

15 | NATURAL  
STRATEGIES  
TO  
REGENERATE  
YOUR BODY AND MIND



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The Science of Natural Healing

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STRATEGIES  
TO  
REGENERATE  
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By GreenMedInfo Research Group

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## INTRODUCTION

There's a widespread misconception that youth, for all intents and purposes, is fleeting – something that lasts but a moment in the span of a lifetime. But what if we told you that when a cell in your body dies, it's not the final word? Further, programmed cell death, otherwise known as apoptosis, is normal and welcome in many cases, serving as a necessary counterbalance to your body's ability to regenerate.

That's right. Your body can regenerate, and you can actively harness the powers of nature and make conscientious lifestyle choices to support its regenerative processes. While it was once believed, for instance, that brain cells only decline with age, it's now known that you can create new ones, at all ages, and elderly people may even generate a similar number of new brain cells as those in their youth.<sup>1</sup>

We like to describe the ceaseless regeneration that occurs in your body as a flame, one that will continue burning as long as you provide it with the proper fuel. It's possible for the fire to go out, and indeed regeneration is challenged daily by toxic exposures, but it's also possible to keep it alive, using methods that are often inexpensive and may be at your disposal right now.

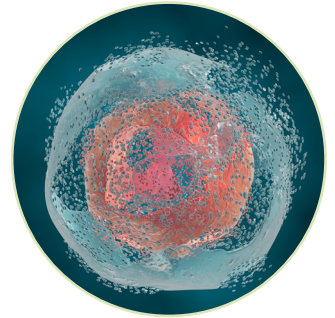
With the information that follows, you can take action to support regeneration for long-term health and vitality.

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1 [Cell Stem Cell April 5, 2018, Volume 22, Issue 4, P589-599.E5](#)

# THE INTRICATE DANCE BETWEEN PROGRAMMED CELL DEATH AND REGENERATION

The human body is conventionally regarded as being either alive or dead, when in reality it exists in a continual state of both. Apoptosis, or programmed cell death, is a normal and controlled part of growth and development. While in the womb, it's apoptosis that causes the webbing between your fingers and toes to disappear, leaving you with 10 separate fingers and 10 separate toes.<sup>2</sup>



Apoptosis also plays a role in brain function and menstruation in women, and much more. Though it may sound counterintuitive, by committing “cellular suicide,” apoptosis maintains homeostasis in your body, helping to eliminate cells with DNA damage, for instance, or remove cells that were only needed for a temporary task.

One of the clearest examples of the benefits of apoptosis is in relation to cancer. Cells with DNA damage are dysfunctional and can be harmful to the body. Apoptosis exists to eliminate these dysfunctional cells, but a hallmark of cancer is that the malignant cells are able to evade apoptosis.<sup>3</sup> Without this crucial balance, cancerous cells continue to grow out of control and can ultimately bring down the whole organism.

Senescent cells, which have stopped dividing and tend to accumulate with age, are another example. Cellular senescence is believed to occur in stressed cells as a tumor-suppressor mechanism, stopping cellular reproduction in order to protect against cancer.<sup>4</sup>

But these cells, even if they're non-cancerous, can become harmful as they accumulate, as they crowd out healthy, regenerating cell lines. As such, elimination of senescent cells is believed to promote longevity and antiaging. There are at least [703 natural substances](#), such as curcumin, the active component in the spice turmeric, and resveratrol, found in grape skins, that have apoptotic properties and serve as a balance to cellular regeneration.

You see, this process of cell death comes with a life-giving counterpart. While your cells are capable of self-destructing, they're also capable of regenerating, which means your body can create new cells to replace those that are damaged, and in so doing turn over new cells to regenerate the tissues and organs made of them.

1 [Cell Stem Cell April 5, 2018, Volume 22, Issue 4, P589-599.E5](#)

2 [Cell Death Differ. 2013 May; 20\(5\): 669–675.](#)

3 [Biooncology, Evasion of Apoptosis: A Hallmark of Cancer](#)

4 [Nature. 2014 May 22; 509\(7501\): 439–446.](#)

Your body's regenerative processes are dynamic, however, and are influenced by age, chronic stress, lifestyle and exposure to environmental pollution. All of these factors can slow or halt regeneration in your body, and when this occurs a disease state may take over.

