addresses sarcopenia
- Increases bone density, reducing osteoporosis risk



Muscle-Strengthening

Activities targeting all major muscle groups, : legs, hips, back, chest, arms, core



Balance Exercises

- Improves stability and coordination
- Reduces risk of falls, a leading cause of injury
- Examples: Tai Chi, standing on one leg, heel-to-toe walking



Aerobic Exercise

- Improves cardiovascular health and endurance
- Helps manage weight
- Boosts blood flow to the entire body and brain
- Examples: walking, swimming, cycling

Aerobic Activity

At least **150 minutes** of
OR moderate-intensity activity weekly
75 minutes of vigorous-intensity
activity weekly



Flexibility Training

- Maintains range of motion in joints
- Reduces stiffness and improves mobility
- Examples: yoga, stretching routines

Food For Thought



Diet

The right diet helps counter both muscle loss *and* weight gain

Protein- and Fiber-Rich Diets are key

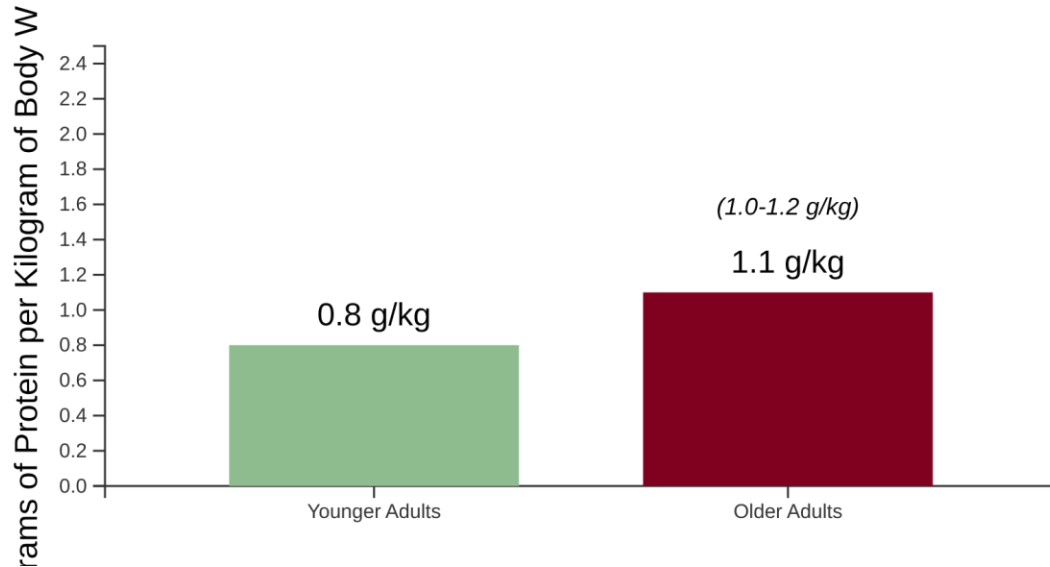
Protein

Protein provides the amino acids needed to **build, repair, and preserve muscle tissue**

- Increasing satiety (fullness).
- Supporting muscle repair & maintenance.
- Reducing age-related muscle loss.
- Raising the thermic effect of food (your body burns more calories digesting it).

Protein Requirements: How Much is Enough?

Daily Protein Requirements



Why the Higher Requirement?

Older adults have **anabolic resistance** - muscles become less responsive to protein stimuli.



Exercise Considerations

Older adults engaged in resistance exercise need **1.2-1.5 g/kg/day** to optimize muscle adaptation.



Clinical Considerations

For those with acute or chronic illnesses, protein requirements increase to **1.2-1.5 g/kg/day**.



Practical Application

Consuming **25-30 grams of high-quality protein per meal** is optimal for muscle protein synthesis.

