Cocoa beans are a rich source of polyphenols, which are a class of antioxidant compounds that may have health benefits:

Polyphenols in cocoa

Cocoa beans contain about 6–8% polyphenols by dry weight, and the main types are catechins, anthocyanins, procyanidins, and flavonol glycosides.

Health benefits

Cocoa polyphenols may help reduce the risk of cardiovascular disease, lower blood pressure, and improve endothelial function. They may also help with inflammation, metabolism, and anti-atherosclerotic effects.

Other potential benefits

Cocoa polyphenols may also help with cognitive function, blood pressure in the elderly, and Alzheimer's disease.

Factors that affect polyphenol content

The chemical composition of cocoa beans can be affected by the variety of cocoa, where it was grown, the climate, and how it was processed after harvest.

Polyphenols are also found in other foods, such as tea and wine, but cocoa has higher levels of polyphenols, flavonoids, and antioxidant activity than these other foods.

Cocoa beans contain approximately 6–8% polyphenols by dry weight [6]. Polyphenols identified in cocoa beans and cocoa products comprise mainly catechins, flavonol glycosides, anthocyanins and procyanidins. As far as procyanidins are concerned, up to decamer ones have been identified in cocoa

Cocoa beans contain many polyphenols, including:

- **Catechins: A main polyphenol in cocoa beans**

Catechins are polyphenolic compounds found in plants like tea, wine, and cocoa products that have antioxidant properties and may help prevent disease:

Antioxidant activity
Catechins scavenge reactive oxygen species (ROS) and inhibit the formation of free radicals and lipid peroxidation. They also act as metal ion chelators, which can reduce lipid peroxidation biomarkers and improve lipid metabolism.
Modulate autophagy
Catechins increase the amount of Beclin-1, a protein that regulates autophagy and endocytosis. They also restore the expression of autophagy genes like Atg5 and LC3.
Neuroprotective effects
Catechins reduce the levels of apoptotic markers like Bad, Bax, caspase-3, and poly(ADP-ribose) polymerase (PARP).
Inhibit NADPH oxidase
Catechins inhibit the overexpression of NADPH oxidase, which is involved in proinflammatory and cytotoxic processes.
Prevent VSMC migration
Catechins inhibit MMP-2 expression, which prevents VSMC migration.

Catechins' therapeutic effects are due to a combination of their antioxidant properties and their ability to produce and scavenge free radicals

- **Epicatechins: A main polyphenol in cocoa beans**

Epicatechin, a type of flavonoid found in foods like cocoa and apples, primarily exerts its effects by acting as an antioxidant, modulating various signaling pathways, including the inhibition of inflammatory markers like

NF-κB, improving insulin sensitivity by activating AMPK, and potentially protecting against cell damage through its influence on mitochondrial function, thereby impacting cardiovascular health and glucose metabolism.

Key mechanisms of action:

Antioxidant activity:
Epicatechin can directly scavenge free radicals due to its phenolic structure, helping to protect cells from oxidative stress.
Inflammation regulation:
By inhibiting the NF-κB signaling pathway, epicatechin can suppress the production of inflammatory cytokines, contributing to anti-inflammatory effects.
Insulin sensitivity enhancement:
Studies suggest that epicatechin can improve insulin sensitivity by activating AMPK (AMP-activated protein kinase), an enzyme crucial for glucose metabolism.
Endothelial function:
Epicatechin can promote nitric oxide production by activating endothelial nitric oxide synthase (eNOS), thereby improving blood vessel function.
Mitochondrial protection:
Research indicates that epicatechin may protect mitochondria from damage by regulating the mitochondrial permeability transition pore (mPTP), potentially contributing to cell survival.
Cell signaling pathways:
Epicatechin can interact with various signaling pathways including PI3K/Akt, which plays a role in cell growth, survival, and metabolism.

Important points to consider:

Absorption and metabolism:
The bioavailability of epicatechin can vary depending on factors like food matrix and individual metabolism.

Dosage and source:
Cocoa is a rich source of epicatechin, and studies often use cocoa extracts to investigate its potential health benefits.

