

## **Effects of Caffeine and Coffee on Aging**

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References can be viewed online at <http://www.teccino.com/aging.aspx>

Aging is a constant process, which can have little to do with chronology. The effects of age have an impact throughout a lifetime, beginning when we are young. The detrimental results of aging can be affected by the constant wear and tear on all the systems of the body. Many of the difficulties experienced that are thought to be part of the normal aging process are accelerated and amplified by the chronic stress that is part of our modern lifestyle. Stress, neuronal damage, cellular degeneration, brain dysfunction, cardiovascular disease, and problems with mineral absorption and bone demineralization are all significant issues associated with the aging process that are impacted by nutrition, particularly coffee and caffeine intake.

### **Coffee and Caffeine Increase Chronic Stress**

Caffeine intake and coffee consumption increase our experience of stress by stimulating the release of the stress hormones cortisol, epinephrine, norepinephrine and the glucocorticoids. The continuous presence of these hormones not only has a damaging effect on a number of different physiological systems, but can also accelerate the aging process. Although short-term stress can be psychologically motivating and can mobilize physiological processes, the extended presence of stress-related hormones is detrimental and damaging. When stress hormones are chronically elevated, which occur as a result of our intense lifestyle as well as a consequence of ingesting coffee and caffeine, mental concentration is short-lived as anxiety and feelings of tension increase, while fine motor coordination is impaired;<sup>1</sup> the immune system is suppressed, digestion and elimination are impaired and the body's normal repair mechanisms are inhibited, thereby accelerating the aging process.<sup>2,3,4</sup>

### **Caffeine Lowers Production of DHEA**

Coffee and caffeine also decrease levels of the steroid hormone, dehydroepiandrosterone, commonly known as DHEA. DHEA seems to have a protective effect on the body and appears to be involved in defending against the negative effects of aging. Some of the physical and physiological changes of aging are related to the decline of many hormones including DHEA that assist in repair of cells and tissues, enhance cognition and memory, and help maintain the body's physiological processes.<sup>5</sup> Caffeine and coffee negatively impact these complex hormonal systems.

Dehydroepiandrosterone (DHEA), produced by the adrenal glands, is one of the most abundant steroid hormones in the bloodstream and brain. The exact biological role of DHEA is currently being identified, but one of its functions is that it is a key component in the manufacture of testosterone and estrogen. The presence of DHEA seems to have a protective effect on illnesses related to the aging process, including: cognitive impairment, immunodeficiency, malignancies, osteoporosis, heart disease, diabetes and obesity.<sup>6,7</sup> DHEA stimulates the immune system,<sup>8</sup> inhibits the inflammatory process,<sup>9</sup> reduces levels of tumor necrosis factor,<sup>10</sup> and is involved in the modulation of memory.<sup>11</sup> While the need for supplemental DHEA is currently under debate, it is undisputed that the body's own endogenous DHEA is vital for overall health.

DHEA starts to appear in the body at around age seven, is of significant concentrations in young adults, peaking between 25 and 30. DHEA subsequently declines as people age; blood levels fall as much as 90% from peak by age 60,<sup>12</sup> giving rise to the hypothesis that decreases in DHEA are implicated in the aging process.

An inverse relationship exists between cortisol and DHEA: high levels of stress and elevated cortisol are associated with lower levels of DHEA.<sup>13</sup> Both of these steroid hormones are manufactured and secreted by the adrenal glands. It is not known if high cortisol levels directly causes a drop in DHEA release, or if there is a competition for resources for production of the two hormones, but in any case, high levels of stress, caffeine and coffee consumption and increased levels of cortisol are associated with lower levels of DHEA.

