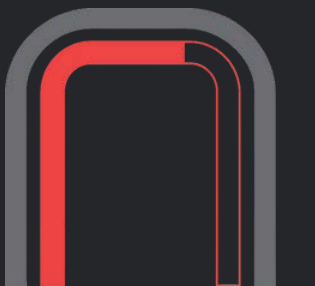


From a cherry 🍒 to cardiovascular health ❤️:

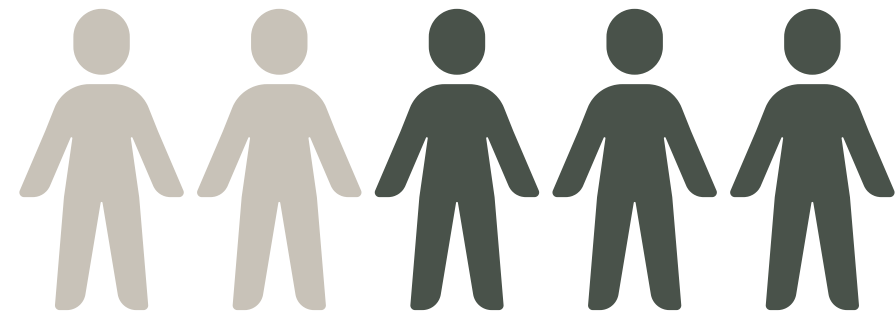
The Science of Coffee & Health

Presented by:

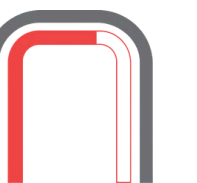
Dr Flavia Fayet-Moore & Dr Carlene Starck



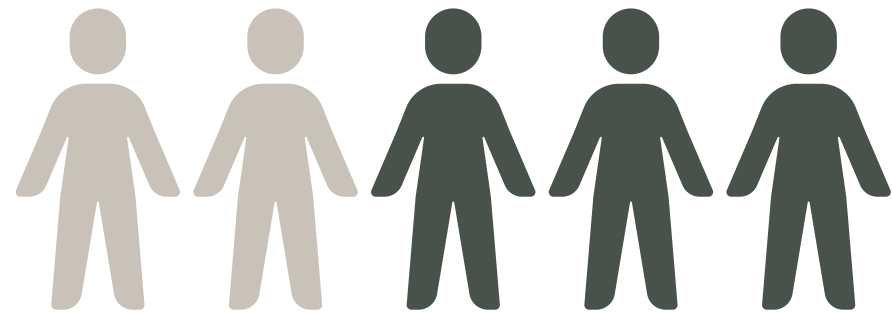
When you think of coffee, what's the first thing that comes to mind?



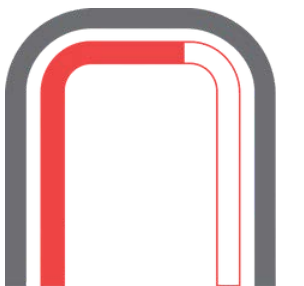
1. **Synonym for Caffeine**
2. **Morning focus**
3. **Health benefits**
4. **Time for a revival**
5. **Should always be avoided**
6. **Don't drink too much**



How confident do you feel in discussing the health effects of coffee?



1. Not confident at all
2. Slightly confident
3. Somewhat confident
4. Fairly confident
5. Completely confident



Learning Outcomes

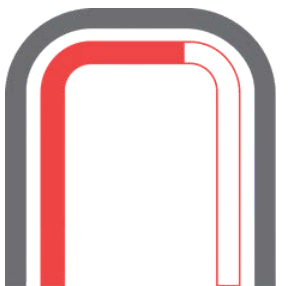
- Increased knowledge of the effect of coffee on health
- Confident in talking about the effect of coffee on health
- Mythbust incorrect information about coffee and its health effects
- Understand when coffee consumption is contra-indicated



What are the health effects of coffee (choose all that apply)?



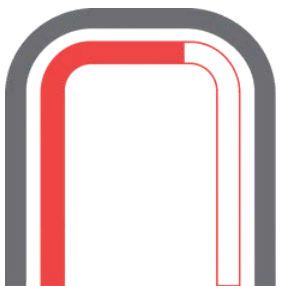
1. **Increases gout**
2. **Increases blood pressure**
3. **Lowers CVD risk**
4. **Increases chronic liver disease risk**
5. **Decreases type 2 diabetes risk**
6. **Is anti-inflammatory**



Does decaffeinated coffee have the same health benefits of caffeinated?



1. **Yes**
2. **No**
3. **Not sure**



What's coffee?