However, it's possible – using surprisingly simple methods and natural substances – to support and boost your body's regenerative potential to achieve high levels of health and well-being.

## WHICH TISSUES CAN BE REGENERATED?

The study of cell and tissue regeneration is still in its infancy, but regenerative medicine is a rapidly advancing field aimed at helping to stave off disease and slow human aging. Synthetic drug-based solutions are, unfortunately, a primary focus of this field in conventional medicine, but natural regeneration has occurred since ancient times.

In fact, even the National Institutes of Health's National Institute of General Medical Sciences (NIGMS) states, "All living organisms regenerate as part of natural processes to maintain tissues and organs."<sup>5</sup> Some organisms are more efficient regenerators than others, however.

NIGMS uses the examples of the hydra, a freshwater animal that can regenerate two whole bodies after being cut in half. A Mexican salamander known as the axolotl can also regenerate new limbs, organs and other body parts. Sea urchins, zebrafish and the planarian, a freshwater flatworm, are other examples of organisms capable of regenerating significant portions of their body and organs.<sup>6</sup>

Regenerative abilities in humans, though believed to be more limited, also exist. If part of your liver is destroyed, for instance, it can be regenerated to its previous size and function.

"Our kidneys, pancreas, thyroid, adrenal glands, and lungs compensate for organ loss in a similar, but more limited, way," NIGMS notes.<sup>7</sup> Some of the more exciting advances in regenerative medicine have revealed, however, that areas of the human body once believed to be finite may also have regenerative potential. This includes the following:

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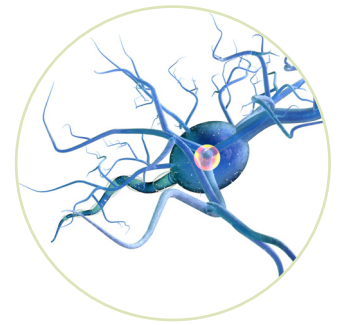
5 [National Institutes of Health's National Institute of General Medical Sciences, Regeneration](#)

6 [National Institutes of Health's National Institute of General Medical Sciences, Regeneration](#)

7 [National Institutes of Health's National Institute of General Medical Sciences, Regeneration](#)

## NERVE CELLS

Neurogenesis, the growth of new neurons, and neuritogenesis, the formation of neurites, are examples of regeneration within the nervous system.



“Extensive research has shown that long after postnatal development the brain continues to birth new neurons (neurogenesis), primarily in the dentate gyrus of the hippocampus, a structure well known for memory processing,” researchers wrote in *BMC Complementary and Alternative Medicine*.<sup>8</sup>

Remyelinating compounds, which stimulate the repair of the protective sheath around the axon of the neurons known as myelin, also exist and have shown promise in treating multiple sclerosis and other neurodegenerative diseases and injury.

Berberine, which is found in the goldenseal plant, hemp seed oil and vitamin D are examples of [substances that support remyelination](#), whereas statin drugs have been found to inhibit myelin formation.<sup>9</sup>

## BETA CELLS

Numerous natural compounds have been found to regenerate the insulin-producing beta cells, which are gradually destroyed in insulin dependent, or type 1, diabetes, and do not produce enough insulin in type 2 diabetes.

If beta cells could be effectively regenerated, or the survival of existing beta cells could be prolonged, it could allow people with type 1 diabetes to live without the need for external insulin. *Gymnema sylvestre*, which has been used in traditional Ayurvedic medicine for centuries, is an example of a natural substance that supports beta cell regeneration.

This woody shrub may stimulate the secretion of insulin in beta cell lines<sup>10</sup> and may even increase the number of beta cells in the pancreas.<sup>11</sup> Black cumin (*Nigella sativa* L.) is another compound that has led to partial regeneration of beta cells in animal studies.<sup>12</sup>

8 [BMC Complement Altern Med. 2016; 16: 26.](#)

9 [J Neurosci. 2008 Dec 10 ;28\(50\):13609-14. PMID: 19074034](#)

10 [Evid Based Complement Alternat Med. 2015; 2015: 629863.](#)

11 [Phytomedicine. 2010 Nov;17\(13\):1033-9. doi: 10.1016/j.phymed.2010.03.019. Epub 2010 Jul 27.](#)