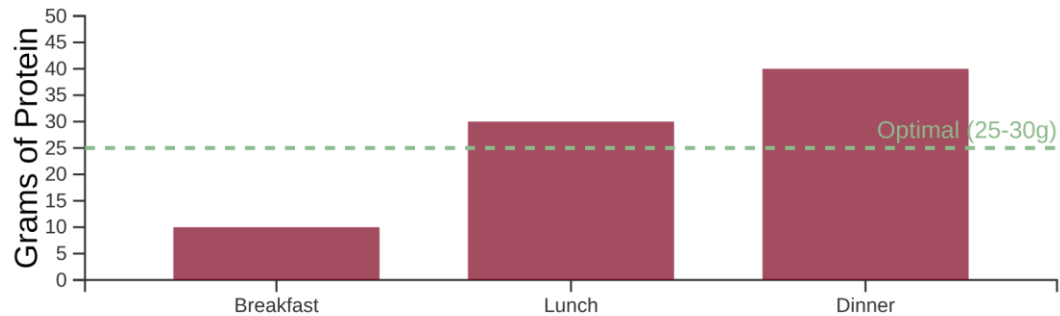
Protein increases feelings of fullness and stabilizes blood sugar

Optimal Protein Distribution and Key Micronutrients

Optimal Protein Distribution

 **25-30 grams** of high-quality protein per meal for maximum muscle protein synthesis

Typical Daily Protein Distribution



Breakfast: 8-10g



Lunch: <30g



Dinner: Higher amount

 Most older adults consume far below the optimal amount at breakfast and lunch

Key Micronutrients



Calcium

1,000 mg daily for adults
1,200 mg for women 51+ and men 71+



Vitamin D

600 IU daily for adults up to age 70
800 IU daily for those older than 70



B Vitamins

Essential for energy metabolism and nervous system function
Deficiencies can impact the biological value of dietary protein

Older adults have higher recovery demands, but weaker and slower healing responses → need protein to repair

Don't forget your fiber

Fiber helps by:

- Slowing digestion → improved fullness & reduced overeating.
- Supporting gut health.
- Stabilizing blood sugar.



What we eat matters

- Vegetarians/vegans have lower [mortality rates](#) than people whose diet regularly includes meat.
- Plant-based diets are associated with an improved metabolic and inflammatory profile.
- Lower all-cause mortality
- Lower cancer mortality
- Better metabolic health

Key reasons:

- Lower saturated fat
- More fiber
- More antioxidants and phytonutrients
- Better gut microbiome diversity
- Lower inflammation



Herpich, C., Müller-Werdan, U., & Norman, K. (2022). Role of plant-based diets in promoting health and longevity. In *Maturitas* (Vol. 165, pp. 47–51). Elsevier Ireland Ltd. <https://doi.org/10.1016/j.maturitas.2022.07.003>

Animal Protein Builds and Preserves Muscle More Effectively

- Animal proteins are higher in:
- **Leucine** (the key amino acid for muscle protein synthesis)
- **Essential amino acids**
- **Better Digestibility**
 - Preserving muscle mass → Increasing strength
- But...



But Not All Animal Proteins Are Equal

- **Better for health:**
- Fish (omega-3s reduce inflammation)
- Poultry
- Eggs
- Low-fat dairy
- Fermented dairy (yogurt, kefir)

Worse for longevity:

- Processed meat (hot dogs, bacon, deli meats)
- High intakes of red meat (especially fatty cuts)



Nutrition for Longevity

- Plant-forward eating pattern
- High fiber, antioxidants, polyphenols
- Adequate protein
- Limiting red/processed meat
- Hydration, micronutrients, vitamin D



- Lentils + salmon
- Tofu bowl + eggs
- Chickpeas + Greek yogurt
- Beans + chicken breast
- Oatmeal + whey protein mixed in



Practical Food Choices and Meal Planning



High-Quality Protein

- ✓ Lean meats: chicken breast, turkey, lean cuts of beef
- ✓ Fish: salmon, tuna, cod (rich in omega-3)
- ✓ Dairy: Greek yogurt, cottage cheese, milk
- ✓ Eggs: complete protein, versatile and easy to incorporate
- ✓ Legumes: lentils, beans, chickpeas (plant-based protein)
- ✓ Tofu and tempeh: plant-based options with substantial protein



