Nourish Your GUT, Feed Your BRAIN

With Australian berries

Berries are a powerful little fruit that support the gut-brain axis.

Interest in gut & brain health is strong & growing. It is emerging that gut health is about more than just fibre, with bioactive polyphenols also important. *Berries are enjoyable all-rounders, rich in nutrients, polyphenols and fibres that nourish the gut & feed the brain.*

Brain Health

Brain health includes full cognitive, sensory, social, emotional, behavioural, and motor function throughout life irrespective of disorders[1].

A HEALTHY BRAIN INCLUDES[1]:

- **Short-term** - good memory, mood, movement, cognitive performance, sensation, and executive function.
- **Mental health** – reducing anxiety, depression, stress.
- **Long-term** – reducing neurodegenerative disease and cognitive decline.

Gut Health

50% of Australians experience gut health problems, with 1 in 7 experiencing distressing gut health symptoms[2].

A HEALTHY GUT INCLUDES:[3,4]

- effective digestion and absorption of food.
- the absence of gastrointestinal illness.
- effective immune status.
- the absence of gastrointestinal symptoms (e.g. abdominal pain, constipation, bloating, diarrhoea).
- normal, stable and diverse microbiota[5].

The Gut Brain Axis

The gut-brain axis is a constantly interacting, bidirectional communication system connecting the central nervous system (CNS) and the gastrointestinal (GI) tract[6].

- Can influence memory, mood, digestion, metabolism, immunity, mood regulation, motivation, cognitive functions and pain[6,7].
- Dysbiosis (microbiome imbalance) occurs in cognitive, neurological, and mood disorders[8].

HORMONES
VAGUS NERVE
METABOLITES

What's in berries that PACKS A PUNCH?

Berries are jam-packed full of health promoting nutrients & fibre. The power of berries also comes from polyphenols.

MICRONUTRIENTS

Vitamins C & E, Folate, Magnesium & Manganese – **levels vary by berry**.

POLYPHENOLS

- Bioactive compounds – they aren't essential to survive but have health-promoting actions[9].
- **Abundant in berries** – they give berries their vibrant colours, flavours, and aromas[5].
- Act like prebiotics in the gut – they help the 'good' bacteria to flourish[10].

FIBRE

Berries contain insoluble & soluble fibres – these promote gut health and feed the 'good' gut bacteria that produce compounds to nourish the brain[5].

IMPROVE BRAIN HEALTH

IMPROVE GUT HEALTH

IMPROVE GUT-BRAIN AXIS

Berries & Brain Health - the evidence

SYSTEMATIC REVIEWS (11 STUDIES EACH)

Consumption of whole berries and their products can improve[11]

- resting brain perfusion
- memory and learning
- executive function
- processing speed
- attention
- psychomotor function

Berry fruits and their components can facilitate[11]

- neuroplasticity
- neurotransmission
- neuronal calcium homeostasis

Blueberry fruit, juice and powder intake linked to[12]

- improvements in short and long term memory

PROSPECTIVE COHORT STUDIES

Higher blueberry and strawberry intakes are linked to slower cognitive decline[23].

- In a study of over 16,000 elderly people the improvements seen were the equivalent of being 1.5-2.5 years younger[23].

BERRIES & THE GUT

- 4 weeks of freeze-dried strawberry powder (~260g fresh equivalent) led to significant changes in the levels of some gut microbes associated with health and longevity (Christensenellaceae, Mogibacteriacea, Verrucomicrobiaceae, Bifidobacterium, Bacteroidaceae)[24].

INTERVENTION STUDIES - BERRY SUPPLEMENTATION

Mixed berries may reduce cognitive fatigue in young adults[13].

- In 40 healthy young adults accuracy on cognitive tasks was maintained over time, and response times were quicker when a 400mL mixed berry smoothie (75g each of blueberry, raspberry, blackberry and strawberry) was consumed[13].

Mixed berries may improve cognitive performance in older adults.

- In 40 healthy older adults working memory was better after a mixed berry drink (150g blueberries, 50g blackcurrant, 50g lignonberries and 50g strawberries)[14].

Blueberries may improve cognitive performance in older adults with mild cognitive impairment.

- In 4 randomized controlled trials,[15, 16-18] ranging from 12 to 24 weeks, cognitive performance was improved across a variety of tests.

Blueberries may limit the loss of cognitive performance after anaesthesia.

- In 26 patients undergoing major surgery 500mL/day blueberry juice for 14 days before surgery improved cognitive function after anaesthesia[19].

Blueberries may improve cognitive performance in children.

- In 21 children (7-10 years old) a single supplement of 15g or 30g of blueberry powder, and repeat dosing over 3 weeks both lead to improve cognitive performance[20,21].

Strawberries may improve spatial navigation and verbal learning performance.

- In 37 older adults supplementation with freeze dried strawberries (equivalent to 2 cups fresh) improved cognition[22].

Many of these benefits are thought to be due to the high polyphenol content of berries.

HIGH IN POLYPHENOLS

Polyphenols: What are they and what do they do?

Polyphenols are bioactive compounds in plant foods

Classified into flavonoids and nonflavonoids based on their chemical structure.

Flavonoids are the most abundant subgroup[9].

Have anti-inflammatory, antioxidant, anti-aging, anti-tumor, antimicrobial, immunomodulatory, and lipid and glucose-lowering effects[9].