Research limitations:
While promising research exists, further studies are needed to fully understand the mechanisms of epicatechin and its potential therapeutic applications in humans

- **Anthocyanins: A main polyphenol in cocoa beans**

Anthocyanins primarily function through their potent antioxidant properties, primarily by scavenging free radicals and inhibiting the formation of reactive oxygen species (ROS), which can lead to cellular damage; they achieve this by directly interacting with free radicals due to their chemical structure, and can also modulate various cellular signaling pathways, including the NF-κB pathway, to exert anti-inflammatory effects.

Key points about anthocyanin mechanism of action:

Antioxidant activity:
This is the primary mechanism, where anthocyanins act as free radical scavengers, preventing oxidative stress in the body by neutralizing harmful reactive oxygen species.
Anti-inflammatory effects:
Anthocyanins can suppress inflammatory responses by inhibiting the activation of the NF-κB signaling pathway, which is crucial in regulating the production of pro-inflammatory cytokines.
Cell signaling modulation:
Studies suggest anthocyanins can interact with various signaling pathways, including MAPKs (mitogen-activated protein kinases) and PI3K/Akt, potentially influencing cell growth, differentiation, and apoptosis.

Enzyme inhibition:
Anthocyanins may also exert their effects by inhibiting certain enzymes involved in the production of reactive oxygen species, like xanthine oxidase.
Gene expression regulation:
Research indicates that anthocyanins can modulate gene expression by activating the Nrf2 pathway, which is involved in the production of antioxidant enzymes.

Potential health benefits attributed to anthocyanin activity:

Cardiovascular health:
By reducing oxidative stress and inflammation, anthocyanins may contribute to maintaining healthy blood pressure and reducing the risk of cardiovascular diseases.
Cancer prevention:
Their antioxidant and anti-inflammatory properties could potentially inhibit cancer cell growth and metastasis.
Neuroprotection:
Anthocyanins may help protect neurons from oxidative damage, potentially benefiting brain health.
Improved metabolic health:
Studies suggest they may play a role in regulating blood sugar levels and reducing insulin resistance.

Important considerations:

Dietary sources:
Anthocyanins are naturally found in various fruits and vegetables, including blueberries, blackberries, raspberries, purple grapes, and red cabbage.
Stability concerns:
Anthocyanins are sensitive to factors like pH, light, and temperature, which can affect their bioavailability.
Further research needed:
While research is promising, more studies are required to fully understand the mechanisms and potential therapeutic applications of anthocyanins in humans.

- **Procyanidins: A main polyphenol in cocoa beans, including decamer procyanidins**

Procyanidins primarily work by exerting antioxidant and anti-inflammatory effects through various mechanisms, including inhibiting the activation of the NLRP3 inflammasome, suppressing NF-κB signaling pathway, reducing reactive oxygen species (ROS) production, and modulating the expression of inflammatory cytokines like IL-1β, TNF-α, and IL-6, often by interacting with cellular components like protein kinases and transcription factors; this mechanism is particularly relevant in conditions like cardiovascular disease, neurodegenerative disorders, and inflammatory bowel disease.

Key points about procyanidin mechanism of action:

Antioxidant activity:
Procyanidins act as free radical scavengers due to their phenolic structure, helping to neutralize harmful ROS and protect cells from oxidative stress.
Inflammation inhibition:
They can suppress the activation of the NLRP3 inflammasome, a key pathway involved in inflammatory responses, by inhibiting caspase-1 activation and subsequent cytokine release.
NF-κB pathway modulation:
Procyanidins can inhibit the nuclear translocation of NF-κB, a transcription factor crucial for inflammatory gene expression, by preventing the degradation of its inhibitor, IκB.
Cellular signaling effects:
They can influence various signaling pathways like MAPKs (mitogen-activated protein kinases) to regulate inflammatory responses and cell survival.

Tissue protection:
By modulating cellular processes like apoptosis and autophagy, procyanidins may protect tissues from damage caused by oxidative stress and inflammation.

Specific examples of procyanidin effects:

Cardiovascular health:
May protect against atherosclerosis by reducing inflammation and improving endothelial function.
Neuroprotection:
Potential to mitigate neurodegenerative diseases by inhibiting neuronal damage caused by oxidative stress and inflammation.
Cancer prevention:
May exhibit anti-tumor properties by inhibiting cell proliferation and inducing apoptosis in cancer cells.
Oral health:
Can help prevent gum disease by reducing inflammation and bacterial adhesion in the oral cavity.