### **The Effects of Chronic Stress on the Hypothalamic-Pituitary-Adrenal Axis**

The endocrine, immune and nervous systems are extremely interrelated, and the hypothalamic-pituitary-adrenal axis is the central focus of these integrated systems which is responsible for coordinating regulation of hormones. Excessive cortisol release through constant psychosocial stress or coffee and caffeine intake can lead to adrenal exhaustion or adrenopause, characterized by a relative excess of cortisol and a corresponding insufficiency of or decline in DHEA. This is related to a number of clinical illnesses, including: osteopenia, impairment of cognitive functioning or mood, progression of coronary artery disease and atherosclerosis, and immune system depletion.<sup>14</sup> Situations where there is chronic release of cortisol and other corticosteroids by the adrenal glands have been implicated in neural degeneration and interference with the hippocampus and memory formation.<sup>15</sup>

Cortisol levels change throughout each day, but they rise naturally with age, along with the ratio between cortisol and DHEA. Older adults demonstrate high levels of nocturnal cortisol release, which is observed in the increased jitteriness, fearfulness, and anxiety often seen in older adults.<sup>16</sup> Coffee and caffeine increase and exacerbate the age-related rise in cortisol levels.

### **Coffee and Caffeine Increase the Risk of America's # 1 Cause for Death**

Caffeine intake and coffee consumption further increase risk of developing heart disease and succumbing to a heart attack. Heart disease is not only the foremost killer of adult Americans; associated cardiovascular problems can create substantial debility in older adults. Some of the factors that contribute to developing cardiovascular disease include: high cholesterol, high levels of homocysteine, elevated blood pressure, abdominal obesity, stress, arrhythmias, low daily fruit and vegetable consumption, and diabetes.<sup>17</sup> Caffeine and coffee consumption negatively impact many of these risk factors. Coffee raises serum cholesterol.<sup>18</sup> Coffee drinking causes increases in serum homocysteine levels.<sup>19</sup> Coffee raises blood pressure<sup>20,21</sup> and increases the incidence of arrhythmias.<sup>22</sup> Coffee drinking and caffeine consumption also significantly increases levels of stress hormones, as discussed elsewhere in this paper. Chronic stress and constant release of excess cortisol (which is affected by caffeine and coffee) produces a more frequent incidence of abdominal obesity, further increasing heart disease risk.<sup>23</sup>

### **The Effect of Caffeine on Cognition in Aging**

The specific influence of the aging process on the nervous system and cognitive function is not well understood. While most sources insist that decline in cognitive function is *not* a normal part of aging, others suggest that cognitive efficiency surrounding memory and speed of processing declines with age, even in healthy individuals.<sup>24</sup>

It is widely believed that caffeine increases alertness, through activating cortisol as well as increasing release of glucocorticoids. Caffeine consumption in older adults increases reaction time and enhances cognitive performance,<sup>25</sup> and a study of women over the age of 80 suggested that higher lifetime coffee consumption was associated with better performance in several cognitive tests.<sup>26</sup> It is difficult to discern if this difference is due to coffee intake or other factors as the same distinction was not observed in men. On the other hand, a long-term longitudinal study examining the positive effect of extended caffeine intake and cognitive performance found the potential benefit of caffeine limited, leading the authors to suggest that caffeine does not produce any reduction in potential age-related cognitive decline.<sup>27</sup> Furthermore, high levels of homocysteine along with other serum protein markers of inflammation have been correlated with lower cognitive performance in long-term studies of normal adults over the age of 60,<sup>28,29,30,31</sup> and coffee demonstrably raises homocysteine levels.<sup>32,33,34</sup>

Alzheimer's disease and associated dementia are not a normal part of aging; but current statistics reveal that approximately 7% of the population age 65 and over suffers from Alzheimer's disease.<sup>35</sup> Although caffeine and coffee consumption are not directly related to Alzheimer's disease risk, hypertension and other vascular abnormalities appear to be linked to a predisposition to developing the disease.<sup>36,37</sup> Coffee and caffeine adversely affect blood pressure and the vascular system.<sup>38,39,40</sup>

### **The Relationship between Stress Hormones, Neurotoxicity, and the Brain**

The hippocampus is the area of the brain responsible for the formation of new memories as well as the retrieval of information from memory storage, making it a structure central to the optimal functioning of the brain and nervous system. The hippocampus is particularly sensitive to the effects of stress, as it contains a high concentration of corticosteroid receptors. Neurotoxicity occurs, even after only a few weeks or months of chronic stress, causing high levels of glucocorticoid release, which can amplify over an entire lifetime.

