



HEALTH AND NUTRITION OVERVIEW 2019

AUSTRALIAN
onions



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INTRODUCTION

Beneath the layers of this humble hero lie many nutrition benefits. With just 7% of Australian adults and 5% of children meeting the daily recommended intake for vegetables^{1,2}, it's important to find ways to help Aussie families reach this daily goal. A staple in most shopping trolleys, onion is added to a variety of common dishes across many cuisines, but many of us don't think of it as part of our daily recommended five serves of vegetables. Just half an onion eaten over a number of meals during the day, can help us reach our five-a-day.

Whilst the onion may not be the hero ingredient of many meals, it definitely stands out in terms of its health attributes. From supporting gut, heart and brain health to fighting free radical damage, onions are a reliable, versatile and affordable pantry staple. It's time to elevate the status of this 'nutrition ninja' in your everyday favourite family meals.

With a young family of my own, we enjoy onions across a variety of dishes from breakfast to dinner. Along with my colleague Lisa Yates Adv APD, I am excited to share the latest onion nutrition research along with usage tips, so all Australians can reap the benefits by including more onions in their diet.

There is nothing better than that sweet succulent smell of cooked onions to stimulate your taste buds so go ahead, grab an onion today and try it blended, sautéed, baked or caramelised. It's the everyday delicious veggie that helps to keep you and your kids' mind and body healthy on the inside and out.

Teri Lichtenstein, Accredited Practising Dietitian (APD)

THE NUTRITION NINJA

Onions are a natural source of folate, vitamin C and antioxidants and have many health benefits:^{3,4}

GOOD FOR
GUT HEALTH

FOOD FOR
BRAIN HEALTH

ANTIOXIDANT
& ANTI-
INFLAMMATORY

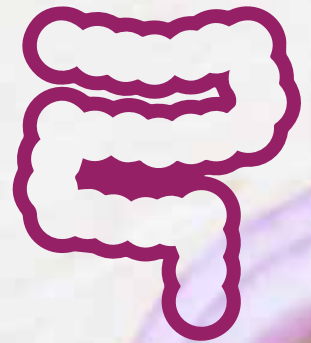
GOOD FOR
HEART HEALTH

Onions contain folate and vitamin C. These essential nutrients support optimal brain function and help to minimise fatigue.*



GOOD FOR THE GUT

Onions are a natural source of fructans, a prebiotic fibre that helps support good gut health*.



PLANT POWER

Onions deliver a unique bundle of vitamins and antioxidants,⁵ protecting cells from free radical damage and inflammation, as well as keeping the immune system strong to reduce the risk of developing chronic disease*:

FOLATE

VITAMIN C

QUERCETIN

SULFOXIDES

ANTHOCYANIN
(RED ONION ONLY)



HEART HEALTH

Onions are naturally low in saturated fat and sodium so contribute to heart health by helping to lower blood cholesterol and blood pressure.*

*As part of a healthy, varied diet.



HOW MUCH AND HOW OFTEN

This report refers to brown, white and red onions, which are members of the *Allium cepa* family of plants and are similar to garlic, leeks, green onions and shallots.

The Australian Dietary Guidelines define a serve of vegetables as 75g or ½ cup (diced) or ½ a medium onion.² The recommended amount of vegetable serves for adults is 6 serves for men and 5 serves for women. Children (aged 1-3 years) need 2½ serves a day or between 4½ - 5½ serves (ages 4 – 18 years).⁶

DID YOU KNOW?

- ONIONS ARE LOW IN ENERGY WITH ABOUT 100KJ OR 25KCAL IN ½ ONION (75G)
- ONIONS ARE NATURALLY LOW IN SUGARS, SATURATED FAT AND SODIUM
- ONIONS' FLAVOUR AND AROMA ARE DUE TO NATURAL SULFOXIDE COMPOUNDS
- ALL FRUITS AND VEGETABLES LIKE ONIONS SCORE 4-5 HEALTH STARS