Important considerations:

Source of procyanidins:
These compounds are primarily found in plant sources like grape seeds, cranberries, pine bark, and cocoa.
Bioavailability:
Absorption of procyanidins can be limited, and further research is needed to optimize their delivery and bioavailability.

- **Flavonol glycosides: A polyphenol in cocoa beans**

Flavonol glycosides primarily exert their biological effects through their antioxidant properties, primarily by directly scavenging free radicals,

chelating metal ions like iron, and modulating the activity of enzymes involved in reactive oxygen species (ROS) production, often acting via mechanisms like inhibiting inflammatory pathways and influencing gene expression, depending on the specific flavonol glycoside and cellular context; their glycosylation pattern significantly impacts their bioavailability and activity within the body.

Key points about flavonol glycosides mechanism of action:

Antioxidant activity:
This is the most well-studied mechanism, where flavonol glycosides act as free radical scavengers, preventing oxidative damage to cells by neutralizing harmful reactive oxygen species (ROS) like superoxide and hydroxyl radicals.
Metal chelation:
Flavonols can bind to metal ions like iron, preventing them from participating in Fenton chemistry which generates highly reactive hydroxyl radicals.
Enzyme inhibition:
Certain flavonol glycosides can inhibit the activity of enzymes responsible for ROS production, like xanthine oxidase and NADPH oxidase.
Anti-inflammatory effects:
By modulating the expression of inflammatory mediators like cytokines and chemokines, flavonol glycosides can suppress inflammatory responses within the body.
Signal transduction pathways:
They can interact with various signaling pathways, including the NF-κB pathway, which plays a key role in regulating inflammatory responses.
Cellular protection:
Flavonol glycosides may protect cells from damage caused by oxidative stress, including DNA damage, lipid peroxidation, and protein denaturation.

Important factors influencing flavonol glycoside activity:

Glycosylation pattern:
The type and position of sugar molecules attached to the flavonol aglycone significantly impact its solubility, absorption, and biological activity.
Structure-activity relationship:
The specific chemical structure of the flavonol glycoside determines its potency and selectivity for different biological targets.

Examples of flavonol glycosides and their potential health benefits:

- **Quercetin: Known for its potent antioxidant and anti-inflammatory properties, potentially beneficial for cardiovascular health and cancer prevention.**
-
- **Kaempferol: May have anti-cancer and anti-diabetic effects.**
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- **Myricetin: Demonstrates strong antioxidant activity and potential neuroprotective effects.**

- **Flavones: A polyphenol in cocoa, including apigenin, quercetin, luteolin, and kaempferol**

Flavones, a type of flavonoid, primarily exert their biological effects by acting as antioxidants, meaning they can neutralize free radicals, and by modulating inflammatory pathways through mechanisms like inhibiting key enzymes (like cyclooxygenase-2) and transcription factors (like NF-κB), ultimately reducing the production of pro-inflammatory cytokines, thereby contributing to anti-inflammatory activity across various bodily systems.

Key points about flavones' mechanism of action:

Antioxidant activity:
Flavones can directly scavenge reactive oxygen species (ROS) due to their

chemical structure, which allows them to donate electrons and stabilize free radicals.

Regulation of inflammatory pathways:

- **Inhibition of NF-κB: Flavones can suppress the activation of nuclear factor-κB (NF-κB), a key transcription factor responsible for the expression of inflammatory genes.**
-
- **Enzyme inhibition: They can inhibit the activity of enzymes like cyclooxygenase-2 (COX-2) and lipoxygenase, which are involved in the production of inflammatory mediators like prostaglandins and leukotrienes.**
-

Cell signaling modulation:

Flavones can interact with various cell signaling pathways, influencing cell proliferation, differentiation, and apoptosis.

Potential therapeutic applications:

Due to their anti-inflammatory and antioxidant properties, flavones are being studied for their potential in treating conditions like cardiovascular disease, cancer, arthritis, and neurodegenerative diseases.