12 [Tohoku J Exp Med. 2003 Dec;201\(4\):213-9. PMID: 14690013](#)

## HORMONES

Secretagogues exist that may increase the endocrine glands' ability to secrete hormones, while other compounds can regenerate hormones that have degraded. In the latter case, this includes vitamin C, which may contribute electrons to resurrect the form and function of estradiol, progesterone and testosterone. In one study, researchers noted:<sup>13</sup>

*“The reported results concerning the regeneration of hormones by the transfer of electrons from an electron donor [vitamin C] offer a new, promising method for the therapy with hormones. As a consequence of the regeneration of hormones, a decreased formation of carcinogenic metabolites is expected.”*

Gamma aminobutyric acid (GABA), an amino acid, is another secretagogue that increases serum growth hormone concentration.<sup>14</sup> While GABA is available in supplement form, you can also stimulate its production naturally by eating foods with glutamate, such as grass-fed meat, eggs and dairy products, mushrooms and seaweed.

L-arginine, another amino acid, is also a secretagogue that may increase growth hormone secretion,<sup>15</sup> along with progesterone.<sup>16</sup> Boosting human growth hormone is important, as levels tend to decline after age 30. Such declines are associated with many of the hallmarks of aging, including declines in muscle mass, increases in body fat and thinning bones.

Like GABA, L-arginine is available in supplement form, but you can also find it via whole foods, including coconut, pumpkin seeds, seaweed, grass-fed meat and nuts. Maintaining healthy levels of magnesium, by eating magnesium-rich foods such as avocados, leafy greens, nuts and seeds, is also important, as magnesium intake is associated with the hormones testosterone and insulin-like growth factor 1 (IGF-1).<sup>17</sup>

13 [Radiat Phys Chem Oxf Engl 1993. Updated 2011 Aug ;80\(8\):890-894. PMID: 21814301](#)

14 [Med Sci Sports Exerc. 2008 Jan;40\(1\):104-10. PMID: 18091016](#)

15 [Curr Opin Clin Nutr Metab Care. 2008 Jan;11\(1\):50-4. PMID: 18090659](#)

16 [Pak J Biol Sci. 2008 Oct 15;11\(20\):2389-94. PMID: 19137847](#)

17 [Clin Exp Rheumatol. 2002 Nov-Dec;20\(6\):767-71. PMID: 21675994](#)



Lifestyle changes can also be powerful in increasing certain hormones, including melatonin, which increases in response to meditation<sup>18</sup> and yoga.<sup>19</sup> Exercise is another important hormone secretagogue, as it's been found to boost levels of testosterone<sup>20</sup> as well as growth hormone. Consuming whey protein after exercise may further increase the growth hormone response.<sup>21</sup>



## HEART TISSUE

While it's long been assumed that the human heart can't regenerate itself, neocardiogenic substances are able to stimulate the formation of cardiac progenitor cells, which can differentiate into healthy heart tissue. Examples of neocardiogenic substances include resveratrol, Siberian ginseng and N-acetylcysteine (NAC), a form of the amino acid cysteine.

An incredible process known as fetal microchimerism, which occurs when fetal cells enter the mother's circulation during pregnancy, is another potential source of cardiac regeneration. In fact, it's been found that fetal cells may "selectively home to injured maternal hearts and undergo differentiation into diverse cardiac lineages."<sup>22</sup>

This may explain why 50% of women have been found to recover spontaneously from heart failure in the months after birth, with the study "potentially uncovering an evolutionary mechanism whereby the fetus assists in protecting the mother's heart during and after pregnancy."<sup>23</sup>

18 Biol Psychol. 2000 May;53(1):69-78. PMID: 10876066

19 J Altern Complement Med. 2004 Apr;10(2):261-8. PMID: 15165407

20 Indian J Physiol Pharmacol. 2014 Apr-Jun;58(2):178-81. PMID: 25509972

21 Int J Sport Nutr Exerc Metab. 2012 Nov 19. Epub 2012 Nov 19. PMID: 23307404

22 Circ Res. 2012 Jan 6;110(1):82-93. doi: 10.1161/CIRCRESAHA.111.249037. Epub 2011 Nov 14.

23 Circ Res. 2012 Jan 6;110(1):82-93. doi: 10.1161/CIRCRESAHA.111.249037. Epub 2011 Nov 14.

## CARTILAGE, JOINT AND SPINE REGENERATION

Cartilage can be difficult to regenerate, as it doesn't have its own blood supply for support, however cartilage-specific stem cells do exist.<sup>24</sup> As noted in the journal *Cell Stem Cell*:<sup>25</sup>