NUTRITION INFORMATION PANEL

NUTRITION INFORMATION

Servings per package: 2 serves per onion. Serving size: ~75g or ½ onion

	Average Quantity per Serving	Average Quantity per 100g
Energy	106kJ (25kcal)	141kJ (33kcal)
Protein, total	1.0g	1.3g
Fat, total	<1.0g	<1.0g
– saturated	0g	0g
– trans	0g	0g
– polyunsaturated	0g	0g
– monounsaturated	0g	0g
Carbohydrate	4.8g	6.4g
– sugars	3.8g	5.0g
Dietary fibre, total	1.6g	2.1g
Sodium	5.5mg	7.3mg
Potassium	124mg	165mg
Folate	22.3ug DFE (11% RDI)	29.7ug DFE
Vitamin C	5mg (13% RDI)	6.7mg
Polyphenols	30mg GAE	41mg GAE
Quercetin	30mg	39.4mg
Anthocyanins	7.2mg	9.6mg
Fructans	1.4g	1.9g
Cysteine sulfoxide	41mg	55mg
Gluten	0mg	0mg

"<" means less than, g = gram, mg = milligram, ug= microgram. Anthocyanins in red onion only.

Sources: FSANZ Australian Food Composition Database 2019. USDA ORAC of Selected Foods, Release 2 2010 (total polyphenol content only)

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EAT ONIONS EVERY DAY

Onions contribute a range of distinctive flavours to a variety of cuisines. Thanks to the versatility of the *Allium cepa* family, you can easily include ½ onion in your everyday meals to help increase your family's vegetable intake. Onions are a truly global food and can be enjoyed for breakfast, lunch and dinner and everything in between.

Start off your day by adding some chopped onions to an omelette or breakfast frittata. For lunch, why not spice up a wrap or roll with a few Spanish onion rings. When it comes to dinner, onions are a staple for so many family meals. Whether it's the base ingredient in soups, stews and casseroles, or more of a feature ingredient such as an onion gravy for a classic roast lamb, it really is quite easy to eat at least ½ onion during the day and reap the nutrition and health benefits of this humble vegetable.



DICED CARROT, CELERY
AND ONION MAKE AN
AROMATIC BASE FOR MANY
STOCKS, SOUPS AND STEWS
- KNOWN BY CHEFS AS
MIREPOIX.

TIPS TO ENJOY ONIONS EVERY DAY



Fresh **SPICY ONION** tomato salsa goes well with chicken, fish or meat



Add **ONIONS** to your kids' **FAVOURITE MEALS**, whether it's spag bol, mac n cheese or shepherds pie

CHEESE AND ONION
a classic combination with countless variations and a sure way to **BOOST THE FLAVOUR** of a basic toastie



BLOOD ORANGE and **SPANISH ONION**
make a pretty pair on a salad plate



Throw in a few small onions when making roast vegetables. The **SUCCULENT SWEETNESS** will add a unique taste dimension



Include finely **CHOPPED ONION** into fried rice or San Choy Bau for **DELICIOUS FLAVOUR** and aroma

Slow **COOKED ONIONS**
turn a basic sausage sizzle into something **SPECIAL**



POTATO AND ONION
two staple ingredients that work magic together. Whether lightly sautéed, combined to make a creamy onion mash or grated and fried in a rosti, together these become so much more than the sum of their parts



RAW ONIONS
lend a sharp, crisp edge to **DIPS AND SALADS**

ONION ANTIOXIDANTS

Onions are one of the top common food sources of polyphenols flavonoids, specifically quercetin.⁷ These naturally occurring phytonutrients act as antioxidants and anti-inflammatories to help protect against free radical damage and inflammation, which can contribute to ageing and chronic disease.

Onions contain over 25 phytonutrient compounds including quercetin, sulfoxides and anthocyanins (in red onion only). They are one of the highest sources of **quercetin** for Australian Adults and quercetin from onions is more bioavailable compared to apples (another common food source) or supplements.⁸⁻¹³ Quercetin has antioxidant and anti-inflammatory properties¹² which may explain its positive effects on heart health (anti-platelet aggregation, improved endothelial function and blood pressure lowering); diabetes (glucose absorption, blood glucose levels and insulin sensitivity), and gut microbiome (boosting good bacteria).¹⁴⁻¹⁶ Quercetin is metabolised in 24 hours so it's necessary to consume quercetin daily to maintain the body's antioxidant capacity.¹⁷ Another reason to enjoy onions on a daily basis.