Important factors affecting flavone activity:

Chemical structure:

The specific arrangement of functional groups on the flavonoid molecule determines its potency and selectivity for different biological targets.

Dosage and bioavailability:

The amount of flavones consumed and their ability to be absorbed by the body can influence their biological effects

Flavonoids act as bactericidal and bacteriostatic by damaging cytoplasmic membrane, inhibiting energy metabolism and inhibiting synthesis of nucleic acids against different microorganisms.

- **Polyphenolic acids: A polyphenol in cocoa, including caffeic acid, chlorogenic acid, ferulic acid, coumaric acid, and syringic acid**

Polyphenolic acids primarily function by acting as antioxidants, directly scavenging free radicals through their phenolic hydroxyl groups, thereby preventing oxidative damage to cells and tissues; they can also modulate various cellular signaling pathways to exert anti-inflammatory, anti-cancer, and other beneficial effects depending on the specific polyphenol and its concentration.

Key mechanisms of action:

Free radical scavenging:
This is the primary mechanism, where the phenolic groups within polyphenolic acids readily donate hydrogen atoms to reactive oxygen species (ROS) like superoxide radicals, neutralizing them and preventing chain reactions of oxidative damage.
Metal chelation:
Some polyphenols can bind to transition metals like iron and copper, preventing them from catalyzing the formation of harmful free radicals through Fenton chemistry.
Enzyme inhibition:
Polyphenols can inhibit enzymes involved in the production of reactive oxygen species, such as NADPH oxidase, and can also activate antioxidant enzymes like superoxide dismutase and glutathione peroxidase.
Signaling pathway modulation:

- **Inflammation: By interacting with specific receptors, polyphenols can suppress the production of pro-inflammatory cytokines and chemokines, thereby reducing inflammation.**
-

- **Cell proliferation and apoptosis: Some polyphenols can influence cell cycle progression and induce apoptosis in cancer cells by affecting signaling pathways like MAPK and PI3K/Akt.**
- **Gene expression regulation: Polyphenols can modulate gene expression by interacting with transcription factors, leading to changes in cellular functions.**

Factors influencing polyphenolic acid activity:

Structure:
The specific arrangement of phenolic groups and other functional groups on the molecule determines its antioxidant potency and potential biological effects.
Concentration:
Higher concentrations of polyphenols generally lead to increased biological activity, but can also reach a point of saturation or potential toxicity.
Bioavailability:
The ability of the body to absorb and utilize polyphenols is crucial for their therapeutic potential, which can be influenced by factors like food matrix, processing methods, and gut microbiota.

Examples of polyphenolic acids and their potential health benefits:

- **Caffeic acid: Found in coffee, may have anti-inflammatory and antioxidant properties.**
- **Ferulic acid: Present in grains, may protect against UV damage and possess antioxidant activity**
- **Rosmarinic acid: Found in rosemary, with potential anti-inflammatory and antimicrobial effects**

- **Gallic acid: Abundant in tannins, may exhibit anti-cancer and antioxidant properties**

- **Caffeoyl-conjugates: A polyphenol in cocoa, including clovamide and deoxyclovamide**
- **(NOT MUCH INFORMATION) https://pubmed.ncbi.nlm.nih.gov/8824943/**

- **Stilbens: A polyphenol in cocoa, including trans-resveratrol and its glycoside, trans-piceid**

Stilbenes, a class of natural compounds found in plants, primarily exert their biological effects by acting as antioxidants, modulating inflammatory pathways through inhibition of transcription factors like NF-κB, and influencing cell cycle regulation by targeting various protein kinases, ultimately leading to potential anti-cancer, anti-inflammatory, and cardioprotective properties depending on the specific stilbene molecule involved.

Key points about stilbene mechanism of action:

Antioxidant activity:
Stilbenes can directly scavenge reactive oxygen species (ROS) due to their phenolic structure, helping to mitigate oxidative stress within cells.
NF-κB inhibition:
A key mechanism of action is the suppression of the nuclear factor kappa B (NF-κB) signaling pathway, which plays a central role in inflammatory responses. By inhibiting NF-κB activation, stilbenes can reduce the production of pro-inflammatory cytokines.