*“We show that repair tissue from human articular cartilage during the late stages of osteoarthritis harbors a unique progenitor cell population, termed chondrogenic progenitor cells (CPCs). These exhibit stem cell characteristics such as clonogenicity, multipotency, and migratory activity.”*

Further, substances such as curcumin may contribute to the regeneration of cartilage.<sup>26</sup> Bone regeneration has also been demonstrated via natural compounds like noni leaves and black tea extracts.<sup>27</sup>

Even the spinal cord has regeneration potential following injury. For instance, co-ultramicrosized palmitoylethanolamide, an endocannabinoid, and luteolin, a plant compound found in celery and artichokes, promote neuronal regeneration in the spinal cord.<sup>28</sup> Electro-acupuncture is also beneficial, promoting differentiation of mesenchymal stem cells and regeneration of nerve fibers after spinal cord injury.<sup>29</sup>

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24 *Ther Adv Musculoskelet Dis.* 2015 Jun; 7(3): 76–87.

25 *Cell Stem Cell.* 2009 Apr 3;4(4):324-35. doi: 10.1016/j.stem.2009.01.015.

26 *Open Rheumatol J.* 2014 ;8:77-81. Epub 2014 Oct 17. PMID: 25352926

27 *Nutrition.* 2017 Jan ;33:42-51. Epub 2016 Sep 7. PMID: 27908549

28 *Front Pharmacol.* 2016 ;7:47. Epub 2016 Mar 8. PMID: 27014061

29 *Exp Toxicol Pathol.* 2009 Dec 10. PMID: 20005688

# NATURAL SUBSTANCES THAT SUPPORT REGENERATION

Regenerative substances are all around you, including in your pantry. In fact, foods and so-called nutraceutical supplements are among the top regenerative substances you can hone in on for better health. This includes:

## 1. CURCUMIN

Turmeric, a bright yellow spice often used in curry, contains curcuminoids, which include curcumin. Curcumin is well known for its anti-inflammatory and antioxidant properties,<sup>30</sup> but it's also a powerful regenerative substance.



It comes in as No. 1 in the list of 20 substances researched for regenerative potential, as ranked by GreenMedInfo.com's Cumulative Knowledge. Notably, curcumin may:

- Support “essentially perfect” skin regeneration following surgery<sup>31</sup>
- Enhance the regeneration of beta cells in the pancreas to benefit type 1 diabetes<sup>32</sup>
- Promote peripheral nerve regeneration, both in normal conditions and after injury<sup>33</sup>
- Help repair and regenerate liver tissue<sup>34</sup>

Keep in mind that the spice turmeric typically contains only about 3.14% curcumin,<sup>35</sup> which means it may be difficult to get therapeutic amounts from eating turmeric alone.

This is one case where a curcumin supplement may be necessary, but be sure it contains the black pepper compound piperine, which increases curcumin absorption by 2,000%.<sup>36</sup> Eating turmeric along with black pepper may also help to enhance curcumin absorption.

30 [Signal Transduct Target Ther. 2017; 2: 17023.](#)

31 [Int J Dermatol. 2011 Sep ;50\(9\):1058-66. PMID: 22126865](#)

32 [Diabetol Metab Syndr. 2013 ;5\(1\):75. Epub 2013 Nov 26. PMID: 24279645](#)

33 [Neurosci Lett. 2015 Nov 10 ;610:139-143. Epub 2015 Nov 10. PMID: 26552010](#)

34 [J Med Assoc Thai. 2012 May ;95 Suppl 5:S133-41. PMID: 22934459](#)

35 [Nutr Cancer. 2006;55\(2\):126-31.](#)

36 [Planta Med. 1998 May;64\(4\):353-6.](#)