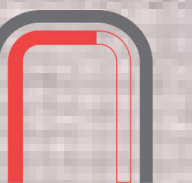
Cherry



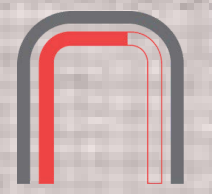
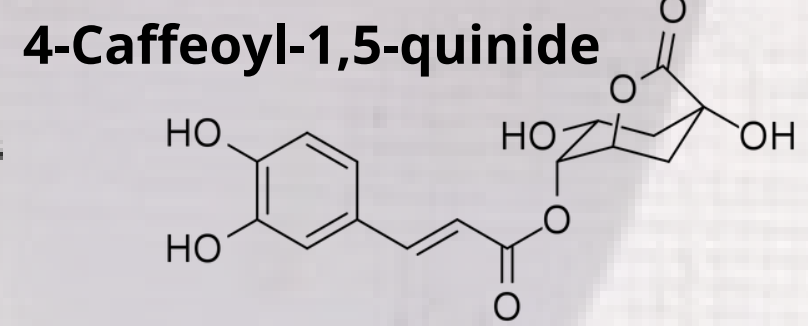
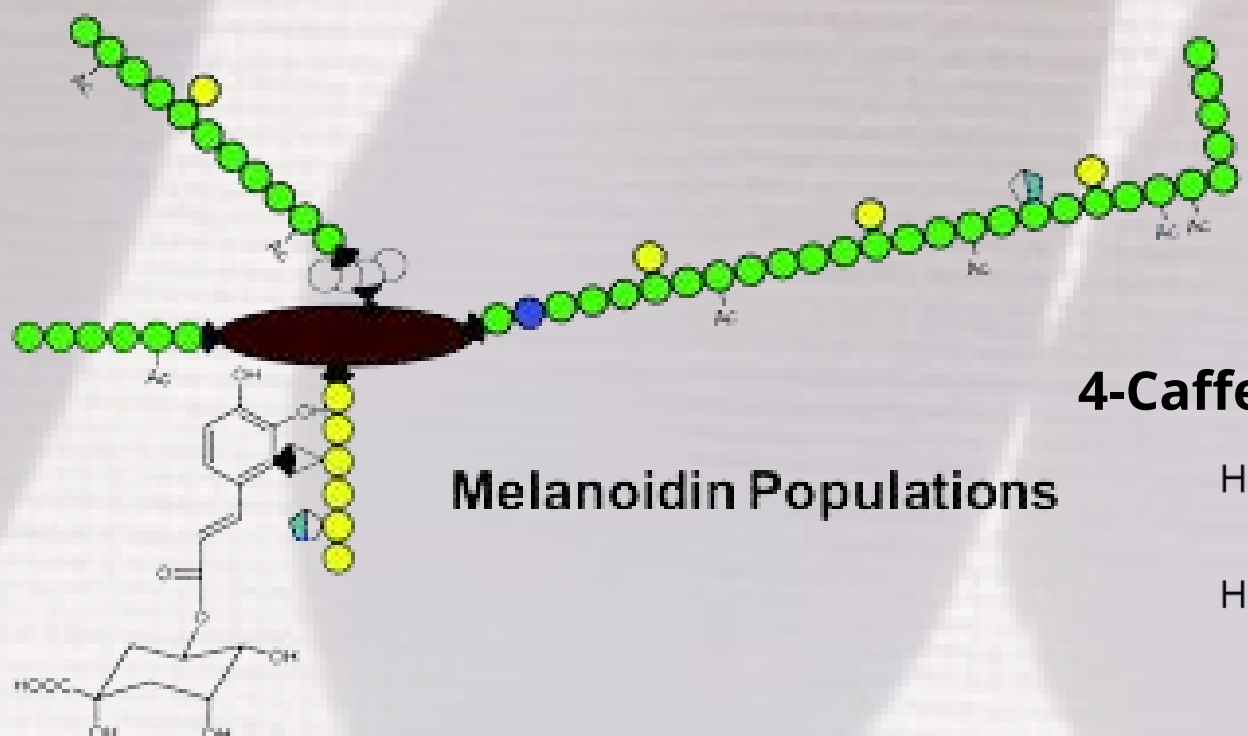
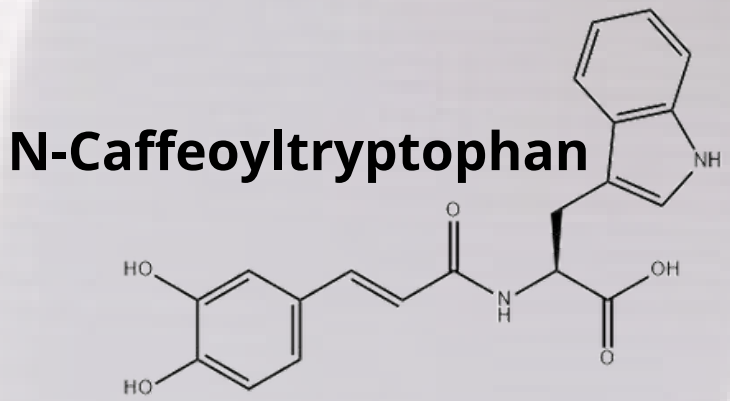
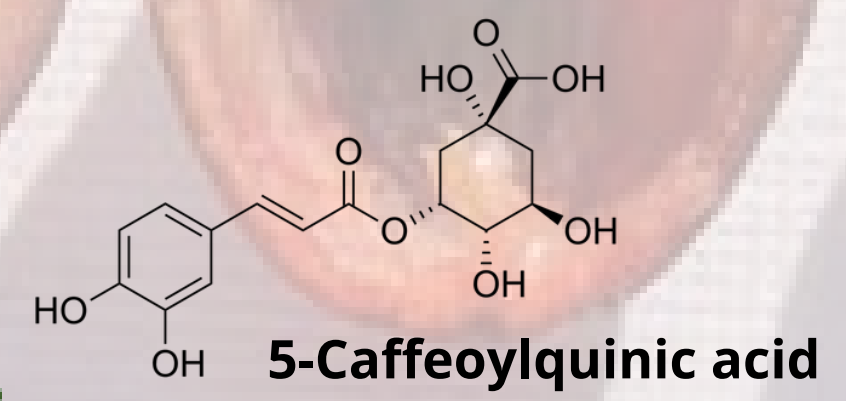
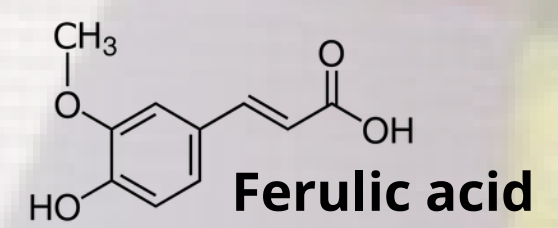
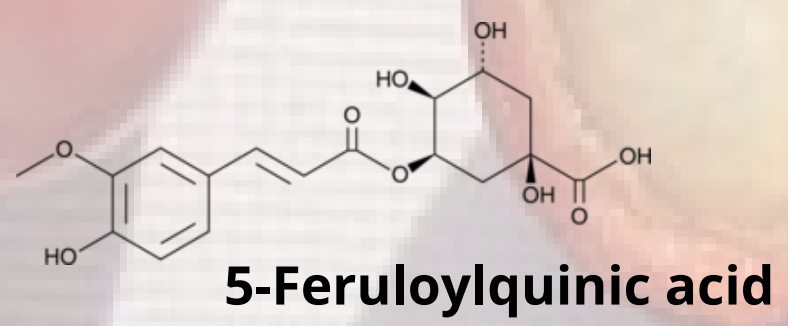