Glucocorticoids are stress-related adrenal steroid hormones whose release is stimulated by cortisol and other corticosteroids. Over-secretion of glucocorticoids is associated with neuronal cell death in the central nervous system as well as in body tissues through metabolic disruption, excitotoxicity, lack of oxygen, increased concentrations of the reactive neurotransmitter glutamate, excessive intracellular calcium release and increased free radical activity.<sup>41</sup> Elevated levels of stress hormones also lead to atrophy of dendritic processes in the hippocampus, compromising memory.<sup>42</sup> Increased depression along with mood and nervous system disorders are associated with stress-related neuronal cell death.<sup>43,44</sup> In animal studies, DHEA has been shown to have a protective effect against stress-related neuronal damage,<sup>45</sup> but since caffeine and coffee-related stress hormone release is shown to lower DHEA levels, the ability of DHEA to perform its repair function is compromised.

### **Coffee and Caffeine Reduce Minerals Absorption and Bone Density**

Although caloric requirements often decrease with age, nutritional requirements increase and thus, it can be difficult to maintain adequate vitamin and mineral status. For instance, deficiency of vitamin B-12 occurs as frequently as in 20% of the elderly, but can be difficult to detect.<sup>46</sup> Coffee and caffeine interfere with absorption and increase excretion of several vital minerals necessary for maintaining cardiovascular health, preserving bone density and preventing chronic diseases, including calcium, potassium, magnesium and iron.<sup>47,48</sup>

In the U.S. today, 10 million people are diagnosed with osteoporosis and 34 million more suffer from low bone mass, which subsequently increases their risk of developing osteoporosis or associated fractures. One out of every two women and one in four men over 50 will have an osteoporosis-related fracture in their lifetime. Osteoporosis is responsible for more than 1.5 million fractures annually. Usually thought of as a disease of post-menopausal women, osteoporosis is increasingly a problem in elderly men: more than 2 million American men have osteoporosis and each year, 80,000 men fracture a hip.

With increasing age, the probability of developing osteoporosis also increases.<sup>49</sup> Osteoporosis has no single cause; it is related to a complex series of hormonal interactions that regulate bone formation and reabsorption. Hormone levels, including estrogen and testosterone, are both important in mineral deposition and activity of osteoblasts, the cells which create new bone.

Bone density is not only influenced by mineral intake, absorption and excretion but also by maintenance of the bone's mineral composition. Adequate calcium and vitamin D is critical for mineralization of bone, and coffee intake not only interferes with calcium absorption but also increases urinary calcium excretion.<sup>50,51,52</sup> Consumption of acidic foods including coffee increases the leaching of minerals from the bone due to overall increased metabolic acidity. Minerals appear to have a buffering effect on the bloodstream and are subsequently leached from bone to realkalize the blood when pH levels have shifted too far into acidity.<sup>53</sup> Excess acidity has been associated with negative calcium balance and increased excretion of calcium.<sup>54</sup>

### **Caffeine's Interaction with Pharmaceutical Drugs**

The body perceives caffeine as a drug that needs to be detoxified by the liver through the cytochrome P450 (CYP) 1A2 pathway. A number of other substances are also metabolized via this pathway, including a number of pharmaceutical medications. These include anti-arrhythmic drugs, the selective serotonin reuptake inhibitor antidepressants, bronchodilators and the quinolones, a group of broad-spectrum antibiotics that includes Ciproflaxacin, among others. The interference among these chemicals may cause toxic effects from the increased levels of either caffeine or medications, or both, in the bloodstream.<sup>55</sup> As people tend to take increasing numbers of pharmaceutical drugs with age, these interactions can become significant. The presence of caffeine increases the workload for the detoxification processes of the liver.

Women who take estrogen replacement therapy should be concerned about caffeine intake. Estrogen inhibits caffeine metabolism,<sup>56</sup> therefore simultaneous use of caffeine and estrogen can increase serum concentration of both chemicals, increasing the risk of toxicity or adverse effects.

At the cellular level, we are constantly being subjected to chemicals, environmental toxins and free radicals that directly damage both cellular DNA and their biochemical structure as well as interfere with the ability to repair the effects of constant injurious onslaughts. Caffeine and coffee impede the processes of constant repair, which are necessary to keep functioning in optimal condition. Eliminating caffeine and coffee from the diet can support the process of aging with grace and improved health.

