





Introduction

Beauty in a Pot's "collagen soup" that we love to order, Estée Lauder Anti-ageing "Night Repair" cream that your mother swears by, Antioxidant supplements that your grandparents take everyday... Do these sound familiar to you?

Indeed, our society seems to be obsessed with anti-ageing “solutions”. But have you ever wondered if these things **actually work**? Hence, in this blog, we will be exposing the truths about the anti-ageing industry and sharing with you some scientifically proven anti-ageing supplements and lifestyle regimens.

Written by: Sim Yeen

Common Myths

Myth #1: Antioxidants

Myth #2: Ageing Creams



“Antioxidants are good for you, the more the better.”



“Collagen creams will combat wrinkles and aging of skin, and are sufficient for young-looking skin.”

Myth#3: Wine





“Consuming wine and grapes can help reverse aging“

Promising Anti-Ageing alternatives



Explore anti-ageing alternatives based on **promising** scientific research!

Ageing Myths Debunked!,

Myth #1: Antioxidants

Myth: Antioxidants are good for you, the more you consume the better

Written by: Sinega, Fitri, Insyirah

Have you ever heard these: “Eat lots of oranges, they’re rich in Vitamin C!” or “Eat lots of berries, they’re rich in antioxidants!” ? Well, more often than not, those statements are followed by “Because they’re good for you!”. I’m pretty sure we have all heard such things. But why is it so?

It has long been said that consuming antioxidants are good for health and can even help with ageing. So much so that consumers purchase up to **\$500 worth** of antioxidant products per year! In fact, according to market research company Euromonitor, in 2017 alone, it was estimated that Singaporean consumers spent a whopping **\$490 million SGD** on vitamins and supplements! But what if these consumer favourites were actually doing more harm than good?

Biological ageing is defined as the **progressive decline in the body’s ability to carry out bodily functions**. Damaged cells which are mostly senescent cells, also known as cells which age and can no longer replicate, can accelerate biological ageing. Now this is where antioxidants come in. It is believed that consuming antioxidants can reverse this ageing process. But what if too much antioxidant consumption actually decreases your life span?

First, let us explore some examples of antioxidants so we can have a better understanding before we find out what they are.

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Well-known Natural Antioxidants

Antioxidant is an umbrella term that covers many substances such as **vitamins, carotenoids, phenolic compounds, minerals and flavonoids** to name a few. Here, we consider three examples of well-known natural antioxidants found in foods and a little on how they exert their antioxidant function. They are Phenolic compounds, Carotenoids and Vitamin C¹.

1. Phenolic Compounds

Phenolic compounds work by **donating a hydrogen atom to a free radical** to inhibit it. In our diet, an example of phenolic compounds is caffeic acid found in coffee beans and potatoes. If consumed in excess, these compounds can cause **oxidative stress** resulting in **cell death and toxicity in cells**².

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2. Carotenoids

Carotenoids work by **transferring an electron or hydrogen atom to free radicals**, thereby suppressing them. Carotenoids are natural pigments that are synthesised by plants and bacteria but not by humans and animal. Hence, we can obtain carotenoids in our diet by consuming foods such as carrots and kale. However, in excess, some carotenoids can cause carotenemia or yellowing of the skin. In addition, some studies found that



Figure 1: Potatoes as an example of phenolic compounds in our diet

(<https://www.healthline.com/nutrition/foods/potatoes>)

consuming too much Beta-carotene from supplements can increase the risk of lung and stomach cancer in smokers³.

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3. Vitamin C

Vitamin C is a water-soluble antioxidant that works by transferring a hydrogen atom to free radicals which inactivates it. Vitamin C are also involved in removing these free radicals. In contrast to other plants and animals, humans are unable to synthesise Vitamin C and hence, we must derive it from Vitamin C-rich foods like oranges and spinach in our diet or from supplements.

Vitamin C, however, can also produce free radicals and cause oxidative damage⁴. Consuming Vitamin C supplements in excess, can increase the risk of cardiovascular diseases (CVD) in postmenopausal women with diabetes⁵.

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What Are Antioxidants⁶?

Antioxidants are molecules which protect our cells by preventing oxidation and the formation of free radicals. Free radicals on the other hand, are

Figure 2: Carrots as a source of carotenoids in our diet
(<https://www.jessicagavin.com/carrot-benefits-types/>)

Figure 3: Oranges as an example of Vitamin C-rich food in our diet
(<https://www.globestats.com/according-to-science-here-is-some-unrevealed-side-effects-of-eating-oranges/>)

unstable, very reactive molecules which can **cause damage to cells by affecting DNA, proteins, and lipids**. An example of free radicals are **reactive oxygen species (ROS)**. Without antioxidants, these free radicals will accumulate and can result in diseases like cancer. That said however, at low amounts, ROS plays an important role in helping to maintain cellular function. They also are involved in regulating cell death or apoptosis.

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Figure 4: Antioxidants stabilising free radicals
(<https://www.haleo.co.uk/the-body/antioxidants/>)

Figure 5: DNA base damage
(<https://loizoulab.org/labnews/activities>)

Figure 6: Sources of free radicals
(<https://hopes.stanford.edu/about-free-radical-damage/>)

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Debunked: Antioxidants don't reverse ageing

Let us discuss 3 reasons why antioxidants are not reversing ageing⁷.