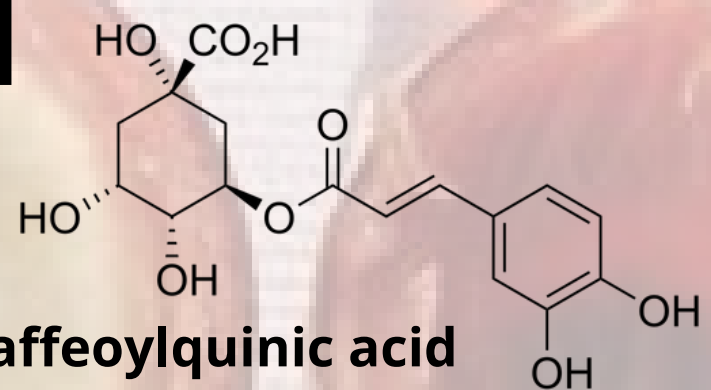
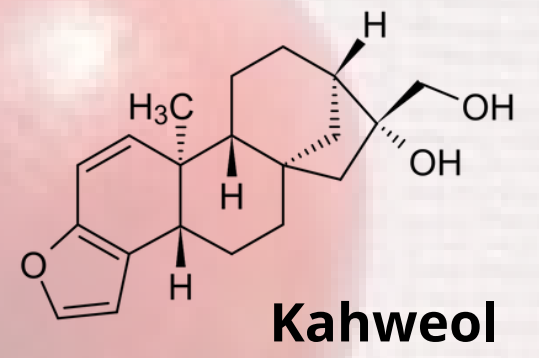
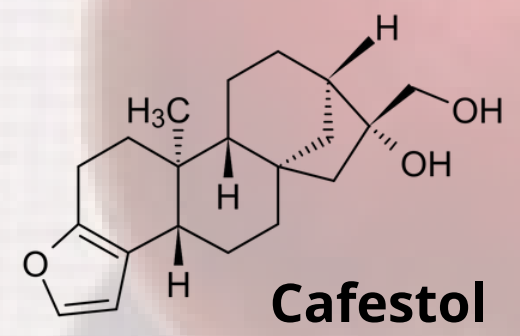
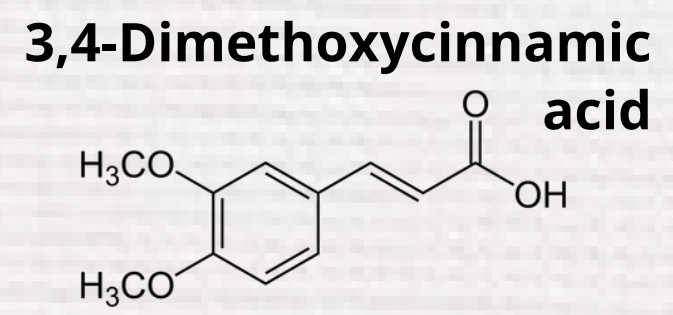
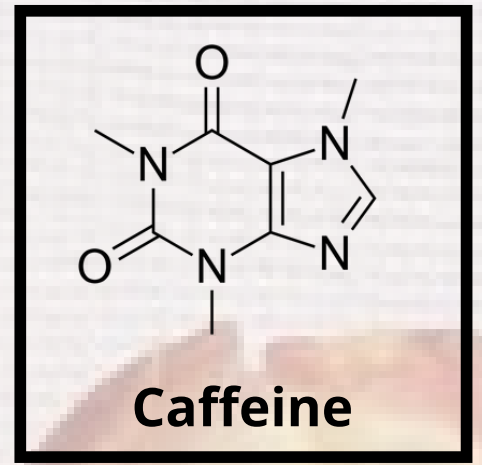
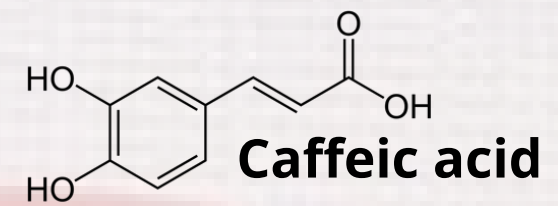
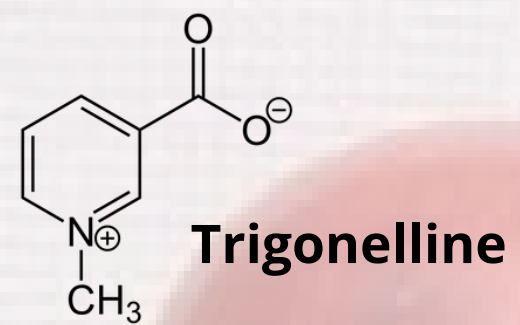
Cascara



