

# Long-Term Health Effects of Coffee Consumption:

## Literature Review

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### Abstract

Coffee, being one of the most popular beverages the world over, has been under scrutiny as of late. It is not well known what long-term effects coffee may have. After reviewing and analyzing literature from research done in recent years, I have summarized long-term health effects of coffee pertaining to mental health, cancer, various organ systems, and miscellaneous findings.

### Mental Health

The immediate positive mental effects of coffee consumption are rather well known: increased alertness, improved focus and capacity, and enhanced memory consolidation<sup>7</sup>. There is research reflecting on even more of coffee's effects on our cognitive functions.

As the life expectancy of people continues to increase, there are increasing cases of neurodegenerative diseases such as Alzheimer's disease and Parkinson's Disease. There is some dispute on whether coffee consumption reduces risks of neurodegenerative diseases<sup>9</sup>, but more studies back the claim that it is beneficial<sup>2,5,7,12</sup>. One study looks beyond the risk factors of contracting the disease, and instead explores the progression. The research of Panza, et al. shows data suggesting that moderate daily coffee consumption may decrease the risk of cognitive impairment or decline in patients with dementia or Alzheimer's disease<sup>13</sup>. So while there is no conclusive evidence that coffee will reduce your chance at contracting a cognitive disease, it could actually prevent those diseases from worsening.

Lopez-Garcia, et al. looked at mental functions related to coffee from a different view, they explored the effect on mood<sup>10</sup>. Through the implementation of multiple quality of life tools, Lopez-Garcia, et al. studied over 11,000 Spanish adults over the course of 3 years. The most interesting part of their research is the results. According to their analysis of the data, men seem to have no mood effects related to coffee consumption, yet it is possible that women's moods may be improved by coffee consumption. They are cautious to not make rash claims, asking for more research to be conducted before definitive conclusions are drawn on the subject.

### Other Organs and Organ Systems

Studies show a wide range of different health effects associated with coffee consumption. Multiple studies suggest that habitual coffee consumption might protect hepatocytes from all sorts of damage, thus supporting liver health<sup>5,7,12</sup>.

Although Gonzalez, et al. cite the adverse effects of caffeine on the skeletal system, Folwarcza, et al. have competing findings<sup>7,8</sup>. Instead of looking at the effects of caffeine, Folwarcza, et al. investigated the effects of caffeic acids and chlorogenic acids, the two main antioxidants in coffee, on the skeletal system of rats. Both of these acid groups are found in high levels in coffee. Folwarcza, et al. studied the effects of high doses of these acids compared to low doses. It turns out that low doses can be detrimental to the density and strength of the tibia and femur. Thankfully, the caffeic and chlorogenic acids are both high in a single cup of coffee. High doses, like those found in coffee, show improvement of the bone density and strength of the tibia and femur<sup>8</sup>. So while caffeine alone can have adverse effects on the skeletal system, other coffee constituents may neutralize or even reverse these harmful effects.

O'Keefe, et al.'s study covered many different aspects of health. Beyond liver, they found evidence supporting other health benefits of regular coffee consumption: weight regulation, increased asthma control, and decreased risk of certain gastrointestinal diseases<sup>12</sup>. Again all these results are based on observational data, clinical studies are needed to verify their significance.