### **Impact of Caffeine Consumption Changes with Age**

Aging increases sensitivity to the physiological effects of caffeine. This is particularly observed in interactions with caffeine and high blood pressure, increased levels of calcium excretion and decreasing bone mineralization.<sup>57</sup> Experimentally, higher concentrations of norepinephrine, a neurotransmitter

involved in the flight or flight response, or stress response, are observed in older versus younger men after caffeine intake.<sup>58</sup>

## **Avoiding Adverse Effects of Caffeine Withdrawal**

Of all the dietary habits that people find difficult to change, coffee drinking is one of the most challenging because it is so entrenched in cultural habits and caffeine addiction.<sup>59</sup> Withdrawal symptoms can involve painful headaches, nausea, vomiting, and loose stools, as well as depression, fatigue and anxiety.<sup>60,61</sup> People whose health problems would be ameliorated if they gave up coffee can improve their chance for successfully quitting coffee if they have both a satisfying alternative and a method to slowly decrease their caffeine intake to reduce withdrawal symptoms.

**The following characteristics of coffee have an adverse effect on the aging process:**

### **1) Coffee Affects the Endocrine System**

#### **▪ Coffee Elevates Stress Hormones**

- Caffeine in coffee elevates the stress hormones cortisol, epinephrine (also known as adrenaline) and norepinephrine.<sup>62,63,64,65</sup> This elevation is present even hours after consumption.<sup>66</sup> Chronic metabolic acidity associated with coffee consumption stimulates cortisol secretion, further activating the stress response,<sup>67</sup> leading to a more rapid aging process.
- Decaffeinated coffee also stimulates the autonomic nervous system.<sup>68</sup>
- The purpose of this “fight or flight” response is to provide the body with a temporary energy boost for intense physical activity by increasing heart rate and blood pressure to create a sense of “emergency alert.” Circulation of oxygen to the brain and extremities is decreased, the immune system is suppressed, and normal circadian rhythms are disrupted.
- With today’s sedentary lifestyle, the continual state of increased stress resulting from coffee and caffeine consumption dramatically accelerates the aging process and compromises the nervous system.

### **2) Coffee Increases Heart Disease Risk**

#### **▪ Coffee Drinking Raises Homocysteine Levels**

- Increased plasma levels of the amino acid, homocysteine, increase a person’s risk of suffering from a heart attack, the number one cause of mortality as people age.
- Coffee significantly increases homocysteine,<sup>69</sup> even more so than simple caffeine. The effect on homocysteine occurs with both caffeinated and decaffeinated coffee, and is noted within hours.<sup>70</sup> Unfiltered as well as filtered coffee increased homocysteine levels, and did not change plasma concentrations of vitamin B6, B12 and folate.<sup>71, 72</sup> Increased plasma homocysteine levels are particularly problematic in individuals who are already diagnosed with, or who exhibit high risk for coronary heart disease.<sup>73</sup>
- High homocysteine levels are related to cognitive difficulties as normal adults age.

#### **▪ Coffee Raises Blood Pressure**

- Acute caffeine intake has been shown to significantly increase central blood pressure as well as systolic and diastolic blood pressure while people are drinking coffee at work.<sup>74,75</sup> Drinking coffee within three hours causes a measurable rise in

both systolic and diastolic blood pressure, and that effect can persist even into the following day.<sup>76, 77</sup> In people prone to hypertension, drinking coffee may be harmful.<sup>78</sup>