Firstly, the results from clinical trials are conflicting. Antioxidants **do not reverse ageing, but it is linked with shorter lifespan**. Therefore, the effect of antioxidants on ageing is not yet clearly established. Secondly, free radicals are not so

bad. Free radicals in optimal amounts are **vital in our body's immunity** to fight off pathogens in our body. Therefore, antioxidant supplements decreasing the amount of free radicals in our body creates an adverse effect. The natural processes of the body cannot be carried out by the body.

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So, how do antioxidants work?

Antioxidants can be categorised into 2 groups based on their mechanism of action. The first are **primary antioxidants** which are produced by our body. They prevent oxidation and remove free radicals. The second are **secondary antioxidants** which have to be obtained from our diet. These prevent the formation of harmful chemicals and restores primary antioxidants.

But what happens when we consume too many antioxidants? Unfortunately, there are certain medical conditions which **worsen with excessive consumption of antioxidants**. Here's a list of such conditions published in the *American Journal of Epidemiology*:

1. High doses of beta-carotene increases the risk of lung cancer in smokers.
2. Too much Vitamin E makes cancer spread faster.
3. Excessive amounts of antioxidants increases the risk of contracting melanoma (skin cancer).

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Can antioxidants be found naturally, instead of just in supplements?

Yes, but is there a difference between the two?

As we know, antioxidants prevent free radicals from forming but they do so by sacrificing one electron to the free radical, thereby stabilising it. However, the **antioxidant will then become a free radical**, requiring another antioxidant molecule to stabilise this never-ending cascade. The typical diet contains a balanced level of antioxidants. On the other hand, the amount of antioxidants in supplements can never be properly estimated, meaning there may be too few or too many of them.

Figure 7: Natural Antioxidant in Foods
(<https://www.healthline.com/nutrition/foods/blueberries>)

When there are **more antioxidants than free radicals** in our body, the antioxidants start to have a harmful effect on our body by causing oxidative stress. This oxidative stress can damage tissues, proteins, and DNA, which may **increase the risk of chronic diseases such as diabetes, hypertension and atherosclerosis**.

Therefore, the bottom line is that there has to be a **balance between the number of antioxidants and free radicals** in our body. Thus, to create this balance and manage oxidative stress, natural antioxidants found in foods or vitamins are recommended over those in supplements.

Figure 8: Antioxidants in supplements
(<https://biohackplanet.com/271-jarrow-antioxidant-optimizer-90.html>)

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Ageing Myths Debunked!,

Myth #2: Anti-Ageing Creams

Myth: Anti-aging creams that contain collagen combat wrinkles and anti-aging of the skin, and are sufficient for young-looking skin.

Written by: Claudia, Jie Shi, Sriharini

In 2018, the **global anti-aging cosmetics market size** was valued at **USD38.62 billion**, and it is projected to reach USD 60.26 billion 2026. In Singapore, women spend around **\$270 each month** on beauty and wellness products. These are some staggering numbers... pumped into an industry whose products may not actually have any effect.

What are anti-aging creams?

Anti-aging cream has been thriving in the beauty industry in the past two decades and has been a largely lucrative industry. This comes as no surprise as the silver generation population has been increasing in developed countries,

and even the younger generation is paying more attention to anti-aging creams¹ to eliminate any facial wrinkles, and to maintain their young and radiant skin.



Figure 1: Young vs old skin with wrinkles and loss of elasticity (<https://www.health.harvard.edu/staying-healthy/why-your-face-ages-and-what-you-can-do>)

So, what is causing our skin to form wrinkles and lose elasticity?

Decrease in collagen turns out to be the major contributor².

Collagen is an essential protein that gives **smoothness and elasticity to the skin**³, but its production is reduced with age by 1 to 1.5% per year.

Hence, many cosmetic companies focus on reversing the wrinkle formation and smoothing the texture of the skin. They do so by making skincare that contains collagen or peptides that can boost the amount of collagen in your skin, resulting in less wrinkle formation. This entices consumers like us to therefore purchase the products.

However, these creams that contain collagen which you may be using now, do they really combat wrinkles result in anti-aging of the skin, and are they sufficient on their own?

Aging Skin

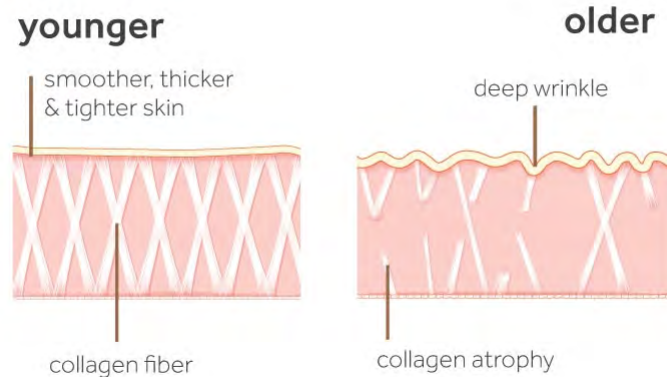


Figure 2: Collagen atrophy in older, aging skin
(<https://www.absolutecollagen.com/pages/collagen-supplements-science>)

Debunked: Anti-aging creams are insufficient in combating aging

1. Wrinkles are not the only factor contributing to the aging of the skin

There are **intrinsic and extrinsic aging** as well. When your body is unable to repair skin damages due to **DNA mutations**⁴, this is an example of intrinsic aging. **Hormonal changes**⁴, such as reduced estrogens or androgens, also contribute to collagen breakdown and loss of elasticity, leading to aged-looking skin.