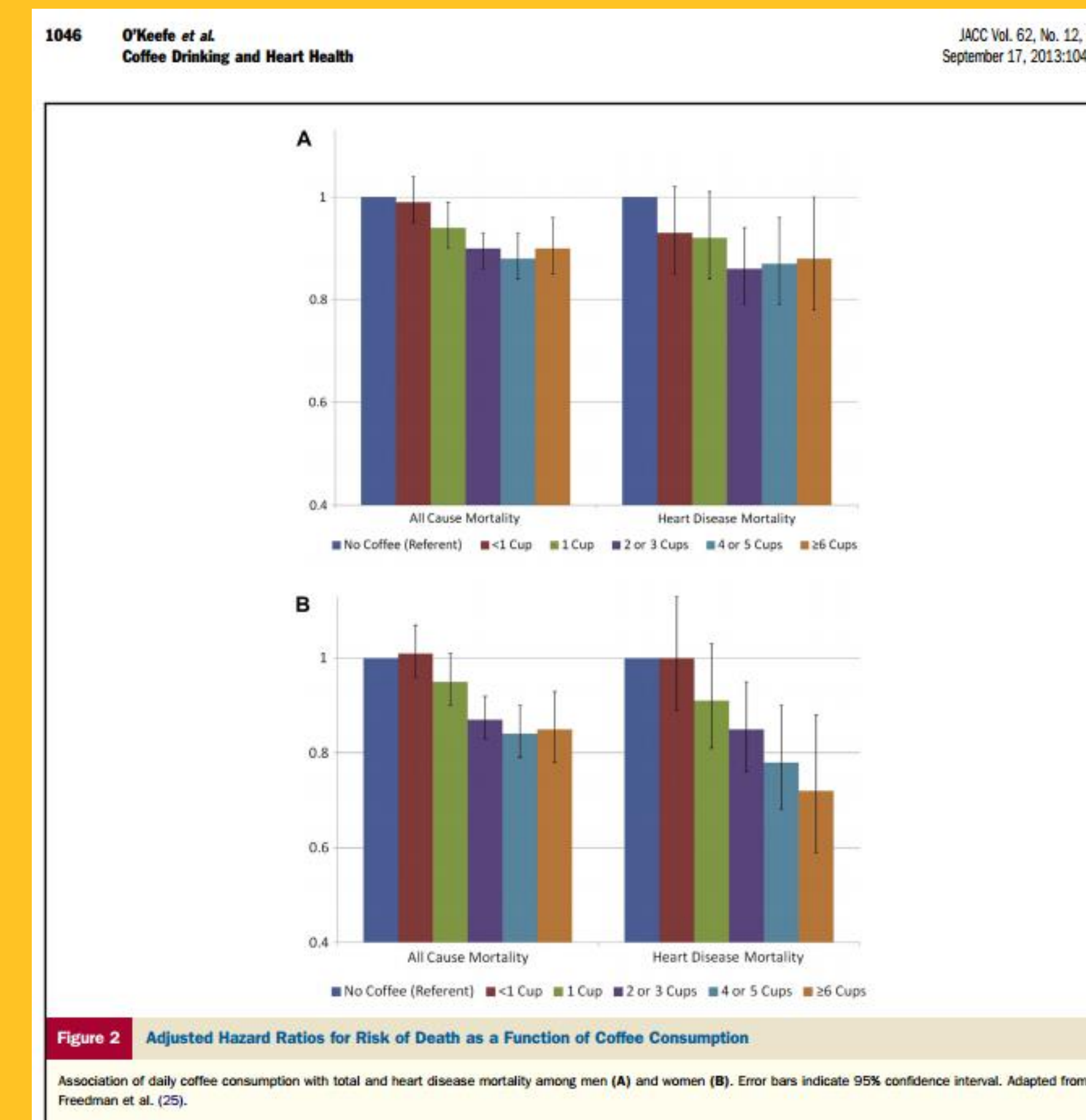
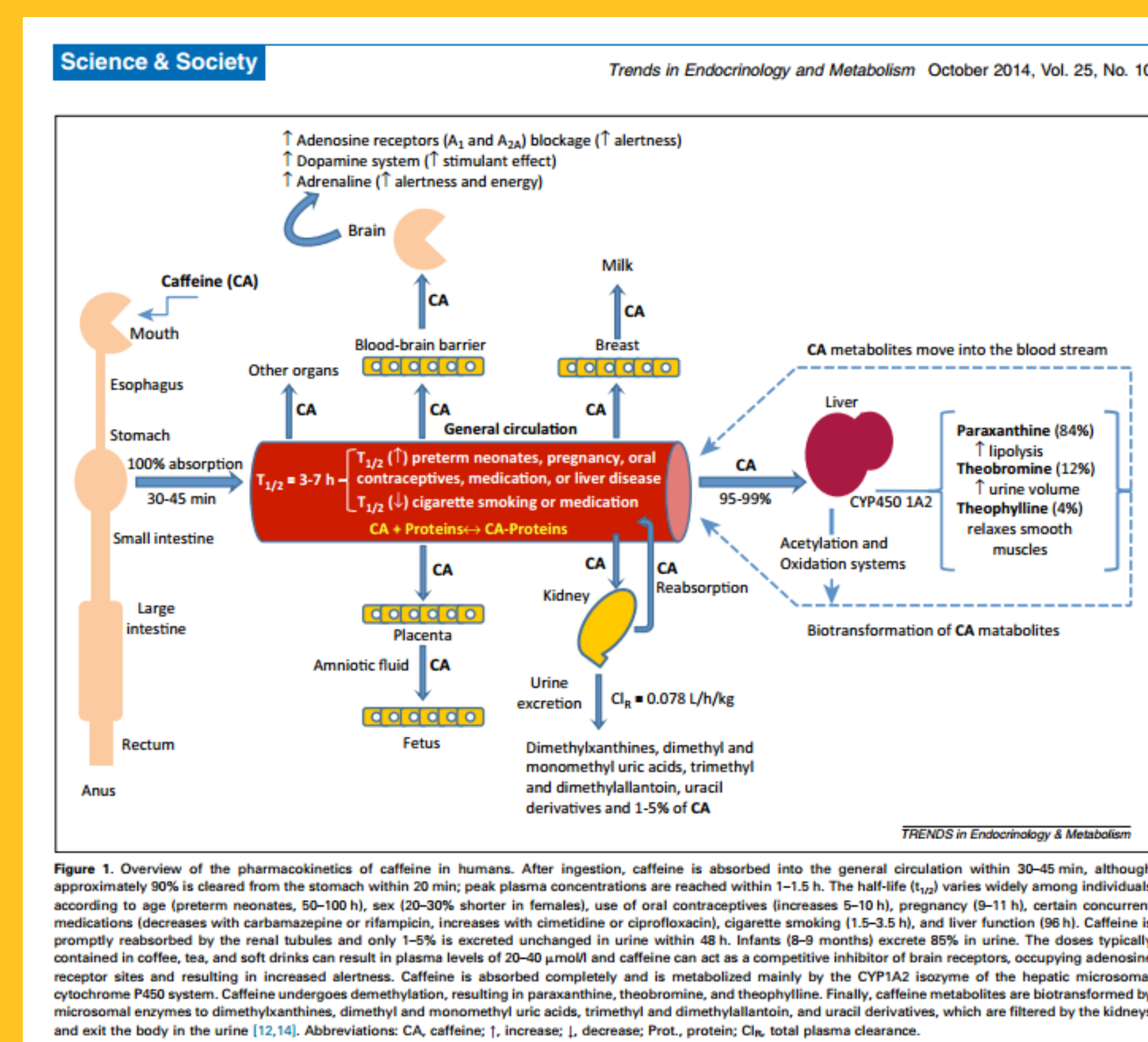
When it comes to the matter of the heart, there is some debate. O'Keefe, et al. found evidence that suggests regular coffee consumption can reduce the risk of heart issues such as coronary heart disease, congestive heart failure, arrhythmias, and stroke<sup>12</sup>. This all reflects on the long-term effects of coffee consumption, not the short-term effects such as heightened blood pressure. Cano-Marquina, et al. dispute this claim, stating that there is no significant connection between coffee consumption and cardiovascular issues<sup>5</sup>. While both studies are compelling, O'Keefe, et al.'s study is more recent and more rigorous, thus more credible than Cano-Marquina, et al.'s. Therefore, it seems that regular coffee consumption may have a beneficial effect on cardiovascular disease.