That being said, there's good reason to also include whole turmeric in your diet, as it contains beneficial compounds beyond curcumin, including ar-tumerone, a fat-soluble compound that supports regeneration in neurologic disease.<sup>37</sup>

## 2. RESVERATROL

This antioxidant polyphenol is abundant in red grape skins. Most well-known for its ability to stimulate sirtuin (SIRT1), which enhances longevity and mitochondria function for disease prevention,<sup>38</sup> resveratrol also stimulates autophagy, which is your body's way of clearing out damaged cells and making room for new ones.<sup>39</sup>

By stimulating autophagy, resveratrol helps to clear out senescent cells and holds major promise in helping your body regenerate. As noted in the journal *Cells*:<sup>40</sup>

*“Autophagy, a process of cellular catabolism, is emerging as a key regulator of muscle regeneration affecting stem cell, immune cell, and myofiber function. Muscle stem cell senescence is associated with a suppression of autophagy during key phases of the regenerative program.”*

In addition, research shows resveratrol is useful for both cardiac cell regeneration<sup>41</sup> and an increase in osteogenesis, the formation of bone.<sup>42</sup>

## 3. COFFEE

A number of protective health effects may be gained from drinking organic, black coffee, including a beneficial effect on liver health and regeneration. In an animal study, liver regeneration was stimulated by feeding a diet supplemented with up to 7% (by weight) of ground green and roasted Brazilian or Hawaiian (Kona) coffee.<sup>43</sup>



37 [Stem Cell Res Ther. 2014 ;5\(4\):100. Epub 2014 Sep 26. PMID: 25928248](#)

38 [Science March 8, 2013](#)

39 [Exp Gerontol. 2016 Dec 1;85:41-47. doi: 10.1016/j.exger.2016.09.016. Epub 2016 Sep 22.](#)

40 [Cells. 2019 Feb; 8\(2\): 183.](#)

41 [J Cell Mol Med. 2010 Sep;14\(9\):2235-9. PMID: 20716127](#)

42 [Acta Biomater. 2011 Feb;7\(2\):751-8. Epub 2010 Sep 16. PMID: 20849988](#)

43 [Res Commun Chem Pathol Pharmacol. 1980 Jun ;28\(3\):457-72. PMID: 7403660](#)

It's also been suggested that coffee, via the caffeine it contains, may protect heart cells and encourage their repair following a heart attack.<sup>44</sup> Trigonelline is another coffee compound that has regenerative potential, as it's been shown to promote neurite outgrowth.<sup>45</sup>

#### 4. GREEN TEA

Tea polyphenols, which make up 24% to 36% (dry weight) of fresh tea leaves, have powerful neuroprotective effects and may be beneficial in the treatment of neurodegenerative diseases.

Specifically, catechins such as epigallocatechin 3-gallate (EGCG) in green tea have been found to significantly improve the survival of neurons and promote neurogenesis in the hippocampus by activating PI3K/AKT signaling pathways, which regulate cell responses such as cell proliferation, differentiation and transformation.<sup>46</sup>

L-theanine, another catechin found in high levels in green tea, may also promote neurogenesis.<sup>47</sup> Further, like resveratrol, green tea promotes autophagy, and in so doing revitalizes the “overall health of the organism consuming it.”<sup>48</sup>

When combined with blueberry and the amino acid carnosine, green tea polyphenols may offer even more benefit, creating a “synergistic effect that promotes the proliferation of stem cells in vitro and in vivo” that, taken together, may “promote health, proliferation, and maintenance of neurons.”<sup>49</sup>

#### 5. BROCCOLI AND BROCCOLI SPROUTS

Sulforaphane, found in sulfur-rich vegetables like broccoli, is a neurotogenic substance capable of stimulating nerve growth in your brain. Even at low concentrations, sulforaphane increases the proliferation and differentiation of neural stem cells.<sup>50</sup> According to a review published in *Brain Circulation*:<sup>51</sup>