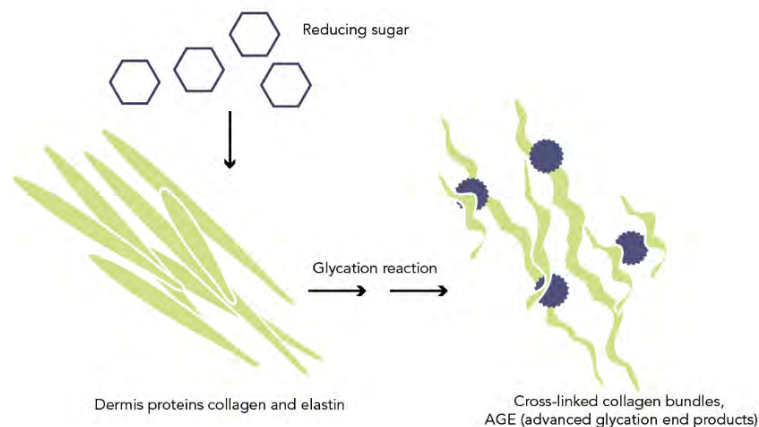


Figure 3: Sugar from our diet sticking to skin's collagen and elastin, forming advanced glycation end-products (AGEs) (<https://www.cosmeticsdesign-asia.com/Headlines/Promotional-Features/Glycation-The-bitter-effects-of-too-much-sugar-in-the-skin>)

How about extrinsic aging? It is aging caused by **lifestyle and environmental factors**. For example, do you consume a high sugar diet? This high amount of glucose you consume in excess will stick to collagen and elastin, forming **advanced glycation end-products (AGEs)** and result in **rigidity and thinning**⁵ of the skin over time.

More often than not, the ultraviolet rays (UVA and UVB) from the sun also contribute and are a major factor in the aging of the skin. Therefore, using **sunblock** is a protective product⁶ that you should

Figure 4: Overexposure to UV rays can damage and cause aging of the skin. (<https://mileca.tripod.com/sunscreenandwaves/id7.html>)

incorporate in your skincare and morning routine, other than the usage of anti-aging creams at night.

2. Anti-aging creams with collagen do not have any conclusive research that they successfully deliver the collagen into the skin to reduce wrinkles.

An anti-aging cream that was introduced in 2009 claims that it can increase the production of youth protein (collagen) with results showing in 7 days. However, this was subsequently proven to be untrue, as it is still **questionable whether the collagen or peptides can enter the skin to produce an effect**. The company then removed this claim and changed it to a product that “smoothes, hydrates and even out skin texture”. There is still much work and research required to conclude if anti-aging creams can successfully deliver the increased production of collagen across the skin.

Therefore, without further multi-combinational supplementation, early interventions, and maintenance, anti-aging creams cannot be deemed as “anti-aging” or “wrinkle-resistant” on their own.

Myth: Anti-aging creams and serums are comparable to cosmetic surgery.

Many products compare creams to cosmetic surgery, misleading consumers into thinking that anti-aging creams are a direct substitute for cosmetic injections.

***Debunked:* Anti-aging creams and serums are not comparable to cosmetic surgery.**

The truth is that many cheaper over-the-counter products may not show similar results. Although they may contain ingredients that are proven to be useful to reduce lines and wrinkles, like niacinamide or pentapeptides, the concentration may not be sufficient to show drastic improvements⁷.

In addition, the skin serves as a protective barrier that is very hard to penetrate⁷.

Figure 5: Skin's protective barrier that does not allow all molecules to pass through and penetrate.
(<https://www.bareminerals.com/blog/what-is-the-skin-barrier.html>)

In particular peptides (ie. collagen) found in many creams are **structurally too large to penetrate the skin cells**. As such, most effective anti-aging creams have found ways to get ingredients to penetrate the skin better and take effect. Many cheap products found online or over the counter do not have such delivery methods, which makes them less effective.

Chemical peels

Alternatively, chemical peels can be considered to reduce fine lines and wrinkles^{8,9}. It is a **skin treatment that involves using acids** (alpha-hydroxy, beta-hydroxy, trichloroacetic acid,

and phenol) to exfoliate the skin and is generally safe. These acidic compounds have also been frequently studied, proving that these are effective in reduction of fine lines and wrinkles, as they **increase the production of collagen and other molecules that complex with collagen**¹⁰.

It affects two layers of the skin, the epidermis, and the dermis, and this depends on the depth of the wound created by the peel, either superficial, medium, or deep peels.

Superficial peels benefit people with skin issues affecting only the top layer of the skin, which is the epidermis. As it doesn't penetrate deep into the skin, it recovers quickly between 1 to 7 days.

The **medium peels** are great for those with fine wrinkles and minor hyperpigmentation and take 7-14 days to heal.

Deep peels are generally not used but recommended if you have severe wrinkles and hyperpigmentation, as well as sun damage. It takes a longer time to heal, from 14 to 21 days.



Figure 6 : Chemical peels can be done easily at home.
(<https://beautybio.com/products/the-peel>)

Chemical peels treatment can actually be done at home by replacing the chemically -produced acids with those that contain weaker, natural derivatives of chemicals such as glycolic acid from sugarcane and lactic acid (from soy products). Of course, what is done at home as compared to a professional dermatologist is different, and may be less effective. These peels have **greater evidence of being effective compared to marketed 'anti-ageing' creams**, however, these come with their **limitations and person-to-person variability**. Also, with most skin products, remember to know how your skin reacts to different chemicals and follow safety instructions and labels on the packages!