Berries are the highest food source of polyphenols per serve:

PHENOLIC ACIDS & FLAVONOIDS	Strawberries	Blueberries	Raspberries	Blackberries
Phenolic acid esters	2.5	89.4	0.9	8.5
Anthocyanins	72.2	187.3	72.5	172.6
Flavonols (glucosides)	2.2	38.6	16.3	12.8
Flavonols (catechins)	9.1	1.1	5.8	13.9
Tannins	173.7	334.2	156.5	75.9
TOTAL PHENOLICS	**209-443**	**154-585**	**192-529**	**411-678**

From Komarnytsky et al 2023[5].

How Berry Polyphenols Improve Brain Health

DIRECT EFFECTS ON THE BRAIN

- Berry polyphenols may support brain health by improving[11] vascular health, neuro-synthesis and glucoregulation.
- Berry polyphenols can reduce oxidative stress and tissue damage in the brain helping to prevent neurodegenerative diseases, reduce neuronal apoptosis and improve memory, learning and cognitive functions[25].

INDIRECT EFFECTS VIA THE GUT

- 90-95% of berry polyphenols reach the colon to interact with the microbiota[5,26].
- Potential mechanisms include[12,27] direct inhibition of bacterial overgrowth and microbial metabolism to produce and enhance bioavailability of compounds that support brain health .
- Berry polyphenols can have a prebiotic-like effect by increasing beneficial bacteria reducing inflammation[5,26] which can impact brain health[10].
- Complex carbohydrates and polyphenols in berries can rebalance Firmicutes: Bacteroidetes ratios[5], which can be unbalanced in cognition-related health conditions[28].
- Berries can increase anti-inflammatory butyrate producing bacteria in the gut[5].

Berry polyphenols can directly protect the brain through anti-oxidant, anti-inflammatory and other modulatory functions.

Through nourishment of beneficial microbes metabolites may support brain health via the gut brain axis.

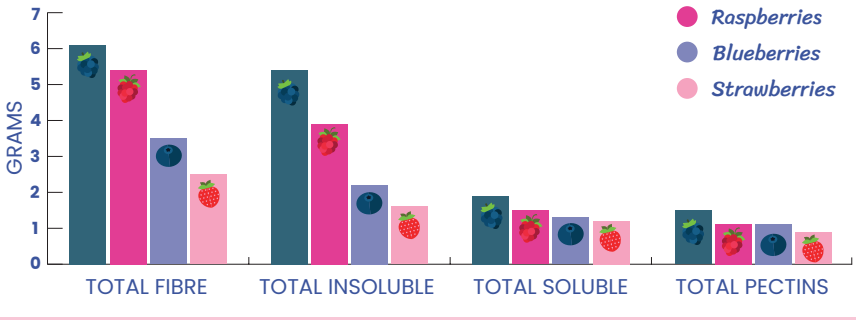
BRAIN RELATED BERRY BENEFITS START WITHIN 30 MINUTES FROM CONSUMPTION

- 30 MINS — Improved glucose and insulin response.
- 60 MINS — Improved flow-mediated dilation and endothelial function.
- 2 HRS — Improved measures of cognitive performance and reduction of inflammatory markers.
- 4 WEEKS — Improved physical functioning in the elderly.
- 6 WEEKS — Favourable changes in gut bacteria.
- 20 YEARS — Reduced cognitive decline in ageing.

Types of dietary fibre in berries

Berries have insoluble fibre (cellulose), insoluble fermentable fibre (hemicellulose), soluble but less fermentable fibres (arabinoxylans), and soluble fermentable fibres (beta-glucans, inulins, pectins) that can benefit the microbiome[5].

BERRY FIBRE FACTS (1 CUP)[29,30]



PREBIOTIC FIBRES Specific abundant pre-biotic fibres

Blueberries	Strawberries	Raspberries	Blackberries

FOS

INULIN

PECTIN

Fructooligosaccharides (FOS): A type of oligosaccharide. FOS acts as a prebiotic by selectively stimulating the growth of beneficial bacteria in the gut, such as Bifidobacteria.

Pectin: Another type of soluble fibre. It has prebiotic properties and helps nourish beneficial gut bacteria.

Inulin: A type of soluble fibre that acts as a prebiotic. Inulin passes through the digestive system intact and serves as a food source for beneficial bacteria in the colon, promoting their growth and activity.

Berry Nutricious

Berries are low in energy and sugars, while tasting sweet, and jam packed with important micronutrients.

NUTRIENTS (per 150 g)[30]	Strawberry 170% of vitamin C needs — Vitamin C Superstar	Blueberry #1 in polyphenols — Polyphenol Punch	Raspberry Source of 5 nutrients — Nutrient All-rounder	Blackberry Highest in fibre, vitamin E & magnesium — Big Boss
ENERGY KJ	164	291	305	317
SUGARS G	5.7	13.8	8.4	11.3
VITAMIN C MG (DI%)	68 (170%)	3 (8%)	44 (110%)	57 (143%)
VITAMIN E MG (DI%)	0.5 (5%)	0.8 (8%)	1.1 (1%)	2.1 (21%)
FOLATE µG (DI%)	59 (30%)	0 (0%)	51 (26%)	51 (26%)
MAGNESIUM MG (DI%)	12 (4%)	9 (3%)	30 (9%)	45 (14%)
MANGANESE MG (DI%)	0.5 (10%)	0.1 (2%)	0.8 (16%)	0.8 (16%)

Berry Unique

Eating a variety of berries offers health benefits above consuming a single type of berry. All berries offer unique health benefits individually, consuming mixed berries can:

1. Enhance nutritional and bioactive diversity - providing a broader spectrum of nutrients, antioxidants, and prebiotics for overall health and wellbeing.
2. Facilitate potential synergistic effects by enhancing functions of different components.

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SCAN FOR MORE INFO

This brochure is intended for educational purposes only.

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