MAPK pathway modulation:
Stilbenes can also influence the mitogen-activated protein kinase (MAPK) signaling cascade, another important pathway involved in inflammation and cell proliferation.
Cell cycle regulation:
Studies indicate that stilbenes can arrest cell cycle progression at different phases, potentially contributing to their anti-tumorigenic effects by inhibiting cell proliferation.
Sirtuin activation:
Some stilbenes, like resveratrol, have been shown to activate sirtuins, a family of proteins involved in longevity and metabolic regulation.

Examples of stilbenes and their potential effects:

- **Resveratrol: Found in grapes, known for its antioxidant and anti-inflammatory properties, potentially beneficial for cardiovascular health.**
- **Pterostilbene: Found in blueberries, considered to have even greater antioxidant potency than resveratrol.**
- **Piceatannol: A more potent stilbene with potential anti-cancer activity.**

Important considerations:

Dosage and bioavailability:
The bioavailability of stilbenes can be limited due to their poor absorption, so proper formulation and delivery systems may be necessary to maximize their therapeutic effects.
Individual variations:
The effects of stilbenes may vary based on individual factors like genetics and dietary intake.

The polyphenol profile of cocoa can vary depending on several factors, including the plant genotype, geographic area, ripeness of the beans, and how the cocoa is processed.

Cocoa is considered a functional food because it contains compounds that have health benefits, such as antioxidant, anti-inflammatory, antimicrobial, analgesic, and vasodilator properties.

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FLAVONOID PROFILE:

The main flavonoids in cocoa are:

- **Catechin: A simple form of flavanol**
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- **Epicatechin: A simple form of flavanol and the main monomeric flavanol in cocoa**
-
- **Procyanidins: Linked chains of flavanols**
-

Cocoa also contains other bioactive compounds, including:

- **Phenolic antioxidants**
- **Polyphenols**
- **Stearic acid, a fat that has a neutral effect on cholesterol**
- **Trace minerals**
-

Cocoa flavanols are plant-based nutrients that can have many beneficial effects, including:

- **Antioxidant protection: Cocoa contains more phenolic antioxidants than most foods.**
- **Vascular health: Cocoa flavanols can modulate vascular homeostasis and improve vascular endothelium.**
- **Reduced risk of diabetes: Cocoa's antioxidant effects may help reduce insulin resistance.**
- **Improved cognitive function and mood: Cocoa consumption may have beneficial effects on cognitive function and mood.**
- **Protection from UV radiation: Cocoa can protect the skin from oxidative damage from UV radiation.**
-

The exact flavanol content of chocolate is not usually listed on the label, but here are some rough estimates:

- **20g of dark chocolate (60% cocoa solids) contains 34mg of flavanols**
- **20g of milk chocolate contains 14mg of flavanols**

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OTHER BOTANICALS WITH IDENTICAL OR SIMILAR POLYPHENOLS & FLAVONOIDS TO THAT OF COCOA:

Many plants and beverages contain catechins, including:

- **Green tea: Unfermented green tea is the best source of catechins.**
-
- **Black tea: Catechins are also found in black tea.**
-
- **Berries: Strawberries, blackberries, and raspberries are rich in catechins.**
-
- **Grapes: Black grapes are high in catechins.**
-
- **Wine: Red wine and cider contain catechins.**

-
- **Fruits: Apples, apricots, cherries, pears, and persimmons contain catechins.**
-
- **Vegetables: Broad beans contain catechins.**
-
- **Chocolate: Chocolate contains catechins.**
-
- **Baiyacha: A wild tea plant from Fujian, China, that is high in catechins.**
-
- **Peanuts and coca: Contain procyanidins, which are oligomers derived from catechins.**
-

Catechins are polyphenols that have antioxidant, antibacterial, and anti-diabetic properties. They work by scavenging free radicals and oxidative stress by binding to metals, lipids, nucleic acids, and proteins in tissues.