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Ageing Myths Debunked!,

Myth #3: Wine

Myth: Consuming wine and grapes can help reverse aging

Written by: Tienlin, Sim Yeen

Have you heard of the “**French Paradox**”? It is the observation of very low incidence of Coronary Heart Disease (CHD) death rates in France, where the French are also incidentally one of the largest consumers of wine.

As such, this has sparked interest in **Resveratrol**, a compound found in wine. With its benefits to cardiovascular health and its anti-aging effects, this has led many to believe that

drinking red wine
is the key to
reverse ageing.

What is Resveratrol?

Resveratrol is a natural compound found in many plant species such as grapes' skin and seeds, blueberries, and wine ¹.



Figure 1. French and wine consumption

<https://news.cgtn.com/news/3d3d514f34456a4e33457a6333566d54/index.html>



Figure 2. Resveratrol structure and natural sources
<http://www.shutterstock.com/pic.mhtml?id=105058538&src=id>

Resveratrol has been found to have various anti-aging properties like **anti-oxidatory and anti-inflammatory** properties. Inflammation is a common symptom of aging that accelerates aging itself.

It's anti-inflammatory properties stem from its ability to **target cyclooxygenase (COX)¹**, an enzyme which initiates the formation of pro-inflammatory compounds like prostaglandins and thromboxane.

Figure 3. How inflammation and aging are interconnected.

Additionally, it's cardiovascular effect is linked to the expression of endothelial Nitric Oxide (NO) synthase¹ that synthesizes NO, a potent vasodilator. Vasodilators are compounds that widen blood vessels, **preventing heart diseases like high blood pressure.**

Debunked:

In light of resveratrol's numerous benefits, it is easy to accredit the “French Paradox” to this “miracle compound”. However, it is important to also consider the socio-economic context of the French. It was discovered that the **French also consume greater amounts of vegetables, fruits, dietary fibres, and less saturated fat in their diet²**. Hence, the low incidence and mortality from cardiovascular heart disease may not be singly attributed to the French drinking habits, but also to their dietary habits.

The composition of red wine and grapes also tells us a different story. In reality, red wine and grape **contain very little amounts of resveratrol**. Red wine contains 0.361–1.971mg/L of Resveratrol while red grapes contain 1604µg of Resveratrol per kg³.



Figure 4. Resveratrol content in wine
<https://desertwineguy.blogspot.com/2018/04/the-benefits-of-resveratrol-follow-up.html?m=1>

In order to ingest 1g/day of Resveratrol, which is the recommended daily allowance (RDA) of Resveratrol, we would need to consume 505-2763L of red wine, or 795kg of red grapes, for instance³. To put things into perspective, that is equivalent to drinking 673 glasses of wine, or eating 2064 bundles of grapes in a day! Which is physically impossible and not to mention, incredibly harmful to our body!

In all, the above information tells us that there **may not be any scientific basis to the claim that eating grapes or drinking wine may help to reverse aging**.

Biochemical Limitations of Resveratrol:

Even if we ingest the daily allowance of Resveratrol, its biochemical properties may have some limitations.

Firstly, extensive break down of resveratrol in the intestine and liver results in an oral bioavailability considerably **less than 1%**⁴. Hence, it is unlikely to produce large therapeutic effects. However, this does not completely invalidate resveratrol. Emerging solutions such as bioenhancers⁵ have been shown to enhance resveratrol's bioavailability, though it's research is still in its infancy.

Secondly, even if scientists manage to raise resveratrol's level of bioavailability, **additional studies need to be conducted to find out its actual biologically effective concentration range for clinical use**. This is because at high doses, it was found that resveratrol has harmful pro-oxidant properties⁶.

In all, more studies are currently ongoing to find out the viable dose and bioenhancer of Resveratrol. It was found that resveratrol could serve as a **potential calorie restriction mimetic**, though not as effective⁷. Calorie restriction have been linked to longer lifespan⁸. Therefore, instead of trying to ingest truckloads of foods thought to contain resveratrol, why not try altering our dietary regimens in our daily lives in order to age healthily?

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Written by: Samuel, Claudine



Is Intermittent Fasting beneficial for ageing?

Recent studies definitely seem to suggest so! A person can engage in intermittent fasting by eating in specific time windows in a day. For instance, if you choose to follow a 16:8 schedule, you would eat within an 8 hour window, and then fast for the remaining 16 hours of the day.

What is the difference between intermittent fasting and just starving?

Starvation is a chronic nutritional insufficiency to one's body over multiple days! Intermittent fasting however allows you to eat everyday, albeit in a specific time period only.

What happens to my body when I fast?

This is a great question! In normal conditions, our body uses the **glucose** from our diet to give us **energy**. However, when we fast, we go through periods when that glucose is not readily available. Our body actually has cool mechanisms to break down **glycogen** in our liver into **glucose** as an energy source.