Calcium-Rich Foods

- ✓ Dairy products: milk, yogurt, cheese
- ✓ Fortified milk alternatives: soy milk, almond milk fortified with calcium
- ✓ Leafy greens: kale, spinach, collard greens
- ✓ Salmon: provides vitamin D, which aids calcium absorption
- ! Adults over 70 should aim for 1,200 mg of calcium daily



Whole Grains & Fruits

- ✓ Whole grains: oats, brown rice, quinoa, whole wheat bread
- ✓ Provide complex carbohydrates and dietary fiber
- ✓ Fruits and vegetables: rich in fiber, vitamins, minerals, and antioxidants
- ! Aim for five total servings a day (three vegetables, two fruits)



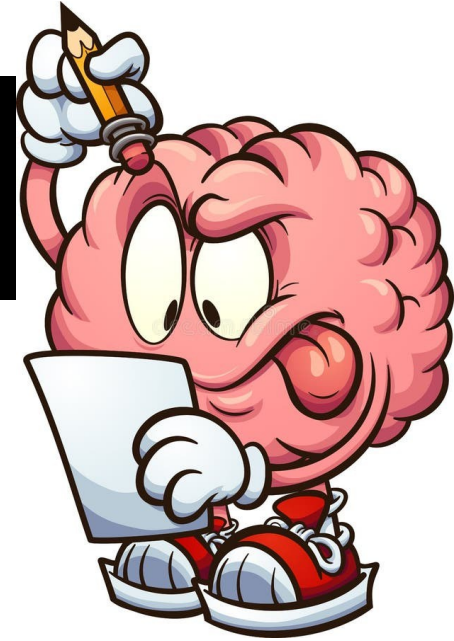
Don't forget your beauty sleep

- **Sleep quantity and quality decline with age**, including less deep sleep and more nighttime awakenings.
- **Circadian rhythms shift earlier**, causing earlier bedtimes and wake times.
- **Poor sleep accelerates aging**, increasing inflammation, weight gain, cognitive decline, and disease risk.
- **Good sleep supports healthy aging** by improving memory, metabolism, immune function, and heart health.
- **Healthy sleep habits**—consistent routines, morning light, limited alcohol, and treating sleep apnea—greatly improve sleep in older adults

Feeling forgetful

The Brain Ages too...

- **Brain structure shrinks with age**, especially in the hippocampus and prefrontal cortex, leading to slower learning and memory recall.
- **Neurons, synapses, and white matter decline**, causing slower processing speed, reduced attention, and weaker multitasking.
- **Blood flow and energy production decrease**, making the brain more prone to fatigue and less efficient at thinking and problem-solving.
- **Neurotransmitter levels drop**, affecting mood, motivation, and the brain's ability to form new connections (neuroplasticity).
- **Risk of cognitive impairment rises**, but cognitive aging can be slowed through exercise, sleep, nutrition, mental stimulation, and stress management.



Cognitive Reserve Factors: evidence-based

1. Metabolic and Vascular Health (the foundation)

Cognition in older age correlates **more with vascular health** than almost anything else.

Keep blood vessels healthy

- **Blood pressure:** Aim for $<120/80$ *if safe*; elevated systolic pressure is a major driver of microvascular brain injury.
- **Blood sugar:** Even mild prediabetes accelerates hippocampal shrinkage.
- **Lipids:** LDL control lowers risk of vascular cognitive impairment.
- **Inflammation:** CRP and homocysteine track with cognitive decline; B12/B6/folate sufficiency matters.

Why it matters

Good vascular health ensures oxygen, glucose, and nutrient delivery to neurons and prevents microinfarcts—the hidden cause of “age-related memory loss.”



2. Physical Exercise (the single strongest lifestyle intervention)

Aerobic exercise and **strength training** literally increase brain volume and neurogenesis.

Recommendations

- **150–300 min/week aerobic training** (fast walking, cycling, rowing, swimming).
- **2–3 × strength sessions/week.**
- **High-intensity intervals** (as tolerated) boost BDNF—your brain's growth factor.