- Decaffeinated coffee also increases blood pressure, stimulates heart rate and increases sympathetic nervous system activity in muscle tissue.<sup>79</sup>
- **Coffee Drinking Is Associated with Heart Rhythm Irregularities**
  - Coffee drinking is shown to be a predictor for the incidence of heart palpitations.<sup>80,81</sup> Due to its effects on raising cortisol, it increases heart rate. It is also implicated in the potential to produce cardiac arrhythmias.<sup>82</sup>
- **Coffee Increases Serum Cholesterol Levels**
  - Coffee drinking is linked to higher levels of serum cholesterol, with particularly high levels noted in people who drink boiled coffee or coffee processed at high temperatures (including espresso and espresso drinks).<sup>83, 84</sup> Other forms of coffee have also been shown to increase serum cholesterol levels including decaffeinated coffee, and studies show that replacement of regular coffee with decaffeinated coffee does not lower lipid levels.<sup>85,86,87</sup> Coffee drinking also demonstrably raised blood levels of low density lipoproteins.<sup>88</sup>
- **Coffee Drinking Aggravates the Body's Inflammation Processes**
  - Inflammation aggravates the aging process and negatively affects the cardiovascular system as well as cognition and optimal nervous system function. Coffee drinkers exhibit increased presence of inflammatory markers, including higher interleukin 6, C-reactive protein, serum amyloid-A, higher tumor necrosis factor alpha and higher white blood cell counts.<sup>89</sup>
- **Coffee Drinking is Associated with Increased Heart Attack Risk**
  - Independent of any other risk factors for heart disease, heavy coffee consumption has been shown to increase the short-term risk of heart attack, or acute myocardial infarction.<sup>90</sup> A J-shaped association is suggested for this link: the more coffee consumed, the greater the risk.<sup>91</sup> Coffee drinking also increases the risk of succumbing to an acute myocardial infarction in people with diabetes.<sup>92</sup>
- **Caffeine Increases Blood Vessel Stiffness**
  - Caffeine has been demonstrated to negatively affect stiffness in the aorta as well as aortic pressure, in healthy adults as well as in adults with hypertension. Increased arterial stiffness is a contributing factor in coronary artery disease and is involved in the process of arteriosclerosis or hardening of the arteries.<sup>93,94,95</sup>

### 3) Coffee and the Stress Response Affect the Body on a Cellular Level

- **Coffee and Caffeine Damages the Nervous System**
  - Over-ecretion of stress-related glucocorticoids is associated with cell death through metabolic disruption, excitotoxicity, lack of oxygen, increased concentrations of the reactive neurotransmitter glutamate, excessive intracellular calcium release and increased free radical activity.<sup>96</sup>
  - Chronic stress, oversecretion of glucocorticoids and associated neuronal cell death is linked to increased depression, mood and nervous system disorders.<sup>97,98</sup>
  - Elevated stress hormones lead to atrophy of dendritic processes in the hippocampus, compromising memory.<sup>99</sup>

- **Caffeine Interferes with GABA Metabolism**
  - GABA (Gamma-aminobutyric acid) is a neurotransmitter naturally produced in the brain and nervous system as well as the heart. It plays an important role in mood and stress management and influences heart rate and function.
  - Caffeine has been found to interfere with binding of GABA to GABA receptors, preventing it from performing its calming function,<sup>100</sup> thereby compromising its role in stress reduction and accelerating the aging process.
- **Caffeine Alters DNA Repair and Metabolism**
  - Although caffeine does not have mutagenic effects in traditional assays, evidence suggests that caffeine can interact with carcinogenic compounds potentially enhancing their effects. Caffeine alters DNA repair, carcinogen metabolism and changes the cell cycle.<sup>101</sup> Caffeine interferes with normal DNA repair, increasing genotoxicity and inhibiting DHA synthesis.<sup>102</sup>
  - Chronic stress and the chronic presence of stress hormones in the body which is stimulated by coffee drinking and caffeine consumption leads to lower telomerase activity and shorter telomere length, both of which are indicators of cellular aging.<sup>103,104</sup>