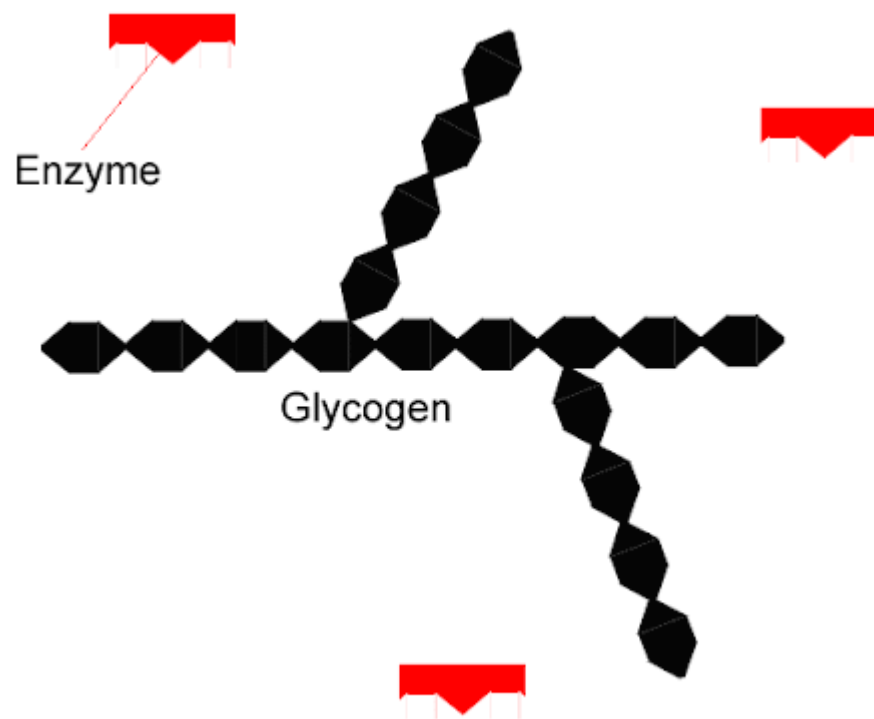


Fig. 1: Glycogen broken down to glucose

(<http://www.dynamicscience.com.au/tester/solutions1/chemistry/foodchemistry/glycogen.htm>)

As fasting continues over a longer period of time, fatty acids would also be broken down and produces ketone bodies, which is also an alternative source of energy for the body. Thus, there is a metabolic switch from **liver derived glucose** to **adipose derived ketone bodies** during the process of intermittent fasting.

This **alternative metabolic pathway** has **longevity benefits** as it is focused on **conserving energy and protecting the organism** during extended periods of food deprivation to optimize survival and reproduction once food becomes available. Moreover, as the body undergoes this metabolic pathway, specific proteins are activated that have been shown to have beneficial impacts on both **lifespan and healthspan**.

How is this relevant to ageing?

Ageing is a risk factor for many diseases and conditions that limit our healthspan. Some of these diseases include cardiovascular disease, diabetes, neurodegeneration and metabolic diseases. Accordingly, intermittent fasting has been shown to protect mice against conditions such as obesity, hyperinsulinemia and inflammation. Moreover, benefits such as **lower visceral fat levels, improved sleep** and **improved blood pressure** were observed¹. These are **crucial** indicators for an increased healthspan! Moreover, in a study that compared women who followed the 5:2 intermittent fasting regimen and women who followed a 25% caloric restriction diet, it was shown that women in both categories recorded **similar weight loss** over a 6 month period. However, women in the IF regimen had a **greater increase in insulin sensitivity** and a **larger reduction in waist circumference**².

Is eating important in intermittent fasting?

Yes!! The **refeeding process** in intermittent fasting is crucial! This is mainly because the **cycle** of fasting and refeeding are powerful promoters for stem cell renewal mechanisms and activators of tissue regeneration. The **reactivation and constant jumpstarting** of various metabolic pathways involved in the fasting–refeeding cycle are important for tissue regeneration! In fact, this regeneration was observed in different cell types