### Introduction

Coffee is a globally popular beverage. Over half of all Americans over the age of 18 are coffee consumers<sup>6</sup>. Globally Americans rank 22<sup>nd</sup> in consumption per person at 3.1kg per capita while Finland tops the list at 9.6kg per capita. Despite this, the United States of America are still the number one consumer of coffee by total weight<sup>4</sup>. Behind water, coffee is the most widely consumed drink in the U.S.A, and is the main source of caffeine among adults<sup>12</sup>. Due to the popularity of this beverage, there have been a number of studies on the health effects of coffee consumption. Although the immediate effects of coffee consumption are common knowledge, few know what the long-term effects are. While it has long been assumed that coffee is overall bad for health, it is actually a great source of antioxidants, which contribute to a whole host of benefits.

### Methods

Reviewed and assessed recent research on the health effects of coffee consumption based on keyword searches of "coffee", "effects", and "health" in PubMed and CINAHL.



### Cancer

While most wouldn't believe it, coffee may actually save people from undergoing chemotherapy. The findings of multiple studies show that coffee could reduce the risk of prostate, colon, and bladder cancer when consumed regularly<sup>5,7</sup>.

Unfortunately coffee can't prevent all cancers. In particular, some scientists have claimed that coffee consumption can protect women from endometrial cancer, but the study by Yang, et al. shows that there is no significant association between the two<sup>14</sup>.

### Miscellaneous

People sometimes worry about filtering their water before using it to brew coffee. It turns out, they may not need to. A study published in March 2015 shows that coffee grounds can absorb some heavy metal contaminants. Marchioni, et al. assessed the ability of coffee grounds to absorb and retain cadmium and lead contamination in water. Their study showed that both metals were absorbed by the coffee grounds at high percentages, over 70% for lead and over 80% for cadmium. The mass of grounds did not affect the absorption results, and only a short time was needed for maximum absorption, as little as 20 minutes<sup>11</sup>.

Although many people subscribe to the notion of coffee causing ulcers and acid reflux, the study by Gonzalez, et al. shows no significant association of coffee consumption with gastric ulcers, duodenal ulcers, reflux esophagitis, or non-erosive reflux disease. They did however find evidence suggesting coffee's adverse effect on serum cholesterol levels and plasma homocysteine<sup>7</sup>.

A continually hot issue is diabetes. While there isn't much to be done about contracting type-1 diabetes, type-2 diabetes is mainly due to a person's lifestyle. Akash, Cano-Marquina, Gonzalez, and O'Keefe all agree that long-term coffee consumption can lower risk of type-2 diabetes. Coffee lowers the risk by improving insulin sensitivity and glucose metabolism thanks to its high levels of antioxidants<sup>1,5,7,12</sup>. As for people who already have diabetes, they have to keep a close eye on their blood glucose levels throughout the day. A constant worry is hypoglycemia during or after exercise. Beam, et al. investigated claims that caffeine and green coffee bean extract consumption post-exercise could affect blood glucose and insulin concentrations. Unfortunately, there was no significant impact seen in their study, calling for more human research before any conclusions can be drawn.

The biggest conclusion drawn from all this research is the connection between coffee and reduced all-cause mortality. On this topic, O'Keefe and Cano-Marquina finally agree. It seems that consuming 2-4 cups of coffee per day lowers the risk of mortality the most<sup>5,12</sup>.

### Conclusion – More Research Needed

While the conclusions stated are based on large sample sizes over long periods of time, almost all of the studies are observational. As many of the studies state, association does not prove causation. There is very little clinical evidence on the long-term health effects of coffee consumption. Unfortunately, it is practically impossible to perform a proper clinical study on human subjects. Animal studies on the long-term effects of coffee consumption will not result in definitive answers to what coffee does to humans, but they would provide useful insight that could be used to further understand the results seen in the observational studies. There needs to be a drastic increase in animal studies on long-term health effects of coffee before the results of all these observational studies can be substantiated and acted upon.

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