Evidence

Regular exercise improves:

- Executive function
- Processing speed
- Memory consolidation
- White-matter integrity (Effect size is comparable to or greater than medications).



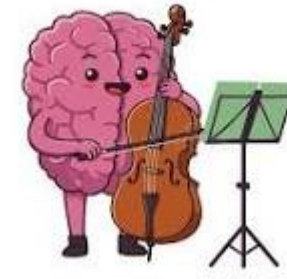
3. **Cognitive Loading (use it or lose it)**

Not crossword puzzles—those don't generalize. You need **progressive, demanding, novel learning.**

Best types of mental training

- Learning a **new language**
- Picking up an **instrument**
- Mastery-level learning (statistics, coding, chess, creative writing, math)
- High-complexity hobbies (advanced cooking, photography, woodworking, etc.)

The key: **The challenge must be real and sustained.**





4. **Sleep Quality**

Aging adults who consistently get **7–8 hours** of high-quality sleep have slower cognitive decline.

Sleep improves:

- Glymphatic clearance of β -amyloid
- Memory consolidation
- Synaptic maintenance

Avoid chronically short sleep (<6 hrs), which is associated with accelerated cortical thinning.



Other factors

5. Diet and Nutrition

You don't need exotic supplements; the strongest evidence is for **dietary patterns**, not pills.

The most proven diets for cognition:

- **Mediterranean diet**
- **MIND diet (Mediterranean–DASH hybrid)**

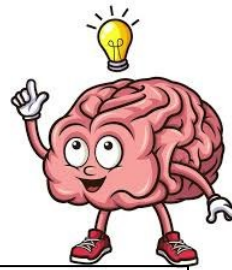
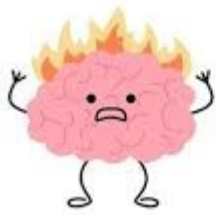
Key elements:

- High intake of leafy greens, berries, legumes, nuts, olive oil, whole grains
- Low intake of processed foods, sugars, trans fats

Specific nutrients that matter

- **Omega-3 (especially DHA)**
- **B12** (especially for vegans—*very important*)
- **Vitamin D**
- **Polyphenols** from berries and tea
- **Adequate choline** (for vegans: consider supplementation or increase beans, tofu, lecithin)





6. **Social Interaction**

Loneliness accelerates cognitive decline via stress pathways and reduced cognitive engagement.

Quality matters more than **quantity**:

- Regular deep conversations
- Community, volunteering, discussion groups, teaching, mentoring

7. **Stress Management & Emotional Health**

Chronic stress shrinks the hippocampus.

- Mindfulness/meditation
- Yoga or tai chi
- Regular exercise (again)
- Psychotherapy if needed
- Purposeful daily routines (“ikigai” effect)

8. **Avoiding Neurotoxins**

- **Smoking**: devastates vascular and cognitive health
- **Heavy alcohol use** (>7–10 drinks/week)
- **Untreated sleep apnea**
- **Chronic exposure to solvents or heavy metals**

9. **Regular Screening**

- **Hearing loss**: treating it significantly Lowers dementia risk
- **Vision correction**
- **Thyroid function**
- **B12 deficiency**
- **Depression**

These are reversible causes of cognitive decline.



And my favorite.....



10. Supplements?

Evidence is mixed, but **these have plausible benefit with low risk:**

- **Creatine (3–5 g/day):** improves working memory in older adults
- **Lion's mane (*Hericium erinaceus*):** small trials show nerve-growth-factor stimulation
- **Curcumin:** may reduce inflammation; bioavailability varies
- **DHA:** many studies use 600–1,200 mg/day

Longevity check list

- Aim for **protein, steps, strength, sleep, and hydration** daily.
- Add plenty of **plants and healthy fats** for heart and gut health.
- Protect mental health with connection and purposeful activity



“You cannot live forever without getting old.”

Passion and dedication



Yūichirō Miura
Mount Everest – Age 80



Carlos Soria Fontán
Manaslu – Age 86
(2 months ago)



Sister Madonna Buder
The “Iron Nun”
Ironman – Age 82
Subaru Ironman Canada
August 26, 2012