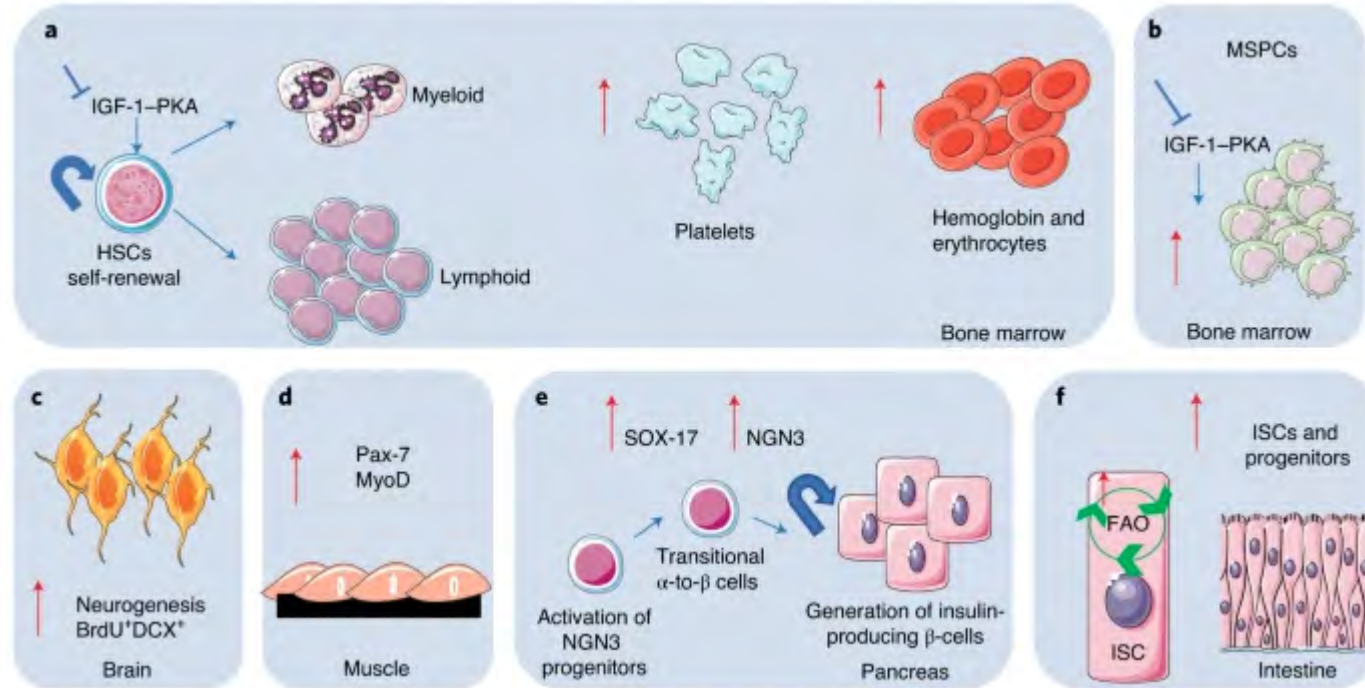


Fig. 2: Different cell types that are benefitted from the fast-refeeding cycle (Longo, 2021)

The tissue regeneration involved in intermittent fasting cycles have been shown to **protect mice from age related deterioration**³. Hence, it is definitely a promising avenue to healthy ageing!



It is known to many, if not all, that exercise is good. In fact, the list of health benefits that exercise can bring about is almost non-exhaustive, including **lower risks of cardiovascular disease, type II diabetes, osteoporosis and depression**⁴ just to name a few.

How does exercise lead to healthy ageing?

When you exercise, there is an increase in vital molecules in the body. These molecules, broadly known as nicotinamide derivatives (NAM, NAD, NR, NMN) have been shown to boost various biochemical pathways in your body that can eventually lead to a reduced incidence of age-related diseases. Moreover, these exercise-induced molecules can also boost the activity of a key enzyme, SIRT1 that plays a crucial role in **protecting us from oxidative stress-related cellular events, promoting DNA stability, and thereby decreasing various age-related disorders**⁵.

What are telomeres? Why do I hear that it is related to ageing and does exercise play a part in this?

Absolutely! In fact, increased telomere length is actually known to be associated with a better longevity. Basically, it works like this. Telomeres are found at the ends of your chromosomes (as seen below)

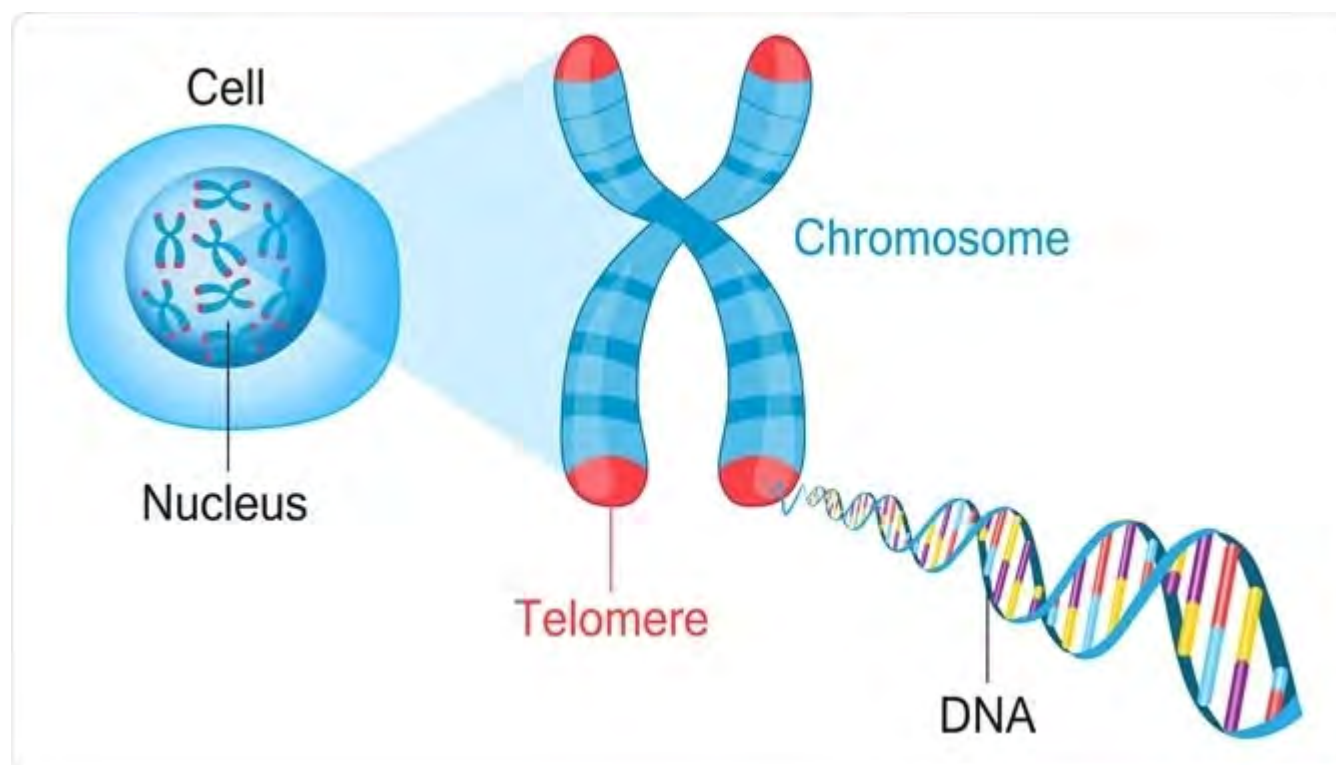


Fig. 3: Telomere ends in a chromosome Sourced from (<https://www.news-medical.net/news/20190902/DNA-methylation-closely-linked-to-telomere-length.aspx>)