44 PLOS Biology June 21, 2018

45 Biol Pharm Bull. 1999 Jul;22(7):679-82. PMID: 10443461

46 Molecules. 2018 Mar; 23(3): 512.

47 Molecules. 2018 Mar; 23(3): 512.

48 Nutrients. 2019 Feb; 11(2): 474.

49 Rejuvenation Res. 2010 Jun 29. Epub 2010 Jun 29. PMID: 20586644

50 Genesis. 2017 Mar;55(3). doi: 10.1002/dvg.23022. Epub 2017 Feb 16.

51 Brain Circ. 2019 Apr-Jun; 5(2): 74–83.

*“SFN [sulforaphane] increases neuronal expression of brain-derived neurotrophic factor, which promotes neuron generation and upregulates Wnt signaling in neural stem cells, which then increases stem cell proliferation and their differentiation into neurons.”*

Sulforaphane also epigenetically enhances brain-derived neurotrophic factor (BDNF), which supports the survival of existing neurons and encourages the growth of new neurons.<sup>52</sup>

In addition to broccoli, sulforaphane is found in other cruciferous vegetables, including cauliflower, kale, Brussels sprouts and cabbage. If you want a particularly concentrated source of sulforaphane, however, try broccoli sprouts. Compared to their mature counterparts, broccoli sprouts contain 10 to 100 times higher levels of glucoraphanin, the glucosinolate of sulforaphane.<sup>53</sup>

## 6. GINGKO BILOBA

Like sulforaphane, ginkgo biloba contains compounds that favorably influence BDNF, helping to regulate the growth and survival of brain cells. Ginkgo biloba extract (GBE) has been found to promote the survival of neural stem cells as well as encourage neural stem cell differentiation, with researchers noting, “Moreover, neurite outgrowth is also dramatically increased upon GBE treatment.”<sup>54</sup>

In the context of brain aging, GBE has been found to significantly increase neurogenesis in the hippocampus,<sup>55</sup> while also increasing the level of BDNF and encouraging the differentiation of stem cells into nerve cells.<sup>56</sup> In other words, ginkgo stimulates the growth of the right cell phenotype for the affected region of the brain, giving your brain exactly what’s needed, where it’s needed.

52 Mol Nutr Food Res. 2017 Feb;61(2). doi: 10.1002/mnfr.201600194. Epub 2016 Nov 30.

53 Proc Natl Acad Sci U S A. 1997 Sep 16; 94(19): 10367–10372.

54 Cell Mol Neurobiol. 2015 Aug;35(6):861-9. doi: 10.1007/s10571-015-0180-z. Epub 2015 Mar 31.

55 Anat Sci Int. 2016 Jun;91(3):280-9. doi: 10.1007/s12565-015-0297-7. Epub 2015 Aug 22.

56 Neural Regen Res. 2019 Jul;14(7):1152-1157. doi: 10.4103/1673-5374.251191.

## 7. LION'S MANE MUSHROOM

Lion's mane mushrooms (*Hericium erinaceus*) contain compounds that stimulate the synthesis of nerve growth factor,<sup>57</sup> which plays a role in the survival and regeneration of neurons in both your central and peripheral nervous systems.

Compounds found in Lion's mane mushrooms, including hericenones and erinacines, offer neurotrophic properties<sup>58</sup> while stimulating the growth and repair of nerve cells.<sup>59</sup>

A supplement of Lion's mane has also been found to improve cognitive function in people with mild cognitive impairment,<sup>60</sup> and Lion's mane extract stimulates nerve myelination,<sup>61</sup> which may offer benefit for those with multiple sclerosis.



## 8. ASHWAGANDHA

Ashwagandha is an adaptogenic herb that's popular in Ayurveda, prized since ancient times for promoting a youthful state and enhancing brain function.<sup>62</sup> In fact, as noted in BMC Complementary and Alternative Medicine:<sup>63</sup>

*“Ashwagandha is known for its memory boosting and restorative functions and is also reported to reverse loss of memory in mice model of Alzheimer's disease by promoting the neurogenesis and growth of brain cells.”*

What's more, ashwagandha may regenerate both axons and dendrites – two important components of neurons – making it a potential treatment for neurodegenerative diseases, as it's able to reconstruct neuronal networks.<sup>64</sup>