Green coffee bean



What's in coffee?



The major bioactives...



Chlorogenic Acids
(CGAs)
Trigonelline




Melanoidins
Diterpenes

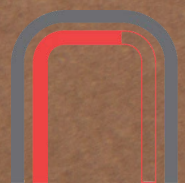


Caffeine



The major bioactives...

	Chlorogenic Acids (CGAs)	Trigonelline	Melanoidins	Diterpenes	Caffeine
Anti-oxidant	✓		✓	✓	✓
Anti-inflammatory	pro-inflammatory at high doses	✓	✓	✓	pro-inflammatory
Anti-diabetic					✓
Anti-cancer		✓		✓	
Anti-hypertensive			✓		
Neuroprotective		✓			
Pro-cholesterol				✓	



And it varies by...

Bean type

Growing region

Growing practice

Caffeination status

Roast level

Brew type





Growing practices & bioactive composition

Geography

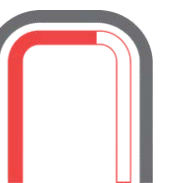
Arabica and Robusta coffee beans from Africa contain 5-10% less caffeine than those from Asia-Oceania and South America

Altitude



CGAs higher with altitude (Arabica), while diterpenes cafestol and kahweol higher at low elevations (Robusta)

Sustainability

Inconsistent results comparing organic versus conventional (both similar and different levels of bioactives)