#### 4) Coffee Interferes With Mineral Metabolism

- **Coffee Decreases Mineral Absorption**
  - The low pH of coffee increases metabolic acidity.<sup>105</sup> In circumstances of excess acidity, minerals are leached from bone to alkalize the body.<sup>106</sup>
  - Adequate mineral intake becomes ever more critical with age. Coffee consumption both reduces absorption and increases excretion of several key vitamins and minerals, including calcium, magnesium and zinc.<sup>107,108,109,110</sup>
  - Ability to absorb iron efficiently is reduced with age, and coffee drinking, as well as intake of chlorogenic acid, further reduces iron absorption.<sup>111,112,113</sup>
- **Caffeine Increases Risk of Forming Kidney Stones**
  - The incidence of developing kidney stones increases as people age (until age 70).<sup>114,115</sup> Caffeine increases urine calcium excretion in both people who do not form kidney stones, as well as stone-formers, suggesting caffeine increases the risk of forming calcium oxalate stones.<sup>116</sup>
  - Low magnesium in postmenopausal women is a risk factor for developing kidney stones,<sup>117</sup> and caffeine and coffee consumption interferes with magnesium absorption and excretion.<sup>118,119</sup>
- **Coffee Consumption Lowers Bone Density**
  - Post-menopausal women and elderly men have an increasing risk for developing osteopenia and osteoporosis.
  - Coffee drinking is associated with increased risk of osteoporosis through interfering with nutritional status of crucial minerals. Caffeine reduces the reabsorption of calcium and magnesium in the kidney, stimulating the excess excretion of those minerals through the urine.<sup>120,121,122</sup>
  - As women age, high caffeine or coffee consumption is associated with lower bone density and higher rates of bone loss.<sup>123,124,125</sup> Women with high caffeine intakes experience higher rates of bone loss than those with low intakes.<sup>126</sup> Bone loss associated with caffeine consumption is especially pronounced in women who do not consume adequate calcium,<sup>127</sup> and older women have particular difficulty compensating for the loss of calcium due to caffeine.<sup>128</sup>

- High levels of the amino acid homocysteine are also a significant risk factor for developing osteoporotic fractures.<sup>129,130</sup> Coffee drinking significantly increases serum homocysteine levels, even more so than caffeine alone, within only hours.<sup>131,132,133</sup>

## 5) Additional Effects of Coffee and Caffeine on Aging

- **Coffee Increases Gastroesophageal pressure exacerbating heartburn and acid reflux**
  - Consumption of both decaffeinated and regular coffee increase gastroesophageal pressure increasing incidence of heartburn, acid reflux and chronic gastrointestinal reflux disease, or GERD.<sup>134,135</sup>
- **Coffee Increases Intraocular Pressure**
  - People over the age of 60 have a greater risk of developing damage to the optic nerve caused by glaucoma, which is most often due to increased intraocular pressure. In healthy adults, consumption of caffeine in regular coffee increases intraocular pressure as well as systolic and diastolic blood pressure,<sup>136</sup> and increases intraocular pressure to a greater extent than drinking herbal tea.<sup>137</sup> Consumption of both caffeinated and decaffeinated coffee demonstrably increases intraocular pressure.<sup>138</sup> Magnesium deficiency is also linked to glaucoma,<sup>139</sup> and coffee interferes with magnesium absorption.<sup>140,141</sup>
- **Coffee Increases Risk of Developing Rheumatoid Arthritis**
  - Rheumatoid arthritis has a common onset of middle-age, between 30 and 50, but it is a chronic degenerative disease that often worsens with age.
  - Preliminary studies indicate that regular coffee consumption can increase the risk of rheumatoid arthritis through the higher levels of rheumatoid factor.<sup>142</sup>
  - Decaffeinated coffee consumption is linked to increased incidence rheumatoid arthritis onset.<sup>143</sup> Other studies found inconclusive results.<sup>144</sup>
  - Significantly, low levels of the hormone DHEA are observed in women who subsequently develop rheumatoid arthritis.<sup>145</sup>
- **Caffeine Affects Erectile Dysfunction**
  - Caffeine consumption is associated with increased incidence of erectile dysfunction in adult men.<sup>146</sup>
- **Coffee Interferes With Ability to Fall Asleep in Older Adults**
  - A study examining the ability of older adults (age 67 or older) found the use of caffeine interfered with their ability to fall asleep.<sup>147</sup> Reduced quality sleep has been found to increase insulin resistance which can lead to type 2 diabetes and heart disease.

### Recommendation:

As people age, their ability to break down caffeine decreases and interactions between caffeine and prescription medications can become more problematic. Caffeine and coffee also increase susceptibility to many of the chronic diseases associated with the aging process. As people get older, they would do well to avoid coffee. Nutrition professionals can support people to maintain health throughout their life by guiding them through the process of substituting a non-caffeinated, alkaline herbal coffee that brews and tastes just like coffee.

