

Supplements for Exercise as Longevity Medicine

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SUMMARY

Supplements as **exercise synergists** that could

- enhance the benefits of exercise for healthy longevity,
- function as ergogenic aids for exercise adherence, and
- mitigate risk or injury during workouts.

For full abstract, refer to conference program guide at <https://cdn2.me-qc.com/pdf/20571820.pdf?time=1708652205>

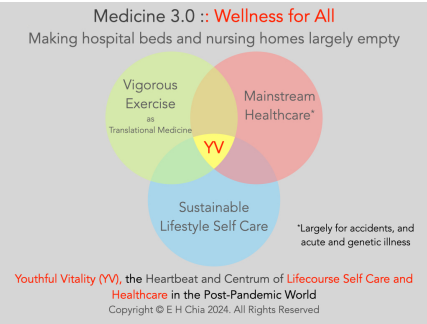
BACKGROUND

A distinctly new paradigm in medicine and healthcare is clearly emerging in the 21st century: the geroscience hypothesis, also dubbed Medicine 3.0.
<https://biomedicalodyssey.blogs.hopkinsmedicine.org/2023/09/building-the-bridge-from-medicine-2-0-to-medicine-3-0/>

Instead of focusing on a disease-centered model, geroscience targets the aging process directly, thereby achieving

- healthspan and lifespan extension
- primordial prevention of secondary aging, and
- the compression of morbidity (Chia, 2024).

Medicine 3.0, Wellness for All



AIMS AND METHOD

Based on a scoping review of literature, 5 key questions are presented.

The objective is to uncover

- the use of supplements in sports, and how their effects differ in relation to exercise as longevity medicine, and
- the classes of supplements in longevity research, and their relationship to physical activities.

RESULTS AND DISCUSSION

Five Novel Questions for Future Research

1. Could supplements for enhancing athletic performance be re-purposed for enhancing the effects of exercise as longevity medicine? (Creatine, Hydroxymethylbutyrate)
2. Could the use of ergogenic aids be useful as a motivational tool for exercise adherence? (Coffee, not decaffeinated)
3. Are there instances when supplements could ameliorate risks of more intense exercise? (Aspirin, Taurine, Niacinamide, Nettle leaf)
4. Are there senolytics that interfere with the benefits of exercise? (Metformin, Nicotinamide mononucleotide, Alpha-ketoglutarate, Curcumin)
5. What insights can we obtain from medical anthropology studies of hunter gatherer societies, and research relating to longevity hotspots and masters athletes? (Lithium orotate, Fucoidan)

Table of Select Supplements

Supplement(s)	Evidence	Interaction with Exercise as Longevity Medicine
Creatine monohydrate	Ergogenic aid. Long term safety up to 5 years for healthy adults (Kreider et al. 2017). Following a food-first approach, creatine may be obtained from red meat and seafood	Not for teens. Monohydrate form best, probably the most extensively studied supplement (Antonio et al. 2021). Needs further research (Kaufman et al. 2022)
Hydroxymethylbutyrate (HMB)	Ergogenic aid for older adults beginning resistance exercise (Holicek, 2017; Gallagher et al. 2000). Doses of up to 3 grams daily for up to one year have been used safely	Contraindicated for blood pressure-lowering medications and cholesterol-lowering agents. Not currently on FDA's Generally Recognized As Safe (GRAS) list. Needs further research (Engelen & Deutz, 2018)
Coffee (not decaffeinated)	Ergogenic aid. Use in moderation for those not sensitive to caffeine. Extensive evidence for health benefits in recent years, likewise for sports performance (Kaufman et al. 2022)	Both coffee and caffeine 0.02% on FDA's Generally Recognized As Safe (GRAS) list. Traditionally used by indigenous peoples
Aspirin	Use to reduce risk to reduce risk for marathon-related cardiac arrest (Siegel, 2024)	Episodic use during race events. Must be aware of side effects and contraindications. Should be used under physician direction
Taurine	Use to reduce toxicity from long frequent swimming in chlorinated swimming pools (Li et al. 2015)	Preliminary reports inconclusive as to effects on sports performance (Kurtz, et al. 2021). Has been proposed as senolytics. Further research warranted for long term use
Niacinamide/Nicotinamide	Chemopreventive agent for sun protection against skin cancer, especially individuals susceptible to melanoma (Chen et al. 2015; Scazzon et al. 2020; Starr, 2015). The benefits are lost once stopped	High dose treatment rather than a supplement. The optimum long-term niacinamide dose is not known. Further research needed
Nettle leaf extract	Herbal supplement containing natural antihistamine for allergies. Antihistamine medications have been found to adversely affect exercise recovery (Romero et al. 2016)	Needs further research
Metformin, Nicotinamide mononucleotide (NMN), ketoglutarate (AKG), Curcumin	These are among the most actively researched supplements (Parkkinen et al. 2023). A Singapore longitudinal aging study found consumption of curry, which is rich in curcumin, extends life expectancy by 1.9 years for those without cardio-metabolic and vascular diseases (Ng et al. 2022). An RCT is underway for AKG (Santalova et al. 2023)	Before going into general use, it behooves that controlled randomized trials with sound methodologies be conducted, not just to show the efficacy of these supplements, but to ensure that they do not blunt the benefits of exercise
Lithium orotate	Higher lithium levels in drinking water has been associated with greater human longevity, see for example Zarse et al. 2011	If the microdose is comparable to that in drinking water, there should be little concerns for healthy individuals
Fucoidan	Sulfated polysaccharide found in the cell walls of many species of brown algae. Reduces markers of cellular senescence and SASP (senescence-associated secretory phenotypes) in senescent mouse and human cells (Zhang et al. 2022)	Needs further investigation. Food wise, wakame (Undaria pinnatifida) is a rich source

Beyond Supplements: The Big Picture

In the larger context of healthy longevity, we should consider all exercise synergists. Indeed, Li *et al.* (2018) found that “adherence to 5 low-risk lifestyle-related factors (never smoking, a healthy weight, regular physical activity, a healthy diet, and moderate alcohol consumption) could prolong life expectancy at age 50 years by 14.0 and 12.2 years for female and male US adults compared with individuals who adopted zero low-risk lifestyle factors.”

With more comprehensive 8 habits (never smoking, physical activity, no excessive alcohol consumption, restorative sleep, nutrition, stress management, social connections, and no opioid use disorder), and based on 276,132 US veterans, Nguyen *et al.* (2024) reported that men and women who adopted all these 8 behaviors could gain a whopping 24.0 or 20.5 years of life expectancy, respectively, at age 40 years, compared to those with no adopted lifestyle factors.

In stark contrast, if a cure for cancer is found, it would only add some 3 years to life expectancy (Mackenbach *et al.* 1999; Gandjour, 2021).

INSIGHTS AND CLINICAL SIGNIFICANCE

Of especial urgency, until proven exercise mimetics are found, research should be directed at supplements as exercise synergists. This will greatly benefit older adults unable to engage in physical activities to the recommended levels.

The emperors of old sent their emissaries in search of the herbs of longevity and the fountain of youth. What these potentates had failed to find, what they would even exchange their vast empires for, this is the knowledge we now have, the dream of a thousand generations.

REFERENCES

<https://www.slideshare.net/secret/bLBcBnBsZTonD7>

Dr Chia (PhD, Australian National University) is a scientist, athlete and coach.

An accredited multidisciplinary athletic and fitness coach, and PADI advanced scuba diver and medal-winning masters athlete, his current research focuses on measurable biological age reversal through exercise genomics and molecular transduction.



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