Telomere ends contain DNA, and with each cycle of DNA division, telomeres are eroded. Eventually, when the length of the telomere becomes too short, the chromosome can no longer replicate. This leads the cell to reach a point call

senescence. Senescence is a **process by which a cell ages and permanently stops dividing but does not die**. Eventually, the cell could choose to trigger cell death to remove the cell. Accumulation of numerous senescent cells is associated with age related diseases!

Fig. 4: Action of telomerase on telomere ends Sourced from:
(<http://www.dynamicscience.com.au/tester/solutions1/advertisinbadsci/telo.html>)

However, telomere ends can be lengthened by an enzyme called telomerase, which ensures that telomeres do not become too short to trigger cell death. However, with age, telomere length is progressively reduced in tandem with reduced telomerase enzyme activity. A study observed that participants who were **less physically active exhibited shorter telomere lengths** as compared to participants with **higher physical exercise level**⁶. Specifically, the average difference in telomere length between physically inactive and active individuals was 200 nucleotides which corresponds to about **10 years!** Of course, while the causation of whether exercise attenuates telomere attrition is not yet established, elevated telomerase activity is speculated to be the missing link that bridges exercise and maintenance of telomere length.

How else can exercise increase longevity?

Exercise has been shown to stimulate the biogenesis (creation) of mitochondria in your cells! This is pretty cool because the mitochondria is the powerhouse of the cell, required to generate energy. When the mitochondria generates energy, it requires a molecule called NAD (Nicotinamide adenine dinucleotide). Thus, with the mitochondrial activity increased, NAD levels, in both its reduced form (NADH) and oxidized form (NAD⁺), increases in the cell. This will increase the activity of a protein known as SIRT1, which promotes stress resistance and as such, longevity.

How intensely should I exercise?

This is a great question! There seems to be a U-shaped association between vigorous exercise and mortality risk. This means that low and moderate levels of vigorous exercise significantly decreases both total and cardiovascular mortality risks. However, people who chronically engage in very high levels of vigorous exercise appear to lose most if not all of the protection against early mortality and cardiovascular disease due to cardiac overuse injury.

Additionally, the tribes that still follow the indigenous hunter-gatherer lifestyles primarily engage in light and moderate ranges of intensity and they exhibit remarkably robust health and virtually no CV disease. Meanwhile, people who sit and remain in an uninterrupted position for a longer duration of time display higher risk of death.

Thus, more is better when it comes to engaging in light or moderate exercise such as dancing, walking, or housework.

Is there a gold standard for exercise?

Various studies⁷ show that the optimal ‘dose’ or level of exercise is known as the ‘Goldilocks Zone’. This includes:

1. At least 150 minutes per week of moderate-intensity aerobic exercise or 75 minutes per week of vigorous-intensity aerobic activity, but not more than 4-5 cumulative hours per week of vigorous exercise, especially for those over 45 years of age

2. Important to take at least one day per week off from vigorous exercise
3. No concerns about an upper threshold for safety for leisure-time low-to-moderate intensity activities such as walking at a comfortable pace, housework, gardening, etc.
4. After every 30 consecutive minutes spent sitting, stand up and move, ideally walking briskly for about five minutes.

Hope this helps!

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Ageing Myths Debunked!,

Supplements

Written by: Samuel, Sriharini

Alpha-Ketoglutarate

Alpha-Ketoglutarate (yes, it is a mouthful so let's call it AKG) is one of the most promising compounds shown to have anti-ageing effects. Though a small molecule, AKG is actually an extremely important metabolite in our body that participates in a myriad of biological processes. For instance, AKG plays a vital role in **breaking down essential compounds in our body to generate energy!** Moreover, AKG plays a role in **collagen synthesis**, a protein that is crucial for healthy skin and hair.

Healthspan, defined as the period of life spent in good health, free from the chronic diseases and disabilities of aging

Kaberlein, 2018

In a 2020 study¹, it was found that AKG when delivered as a calcium salt (Ca-AKG) **increased both the healthspan and lifespan of mice**. Healthspan, defined as the period of life spent in good health, free from the chronic diseases and disabilities of aging², was studied using a frailty index that assessed 31 different characteristics that included loss of fur, tail stiffening, breathing rates, coat condition and intrinsic factors such as metabolic rates. Interestingly, it was found that mice treated with AKG showed **richer fur quality and significantly less fur loss than mice that were not treated with AKG**.