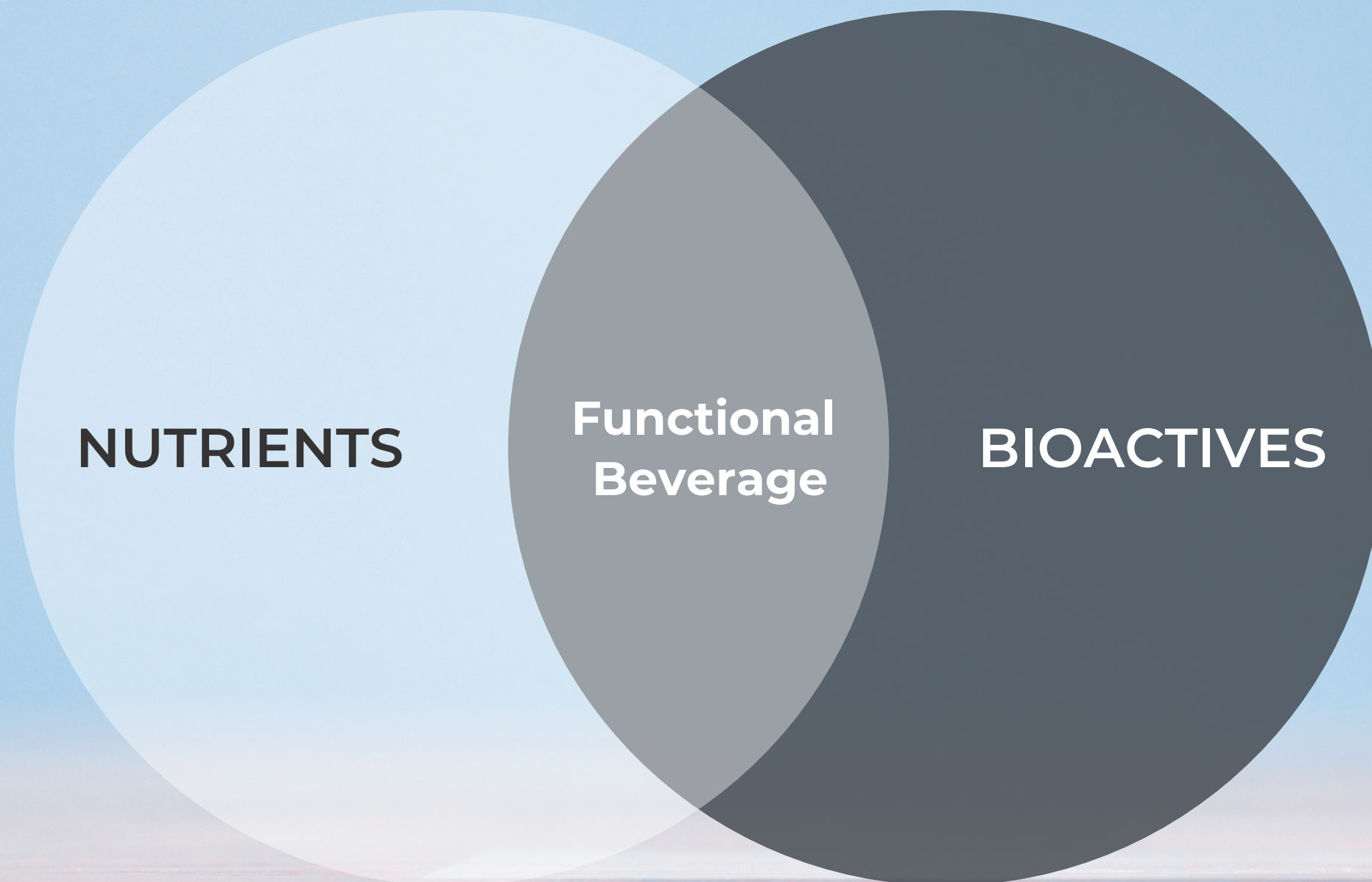


Bioactive levels vary widely...

	CGAs	Trigonelline	Melanoidins	Diterpenes	Caffeine
	<ul style="list-style-type: none">• Unfiltered• Light roast• Caffeinated	<ul style="list-style-type: none">• Arabica	<ul style="list-style-type: none">• Instant• Roasted beans	<ul style="list-style-type: none">• Unfiltered• Medium roast• Arabica	<ul style="list-style-type: none">• Unfiltered• Robusta
	<ul style="list-style-type: none">• Instant (soluble)• Dark roast• Decaffeinated	<ul style="list-style-type: none">• Robusta	<ul style="list-style-type: none">• Green (unroasted) beans	<ul style="list-style-type: none">• Filtered• Instant	<ul style="list-style-type: none">• Instant (soluble)• Decaffeinated



The specific health effects depend on the amount of nutrients and bioactives



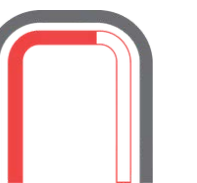
But we don't drink only one type of coffee.....



How many cups of coffee per day do you recommend?



1. **Don't recommend**
2. **1-2 cups**
3. **3-4 cups**
4. **4 or more cups**

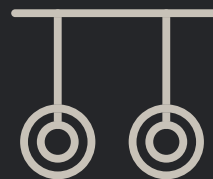


What we did



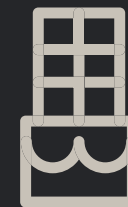
Targeted search of the literature

Support findings and answer additional questions on emerging science, cascara, growing practices, coffee types



Systematic search algorithm

Identify all umbrella reviews and systematic literature reviews (SLRs) which explored the effect of coffee consumption on 12 health topics



Data extracted and summarised

Study type, coffee intervention (dose, duration, delivery [whole bean, ground bean with hot water extraction, ground bean with cold water extraction, soluble/instant], subspecies [Arabica, Robusta, other]), outcomes measured, population characteristics (age, sex, health), quality of included original studies (i.e., risk of bias), key outcome results.





Health & Wellbeing

Cancer

Mental Health

Neurodegenerative Disease

CVD

T2 Diabetes

Liver Health

Kidney Health

Weight Management

GI Health

Inflammation & Oxidative Stress

Bone Health

12 outcomes





Health & Wellbeing

Cancer

T2 Diabetes

Weight Management

Inflammation & Oxidative Stress

Mental Health

CVD

Liver Health

Gut Health

Bone Health

**Neurodegenerative
Disease**

Kidney Health

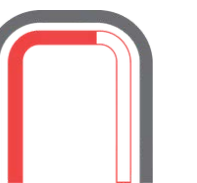
Our focus



Is coffee good for heart health?