57 Biol Pharm Bull. 2008 Sep;31(9):1727-32.

58 Int J Med Mushrooms. 2013;15(6):539-54.

59 Int J Med Mushrooms. 2015;17(11):1047-54.

60 Phytother Res. 2009 Mar;23(3):367-72. doi: 10.1002/ptr.2634.

61 Fiziol Zh. 2003;49(1):38-45. PMID: 12675022

62 Afr J Tradit Complement Altern Med. 2011; 8(5 Suppl): 208–213.

63 BMC Complementary and Alternative Medicine volume 17, Article number: 136 (2017)

64 Br J Pharmacol. 2005 Apr;144(7):961-71. PMID: 15711595

## 9. ROYAL JELLY

Honeybees produce royal jelly as food for their queen bees and young. It's been linked to a host of health benefits in humans, including improved production of red blood cells, glucose tolerance and mental health when taken for six months.<sup>65</sup>

One of its unique fatty acids, 10-hydroxy-trans-2-decenoic acid, has also been found to promote neurogenesis,<sup>66</sup> and the substance as a whole is believed to contain longevity-promoting factors.<sup>67</sup>



## LIFESTYLE STRATEGIES TO REGENERATE YOUR BODY

What else influences your body's regenerative potential, aside from the food and nutraceuticals you consume? A host of lifestyle strategies that you can turn into daily or weekly habits to support health and healing.

## 10. MEDITATION

Meditation can change your brain in beneficial ways, including increasing the density of brain gray matter in regions involved in learning and memory processes, emotion regulation, self-referential processing and perspective taking.<sup>68</sup>

In fact, in a review of 13 studies involving various meditation techniques in people with and without cognitive impairment, all of them reported significant increases in grey matter volume in those who meditated, suggesting it may “offset gray matter atrophy.”<sup>69</sup>

## 11. EXERCISE

Physical exercise is well known to induce hippocampal neurogenesis and prevent cognitive decline,<sup>70</sup> while also promoting the expression of BDNF.<sup>71</sup>



65 Nutrition Journal volume 11, Article number: 77 (2012)

66 Biomed Res. 2007 Oct;28(5):261-6.

67 PLOS One August 9, 2011

68 Psychiatry Res. 2011 Jan 30; 191(1): 36–43.

69 J Alzheimers Dis. 2017;56(1):275-286. doi: 10.3233/JAD-160899.

70 Behav Brain Res. 2017 Jan 15;317:332-339. doi: 10.1016/j.bbr.2016.09.067. Epub 2016 Oct 1.

71 Elife. 2016 Jun 2;5. pii: e15092. doi: 10.7554/eLife.15092.



It may also generate new brain cells in other brain regions, including the hypothalamus and ependymal cell layer, which may help to restore the brain after cerebral damage. Further, due to its beneficial effects on brain regeneration and volume:<sup>72</sup>

*“Several lines of evidence suggest that physical activity counteracts the cognitive decline occurring in late adulthood ... The improvement may be linked to structural variations in the central nervous system, since greater extents of physical activity are prognostic of larger hippocampal volume in healthy elderly individuals.*

*In fact, it has been observed that regular exercise during old age is able to enhance hippocampal volume up to 2% and to ameliorate performance in spatial and episodic memory tasks, as well as attention.”*

## 12. MUSIC

Music has been described as the most ancient human language and it, too, can rewire your brain and enhance neuroregeneration. Like exercise, exposure to music can influence activity of the hippocampus by increasing BDNF production.<sup>73</sup>

Music is also known to affect levels of the hormones cortisol, testosterone and estrogen, and researchers have suggested that “music facilitates the neurogenesis, the regeneration and repair of cerebral nerves, by adjusting the secretion of steroid hormones, ultimately leading to cerebral plasticity.”<sup>74</sup>

As for which type of music is best for regeneration, this remains to be seen, although differences have been noted depending on musical style. Natural sounds, for instance, may enhance cognitive functioning and concentration,<sup>75</sup> while classical music is good for relaxation and self-selected music induces the most joy.<sup>76</sup>

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72 *Curr Neuropharmacol.* 2017 May; 15(4): 519–533.

73 *Behav Pharmacol.* 2007 Sep;18(5-6):491-6.

74 *Medical Hypotheses* November 2008, Volume 71, Issue 5, Pages 765-769

75 *The Journal of the Acoustical Society of America* 137, 2291 (2015); <https://doi.org/10.1121/1.4920363>

76 *Int J Psychophysiol.* 2017 Oct;120:118-125. doi: 10.1016/j.ijpsycho.2017.07.012. Epub 2017 Jul 27.