**Kicking the Caffeine Habit:**

The social prevalence of coffee drinking and the addictive side effects of caffeine can cause problems with patient compliance. Caffeine-free herbal coffee marketed under the brand name of Teeccino® helps coffee drinkers replace their regular or decaf coffee with a satisfying alternative. Coffee drinkers need a dark, full-bodied, robust brew to help satisfy their coffee craving. Teeccino satisfies the 4 needs coffee drinkers require in a coffee alternative:

- 1) Teeccino brews just like coffee, allowing coffee drinkers to keep their same brewing ritual.
- 2) It has a delicious, deep roasted flavor that is very coffee-like.
- 3) It wafts an enticing aroma.
- 4) People experience a natural energy lift from drinking Teeccino.

**Teeccino offers the following health benefits to people to prevent the ravages of aging:**

<u><b>Beneficial Features of Teeccino</b></u>	<u><b>Teeccino Ingredients:</b></u> <small>149,150,151,152,153,154,155,156,157,158</small>
<ul style="list-style-type: none"> <li>▪ Inulin fiber from chicory               <ul style="list-style-type: none"> <li>• Unlike coffee, Teeccino has nutritional value, including soluble inulin fiber, a pre-biotic that helps support a healthy population of beneficial microflora</li> <li>• Inulin improves mineral absorption</li> </ul> </li> <li>▪ 65 mg of Potassium               <ul style="list-style-type: none"> <li>• Teeccino is a source of potassium. In liquid form, potassium is easily absorbed to help relieve muscle fatigue, maintain normal heart rhythm and blood pressure, and help prevent strokes.</li> </ul> </li> <li>▪ Alkaline – helps reduce acidity               <ul style="list-style-type: none"> <li>• As opposed to acidic coffee, Teeccino is alkaline, which reduces excess stomach acid and metabolic acidity.</li> </ul> </li> <li>▪ Gluten Free               <ul style="list-style-type: none"> <li>• Gluten does not extract into boiling water. Tests show Teeccino is gluten free although it contains barley.</li> </ul> </li> <li>▪ Naturally Caffeine-free               <ul style="list-style-type: none"> <li>• No chemical processing like decaffeinated coffee.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>▪ Carob               <ul style="list-style-type: none"> <li>• Consumption of water-soluble fiber from carob lowers elevated blood cholesterol in healthy people.</li> </ul> </li> <li>▪ Barley               <ul style="list-style-type: none"> <li>• Contains niacin, a B vitamin important for healthy heart function.</li> <li>• Shown to have a beneficial effect on lipid metabolism.</li> </ul> </li> <li>▪ Almond               <ul style="list-style-type: none"> <li>• Has a beneficial effect on serum lipid levels.</li> </ul> </li> <li>▪ Figs               <ul style="list-style-type: none"> <li>• Contain polyphenols, plant compounds that act as antioxidants.</li> <li>• A good source of potassium.</li> </ul> </li> <li>▪ Dates               <ul style="list-style-type: none"> <li>• Contains potassium and magnesium, important for maintaining heart rhythm and preventing chronic diseases associated with the aging process.</li> </ul> </li> <li>▪ Chicory root               <ul style="list-style-type: none"> <li>• Has been shown to improve mineral absorption, including magnesium.</li> </ul> </li> </ul>

**The Pain-free Way to Wean off of Coffee**

Start by mixing normal coffee 3/4 to 1/4 Teeccino Herbal Coffee. Gradually reduce the percentage of coffee over a two to three week period until only 100% Teeccino Herbal Coffee is brewed. Gradual

reduction of caffeine is recommended.<sup>148</sup> Side effects such as headaches, fatigue, and brain foginess can be avoided as the body gradually adjusts to less reliance on stimulants.

**Example:** Use the following proportions if you make a 10-cup pot of coffee daily:

<b>DAY</b>	<b>Regular Coffee</b>	<b>Teecino</b>
<b>Day 1-3:</b>	4 tablespoons	1 tablespoon
<b>Day 4-6:</b>	3 tablespoons	2 tablespoons
<b>Day 7-9:</b>	2 tablespoons	3 tablespoons
<b>Day 10:</b>	1 1/2 tablespoons	3 1/2 tablespoons
<b>Day 11:</b>	1 tablespoon	4 tablespoons
<b>Day 12-13:</b>	1/2 tablespoon	4 1/2 tablespoons
<b>Day 14:</b>	0	5 tablespoons

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