1. **Yes, 1-2 cups per day**
2. **Yes, less than 4 cups per day**
3. **No, it is bad for the heart**
4. **No, if you have risk factors or heart disease**





Cardiovascular Disease



3 cups a day

Lower risk of..

hypertension, CVD, CHD, stroke, heart failure, all-cause mortality (but not CVD or stroke mortality), CVD mortality after heart attack, & MetS

Short-term...

Increases blood fats (total and LDL-cholesterol, triglycerides, lipoprotein A), no effect on blood pressure & improved endothelial function





Heart health effects of bioactives

Caffeine

- ↓ bodyweight/fat, risk for blood clotting, circulation
- ↑ blood pressure, inflammatory markers

Chlorogenic acids

- ↓ oxidative stress, inflammation, blood pressure, cholesterol
- ↑ circulation, inflammatory markers at high doses

Melanoidins

- ↓ oxidative stress, inflammation, blood pressure

Diterpenes

- ↓ oxidative stress, inflammation
- ↑ cholesterol



U-shaped effect

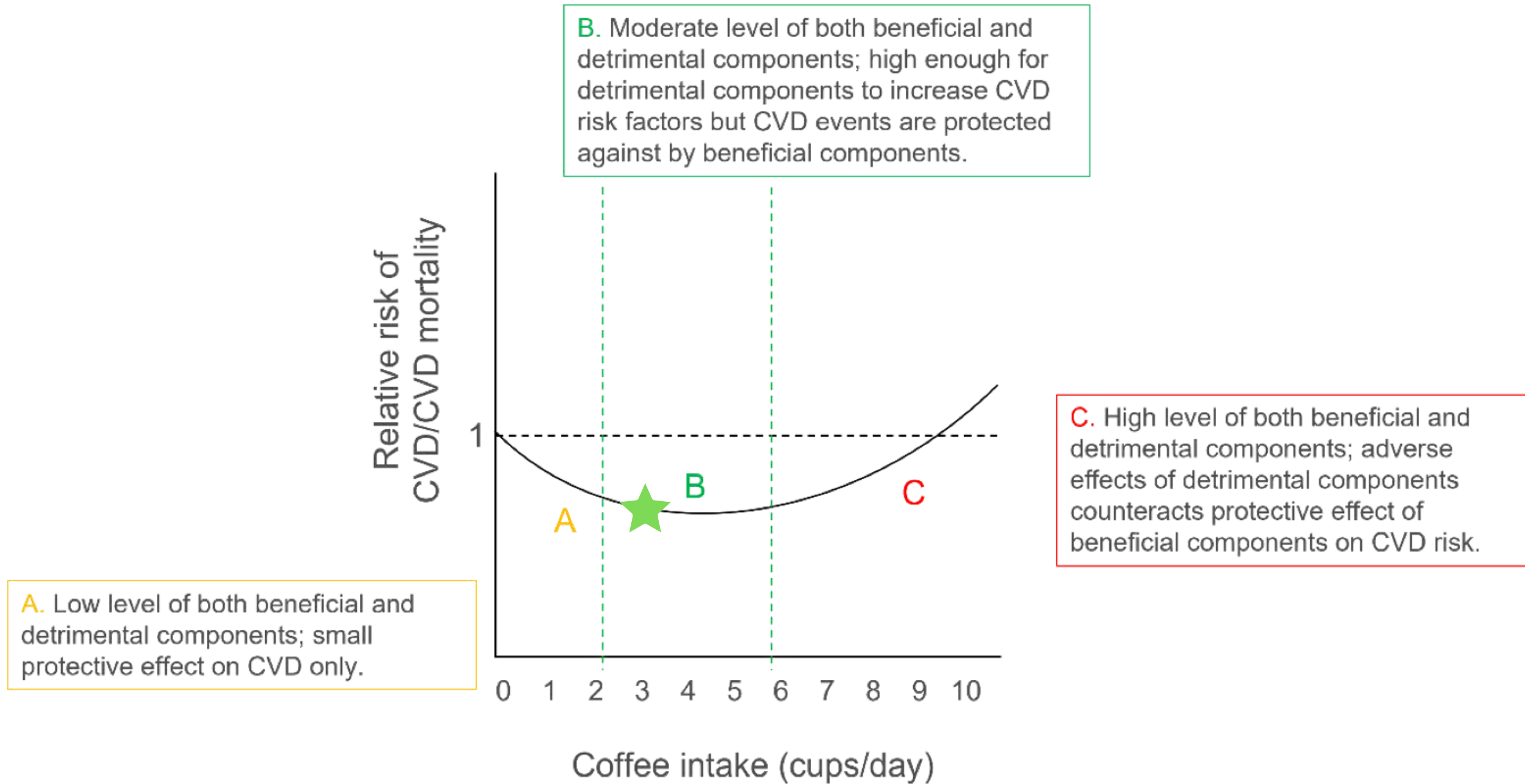


Figure modified from Ding *et al.*, (2014)