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Many plants contain anthocyanins, including:

- **Berries**: Blueberries, strawberries, raspberries, blackberries, cranberries, cherries, and red or violet grapes
-
- **Vegetables**: Red cabbage, eggplant, and red onions
-
- **Grains**: Black rice and purple corn
-
- **Legumes**: Black soybeans
-
- **Flowers**: Hibiscus, roses, cornflower, blue chicory, blue rosemary, purple mint, purple passion flower, purple sage, common violet, and lavender
-

- **Herbs and spices**: Blackcurrant, bilberry, and black elderberry
-
- **Other**: Red-fleshed peaches and apples, Okinawan sweet potato, Concord grape, muscadine grape, and ube
-

Anthocyanins are pigments that give plants their red, purple, and blue colors. They are strong antioxidants and have many potential health benefits, including:

- Reducing the risk of heart disease
-
- Improving brain function
-
- Protecting organs like the liver, cardiovascular system, gastrointestinal tract, and kidneys
-
- Improving bone health and obesity
-
- Regulating glucose and lipid metabolism
-

Anthocyanins are also used as food colorants and dyes

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>
> Procyanidins, including the lesser bioactive / bioavailable polymers (4 or more catechines), represent a group of condensed flavan-3-ols that can be found in many plants, most notably apples, maritime pine bark, cinnamon, aronia fruit, cocoa beans, grape seed, grape skin,[1] and red wines of *Vitis vinifera* (the common grape).[2] However, bilberry, cranberry, black currant, green tea, black tea, and other plants also contain these flavonoids.[3] Procyanidins can also be isolated from *Quercus petraea* and *Q. robur* heartwood (wine barrel oaks).[4] Açaí

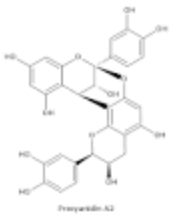
oil, obtained from the fruit of the açaí palm (*Euterpe oleracea*), is rich in numerous procyanidin oligomers.[5]

Apples contain on average per serving about eight times the amount of procyanidin found in wine, with some of the highest amounts found in the Red Delicious and Granny Smith varieties.[6]

The seed testas of field beans (*Vicia faba*) contain procyanidins[7] that affect the digestibility in piglets[8] and could have an inhibitory activity on enzymes.[9] *Cistus salviifolius* also contains oligomeric procyanidins

Many plants contain procyanidins, including:

- **Fruits**: Blueberries, strawberries, apples, grapes, kiwis, cranberries, cherries, apricots, mangoes, persimmons, litchi, durian, and mangosteen
- **Nuts**: Almonds, hazelnuts, walnuts, pistachios, and peanuts
- **Crops**: Barley, sorghum, red rice, soybeans, and cocoa
- **Other plants**: Maritime pine bark, cinnamon, aronia fruit, grape seed, grape skin, coconut husk, açaí palm fruit, Quercus petraea and Q. robur heartwood, Cinchona pubescens, Cinnamomum verum, Crataegus monogyna, and Uncaria guianensis
- **Processed drinks**: Fruit juices, wine, and beer



Procyanidins are a class of polyphenols that are found throughout the plant, including in the seeds, leaves, fruits, flowers, skins, and shells. They are responsible for the red, blue, or purple colors of many plants' fruit or flowers. Procyanidins have anti-inflammatory properties and may help prevent cancer

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Many plants contain flavonol glycosides, including:

- **Fruits**: Apples, grapes, berries, and more. The concentration of flavonol glycosides in fruit varies, and is often higher in the outer parts of the fruit.
- **Vegetables**: Onions, kale, broccoli, spinach, rutabagas, leeks, and more. The concentration of flavonol glycosides in leafy vegetables is higher in the outer leaves.
- **Herbs and spices**: Chamomile, mint, and ginkgo biloba.
- **Tea and juices**: Green tea, apple juice, and cranberry juice.
- **Wine**: Red wine.

Flavonol glycosides are also found in the form of quercetin, kaempferol, and myricetin.

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NOW FOR THE NEXT PART: STEM CELL REGENERATION WITH COCOA FINDINGS:

Yes, cocoa can help with stem cells:

Stem cell function

Cacao contains bioactive compounds, especially flavanols, that can improve stem cell function and mobilization. In one study, participants who drank a chocolate drink made with high-flavanol cocoa had twice as many stem cells in their circulation as those who drank a low-flavanol cocoa drink.

Stem cell regeneration

Dark chocolate can help mobilize stem cells to carry out their job of regenerating the body. In one study, participants who drank a chocolate drink made with cocoa twice a day for 30 days had twice as many stem cells in their circulation as the control group.