### 13. SAUNA USE

Using a sauna is a form of heat acclimation or hyperthermic conditioning, which is associated with enhanced neurogenesis.<sup>77</sup> Raising your body's core temperature, as can occur during sauna use, is also known to increase circulating BDNF, which signals improved neuroplasticity.<sup>78</sup>



What's more, exposure to heat stress during sauna use can lead to the expression of beneficial heat shock proteins that, among other things, promote the regrowth of muscle.<sup>79</sup>

Regular sauna bathing also influences hormone generation and can increase levels of growth hormone by up to 16-fold.<sup>80</sup> Growth hormone, in turn, helps to repair, build and maintain tissues in your brain and throughout your body.

### 14. NEAR INFRARED LIGHT THERAPY

Light in the near infrared range, also known as low-level laser or [light-emitting diode \(LED\)](#) therapy, utilizes wavelengths in the red to infrared spectrum to offer neuroprotective treatments for a number of conditions, ranging from Alzheimer's and Parkinson's disease to traumatic brain injury.<sup>81</sup>

Light therapy can promote regeneration after spinal cord injury,<sup>82</sup> for instance, and when used following traumatic brain injury may inhibit apoptosis, stimulate angiogenesis (the development of new blood vessels) and increase neurogenesis, helping to reduce brain damage.<sup>83</sup>

While the mechanisms behind near infrared light therapy's successes are still being explored, it may offer neuroprotection and regeneration via the following:<sup>84</sup>

77 PLOS One December 29, 2017

78 Journal of Thermal Biology December 19, 2019

79 J Appl Physiol (1985). 2007 Apr;102(4):1702-7. Epub 2006 Nov 16.

80 Acta Physiol Scand. 1986 Nov;128(3):467-70.

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*“First, Nlr [light in the near infrared range] acts at a cellular level, activating intracellular cascades that ultimately contribute to the survival of the target, and possibly neighboring, cells and/or stimulating neurogenesis.*

*Second, Nlr appears capable of triggering systemic protective mechanisms; this presumably involves as yet unidentified circulating cellular or humoral factors that can transduce protective effects to the brain.”*

## 15. BRAIN TRAINING

Challenging your brain as you age is another key to regeneration. Similar to the atrophy that can occur in your muscles if you stop using them, your brain also needs to be challenged to stay strong. While there are brain training programs commercially available, you can also achieve benefits by engaging in a new pastime or hobby that you enjoy.



Knitting, photography and crossword puzzles are just a few examples. Learning a new language is another option, which can lead to increased brain activation and neural connections.<sup>85</sup>

What’s more, engaging in purposeful activities like music, drawing, meditation, reading, arts and crafts and even home repairs can lead to stress-reduction benefits while also stimulating your neurological system.<sup>86</sup>

A little-known fact is that even if new neurons are generated in your brain, many of them may die if not engaged in a new learning experience. As noted in Behavioural Brain Research, “If learning does occur, the new cells become incorporated into brain circuits used for learning.”<sup>87</sup> As such, learning new skills can increase the survival of new neurons, which otherwise may not survive.

85 [Journal of Neurolinguistics February 2015, Volume 33, Pages 29-49](#)

86 [Occup Ther Int. 2007;14\(2\):71-85.](#)

87 [Behav Brain Res. 2012 Feb 14; 227\(2\): 450–458.](#)

## SUPPORTING REGENERATION IS AN ONGOING PRACTICE

Supporting your body's natural restorative powers is something you can do on a daily basis. By gradually integrating the foods and supplements mentioned here, along with making positive lifestyle changes like exercising regularly, meditating and using a sauna, the cells in your body will enjoy regular turnover and rejuvenation for a healthy body and mind.

It's important to actively seek out foods and habits that support regeneration in order to counteract the many damaging exposures, from unhealthy food and pollution to chronic stress, that may occur on a daily basis.

Keep in mind, too, that this is only a short list of the regenerative substances and strategies at your disposal. [GreenMedInfo.com's Regenerative Substances Research Database](#) is continually updated with the latest revelations in this field, so stay tuned for more exciting updates into your body's incredible regenerative potential.