Bone Health



1 cup a day



3 cups a day

Lower risk of..
osteoporotic fractures in men (3 cups vs. none)

Higher risk of..
osteoporotic fractures in women (dose-dependent)

No effect for..
hip fracture specifically



Type 2 Diabetes



2-3 cups a day

DIABETES

Lower risk of..

type 2 diabetes with both caffeinated and uncaffeinated coffee intake

Short-term...

no lasting adverse effects on fasting blood glucose and insulin levels, or on the homeostasis model for insulin resistance



Cancer

high consumers

VS

low consumers

Lower risk of..

liver, endometrial, oral/pharyngeal, skin (melanoma/non-melanoma), oesophageal and colorectal

Higher risk of..

lung, bladder, acute lymphocytic leukaemia, and leukemia

No change in risk of..

acute myelogenous leukaemia, breast, colon, kidney, ovarian, rectal, biliary tract, gastric, laryngeal, pancreatic, thyroid, breast, or prostate





Kidney Health



dose-dependent

Lower risk of...

chronic kidney disease (by 13-14%), kidney stones (dose-dependent, 8.7% per cup), gout (by 57%)

Inconsistent effect on..

uric acid levels



Liver Disease



dose-dependent

Lower risk of..
chronic liver disease
related conditions (fibrosis, cirrhosis, NALFD-regular vs. none)
liver cancer (both caffeinated and decaffeinated)
pancreatitis (caffeinated only, 3-4 cups vs. less/none)
gallstone disease (dose-dependent 25% reduction at 6 cups)



Cognition



highest intakes:
1-5 cups a day

Conflicting results...

27% lower risk for Alzheimer's Disease with highest vs. no intake
no association with Alzheimer's Disease (dose-dependent decrease)

No difference in risk of...

All-cause dementia, cognitive decline or impairment (1-8 cups)





Gut Health



2-4 cups a day

No effect on...
ulcerative colitis

Improved GI effects

post abdominal surgeries; first defecation, flatus,
audible bowel sound, tolerance to solid food

Alters GI function (RCTs)- any amount



Health



dose-dependent

Lower risk of..

all-cause mortality (17% lower 3 cups vs. none, 4% per cup)

Parkinson's disease (36% lower vs. none)

depression (12% for habitual, 8% decreases per cup)

Increased risk of...

pregnancy loss (46% overall and 4% per extra cup), low birth weight (31%), first & second trimester preterm birth (12 to 22%)



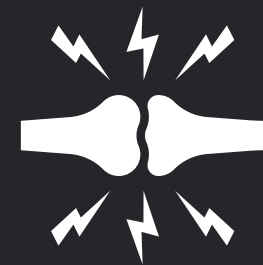
Emerging Health Benefits

Weight Management



- Lower BMI and waist circumference, more pronounced in men
- Dose not reported, cross-sectional data

Inflammation



- Many inflammatory markers-evidence inconclusive.
- Beneficial or neutral effects on levels of adiponectin and interleukins-6 and -18.

Mental Health







- 24% lower risk of depression with a high quality SLR
- 3-4 cups/day vs. none
- Non-linear dose-response; 11% at 200ml, no effect >1L/d

Gut + Prebiotic Effect



- Increase in Bifidobacterium (RCT)
- Prebiotic effect in animal and experimental studies
- Increased gut mobility (RCT)
- Greater adverse events in people with gastrointestinal disorders

Health effect by type of coffee is not so simple

Coffee Type 	Adverse for	Beneficial for	No effect for	High Bioactives ✓
 Filtered	Cancer mortality (high intake)	CVD + T2D mortality	CVD risk factors Inflammatory markers	Caffeine CGAs Melanoidins
 Unfiltered	CVD risk factors	T2D mortality	Cancer mortality CVD mortality GI comfort Inflammatory markers	Caffeine CGAs Diterpenes
 Instant	Cancer mortality (high intake)	T2D risk factors Chronic liver disease	CVD mortality GI comfort	Melanoidins



What is the effect of coffee type on health?

Caffeination status

Highly similar (caffeinated vs decaffeinated) for reduced:

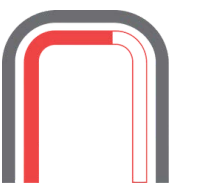
- liver cancer risk, T2D risk, chronic liver disease, inflammation, and all-cause mortality risk

Caffeinated only: lower pancreatitis risk

Roasting level

No clear benefit of one roasting level over another overall:

- **Light:** inconsistent effect on T2DM risk factors
- **Medium:** decreased CVD risk factors but increased T2DM risk factors
- **Dark:** no change in CVD or T2DM risk factors



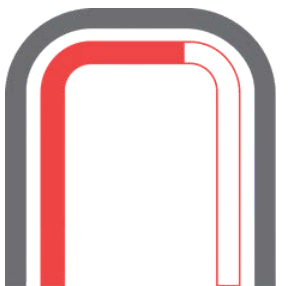
MYTH



Which of these are **true** about coffee?