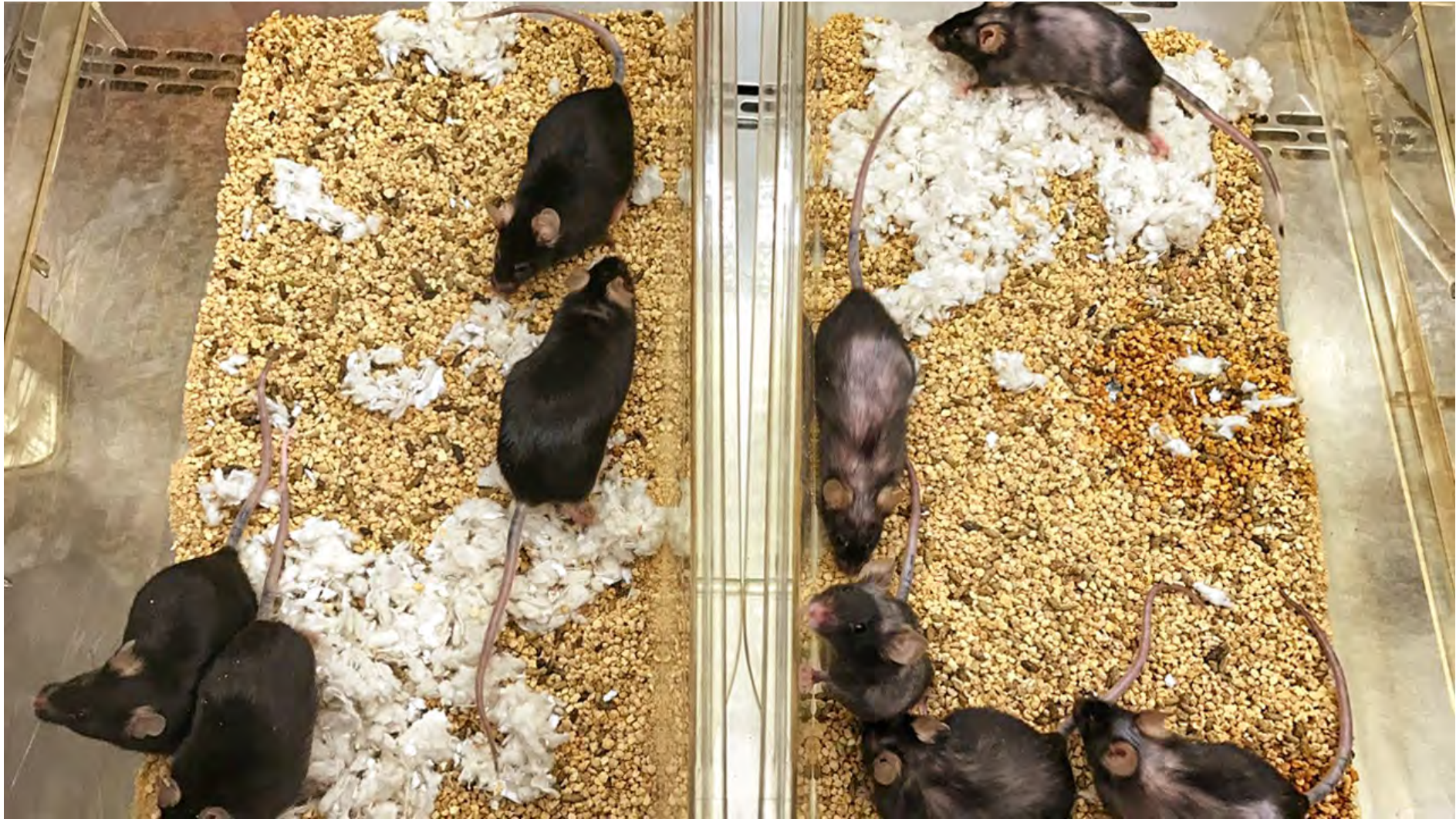


Figure 1: Mice on the left were treated with AKG supplements while mice on the right were not (Shahmirzadi et. al, 2020)

Moreover, studies also show how AKG supplements increased the bone mass of aged mice and even protected bone loss in adult mice. This provides suggestive evidence of its ability to protect against age-related osteoporosis, which is a common affliction amongst seniors.

A clinical trial of AKG involving 45 to 65 year olds is in progress at the Centre for Healthy Longevity at the National University of Singapore (NUS) which will illuminate the effects of this small but seemingly powerful compound on the ageing process. Watch this space for more updates on this!

Fisetin

Have you ever eaten an apple? What about grapes, onions or cucumbers? If so, you have actually consumed fisetin!

Fisetin is a compound that naturally occurs in plants, which is beneficial to us. It has been proven to be capable of killing cells in our body which are still alive, but barely functioning. These cells are known as senescent cells, which are no longer able to divide like normal, healthy cells. Compounds which are able to kill and remove these cells are known as senolytics, and fisetin is one such promising senolytic. While these barely-alive cells not being able to divide is good news in tumours, they often release proteins and other compounds. These may accumulate and cause detrimental effects, including chronic inflammation,



leading to cardiovascular problems, neurodegeneration and metabolism issues³.

Fisetin is able to remove these senescent cells, which was shown in a 2018 paper⁴. With the build up of these cells reduced, the problems they cause down the road are largely eliminated as well. This is one good way to increase one's healthspan and lifespan, allowing one to age healthily. These were proven using mice models. Not to fear, fisetin has been tested on human adipose tissues as well, which also

Senescence Associated secretory phenotype (SASP): Proteins and other metabolites secreted by senescent cells, causing downstream

damage

demonstrated a significant reduction of the proteins and chemicals that are usually secreted by the senescent cells.

When a particular enzyme (metalloproteinases) production is reduced by senescent cells⁵, it was found that collagen and elastin break down was reduced, leading to skin looking less aged.

These studies put together strongly suggest that adding the additional apple or cucumber to your meal could be an easy effective anti-ageing strategy in the long run.

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