Gut microbiome

Cacao can also positively impact the gut microbiome by feeding healthy gut bacteria. These bacteria produce compounds that can reduce inflammation and improve glucose and lipid metabolism.

Cardiovascular health

The Cosmos study found that eating high-flavanol cocoa can decrease the risk of cardiovascular death.

Dark chocolate that contains 70-80% cacao or higher is rich in polyphenols and magnesium.

Dark chocolate that contains 70-80% cacao or higher is rich in polyphenols and magnesium.

They also concluded that ingesting your daily ration of cacao through two cups of dark hot chocolate can double the number of stem cells in your blood stream at any time.

HERE ARE SOME AMAZING REFERENCE FINDINGS BY DOCTORS:

1. https://drwilliamli.com/health-benefits-of-cacao/
2. https://stemwell.co/does-dark-chocolate-increase-stem-cell-production/#:~:text=Dark%20chocolate%20that%20contains%2070,blood%20stream%20at%20any%20time.

OTHER STEM CELL REPLENISHING HERBS:

Chinese Herbs: Panax ginseng and Panax notoginseng, notable Chinese herbs, are known to aid the proliferation and differentiation of neural and mesenchymal stem cells.

Cruciferous vegetables such as cauliflower, Broccoli, kale, cabbage, bok choy, garden cress & Brussels sprouts are some of the best foods for stem cell growth. These veggies are full of the sulforaphane compound, which boots enzymes in the liver that counteract harmful toxins we might digest or breathe in

Some mushrooms that may stimulate stem cell production include:

- **Cordyceps sinensis**: A parasitic fungus that may accelerate stem cell recruitment and expansion in human skeletal muscle after exercise
-
- **Ganoderma petchii**: A mushroom that may stimulate umbilical cord mesenchymal stem cells
-
- **Ganoderma lucidum**: An edible medicinal mushroom that may have antiaging properties and enhance telomerase activity
-
- **Maitake**: A mushroom that may enhance differentiation and migration of hematopoietic cells
-
- **Lion's mane**: An edible mushroom that may improve brain cell growth and memory
-

Other mushrooms that may have biological activity include:

Pleurotus
May stimulate NK cell, macrophage, and T cell proliferation

Lentinula edodes
May stimulate the release of cytotoxic and cytostatic IL-1, IL-2, IL-6, IL-8, TNF-, and TNF

Trametes versicolor
May have apoptosis, antiangiogenesis, antimetastasis, and immune modulation properties

Agaricus
May induce apoptosis, inhibit angiogenesis, and stimulate TNF-α production by BMM

Some herbs that may help stimulate stem cell production include:

- **Panax ginseng and Panax notoginseng**
  These Chinese herbs can help with the differentiation and proliferation of mesenchymal and neural stem cells.
- **Turmeric**
  Contains curcumin, which can increase stem cell proliferation and has antioxidant and anti-inflammatory properties.

Other ways to increase stem cell production include:

- **Exercise**
  An active lifestyle with lots of exercise can increase the number of circulating stem cells in the body.
- **Supplements**
  Vitamin C and D, glucosamine, chondroitin, fish oil, and resveratrol may help increase stem cells.
    - **Fasting**
      Fasting for at least 24–48 hours without consuming calories may help increase stem cells. However, you should consult your doctor before starting a fasting program.

Thank you for all your time and support. In this day and age it is our responsibility for self education and preservation. That's what JJ Medicinals is all about collecting all the testimonials, evidence, and findings and combining them together for a definitive answer and wisdom resource. I decided to include additional plants and fungi for stem cell regeneration, as the cocoa bean is currently under attack and becoming scarce due to a new progressive fungus called " Moniliophthora roreri " lurks in most cacao-growing countries of Central and South America. This fungus causes "frosty pod rot," a disease that can destroy as much as 90 percent of the beans from which cocoa, cocoa butter, and ultimately chocolate are made.

I feel we need to adapt the cocoa bean to northern hemispheres to preserve this phenomenal natural medicine and super food. I'm glad i was able to share this information with you all and stay educated and happy healing.

John C. Barlow - jjmedicinals.com