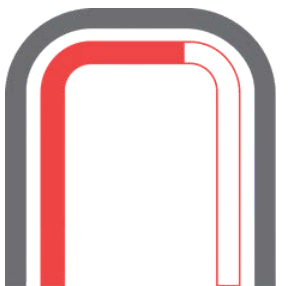
1. Addictive
2. Dehydrates
3. Contains polyphenols
4. Improves sports performance
5. Should always be avoided in pregnancy
6. Instant (soluble) is high in caffeine
7. Dark roast has more caffeine
8. Instant has additives



Which of these are **true** about coffee?



1. Addictive
2. Dehydrates
3. **Contains polyphenols**
4. Improves sports performance
5. **Should always be avoided in pregnancy**
6. Instant (soluble) is high in caffeine
7. Dark roast has more caffeine
8. Instant has additives



Coffee...

Is addictive

MYTH

Caffeine dependence and withdrawal can occur in some people but there are no long-term effects

Dehydrates

MYTH

Caffeine has a small diuretic effect that is outweighed by the fluid consumed with coffee

Improves sports performance

MYTH

True for **caffeine**. Acts as an ergogenic aid (by reducing perception of effort)

Should be avoided in pregnancy

MYTH

Guidelines recommend no more than 200mg/day caffeine

Instant (soluble) has additives & high in caffeine

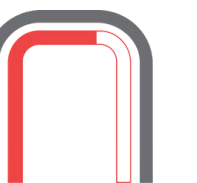
MYTH

100% coffee beans that have been dehydrated

Dark roast has more caffeine

MYTH

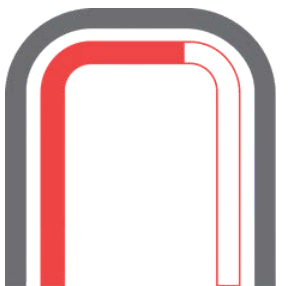
Roasting does not affect caffeine levels



What are the health effects of coffee?



1. **Increases gout**
2. **Increases blood pressure**
3. **Lowers CVD risk**
4. **Increases chronic liver disease risk**
5. **Decreases type 2 diabetes risk**
6. **Is anti-inflammatory**



How many cups a day for optimal health?

**3-4 cups per day,
unless
contraindicated**



So is coffee good for health?

Very beneficial for

- T2DM (caffeinated and decaffeinated)
- CVD risk & events (choose filtered if high lipids)
- Depression
- Kidney health
- Alzheimer's disease
- Liver health and cancer
- Endometrial and oral cancers
- Melanoma
- All-cause mortality



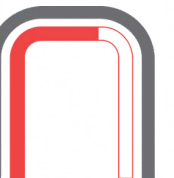
**3-4 cups
a day**

Be careful with

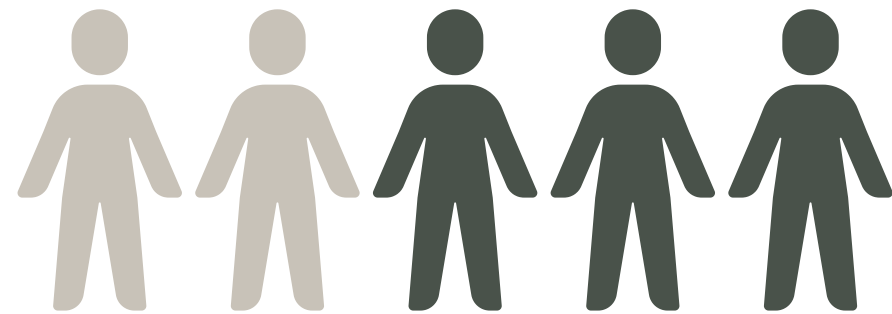
- Pregnancy
- Bone fracture in women
- Digestive disease
- High blood lipids
- Acute lymphocytic leukemia
- Bladder and lung cancers

Watch this space

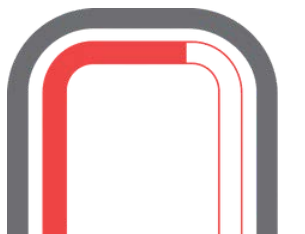
- Prebiotic effect
- Cascara benefits



How confident do you feel in discussing the health effects of coffee?



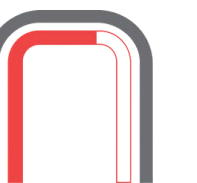
1. Not confident at all
2. Slightly confident
3. Somewhat confident
4. Fairly confident
5. Completely confident



How many cups of coffee per day do you recommend?



1. Don't recommend
2. 1-2 cups
3. 3-4 cups
4. 4 or more cups

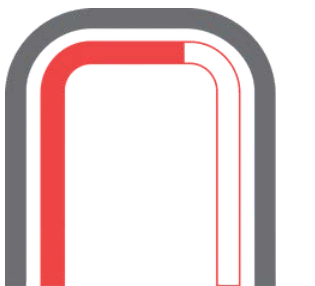


Do you consider coffee to make a positive contribution to the diet?



1. Yes

2. No



Q&A



THANK YOU



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