Spanish or red onions contain quercetin but they have extra phytonutrients responsible for the purple colour known as anthocyanins. With at least 25 different **anthocyanins** in onions¹⁹, anthocyanin intake similarly has benefits for cardiovascular disease (blood cholesterol and blood pressure lowering).^{20,21} Its anti-inflammatory effects can help to reduce low-grade inflammation linked to insulin resistance,²² and anthocyanins appear to improve blood glucose levels through inhibiting intestinal carbohydrate enzymes and improving glucose uptake into cells.²³

Onions are one of the few plant foods that contain organosulfur compounds called amino acid **sulfoxides**. These are largely responsible for onions' distinct flavour and aroma. Sulfoxides also have antioxidant, anti-cancerous, anti-hypertensive and anti-atherogenic properties (through reducing blood cholesterol and inhibiting platelet aggregation).²⁴



SUNLIGHT BOOSTS
QUERCETIN IN THE
OUTER LAYERS, SO
DON'T OVER PEEL
YOUR ONIONS!¹⁸

½ ONION (75G)
CONTAINS ON AVERAGE
30MG QUERCETIN;
A FLAVONOID
ANTIOXIDANT.⁷

ONION HEALTH BENEFITS

To date, research shows onions have positive benefits for gut and heart health, and possibly diabetes, weight management and cancer. A surprising finding is the potential positive effects on bone. So many healthy reasons to enjoy a delicious daily portion of onions.

Gut Health

Like all vegetables, onions contain dietary fibre (1.6g in ½ onion or 75g) and contribute to an adult's fibre needs of 30g a day. However, it's onions' fructans, a prebiotic fibre or fermentable carbohydrate resistant to digestion that is of interest. Onions contain 1.4g fructans in ½ onion.²⁵ For most of us, fructans are food for the gut microbiome and promote the growth of healthy bacteria such as bifidobacteria.^{26,27} Whereas for others with Irritable Bowel Syndrome (IBS), fructans can cause undesirable gut reactions. People with IBS are told to avoid onions during the elimination phase of the low FODMAP diet since fructans are a FODMAP*²⁸ and they end up in the large intestine where they can ferment causing bloating, gas and pain.²⁹

Those with IBS may still be able to enjoy the flavours of onion in meals by simply cooking larger pieces of onion which can be more easily removed prior to eating. Fructans are water soluble so best to avoid adding onions in soups and casseroles. However, since fructans are not fat soluble, large onion pieces can be added to stir fries and other oil based dishes for flavour, and then removed before eating. Alternatively, an onion infused cooking oil can be used for flavour.³⁰

*Fermentable Oligosaccharides, Disaccharides, Monosaccharides And Polyols

Heart Health

Onions have heart health benefits such as effecting total and LDL cholesterol and blood pressure. Onions' natural phytochemicals have antioxidant and anti-inflammatory properties, which impact platelet aggregation and endothelial function.

Epidemiological evidence suggests onion eaters have a reduced mortality and reduced risk of developing heart disease and hypertension. A Finnish study of 5133 men and women found those eating over 5g of onion a day reduced their risk of total mortality and death from coronary heart disease by 29% and 35% respectively, compared to those who did not eat onion.³¹ Italians who ate more than one 80g portion of onion a week had a 22% reduced risk of myocardial infarction compared to non-onion eaters (p for trend 0.05).³² Another large study following 3052 adults for 6 years, found those who habitually ate garlic and onion over this time had a significant 64% reduced risk of cardiovascular disease (p for trend 0.011) and a 26% decreased risk of developing hypertension (p for trend 0.06).³³

GOT IBS?

COOK LARGE ONION PIECES
IN YOUR OIL BASED DISHES.
REMOVE PRIOR TO EATING
TO STILL ENJOY THE
FLAVOUR.

Clinical trials show that onions may improve **total and LDL cholesterol, and blood pressure** – all risk factors for heart disease. Fifty four women with Polycystic Ovarian Syndrome (PCOS) were randomly allocated to either a ‘high-onion’ diet (raw red onions: 80-100g/day if overweight and 100-120g/day if obese) or a control ‘low-onion’ diet (raw red onions: 20-30g/day) for 8 weeks. Results showed total and LDL cholesterol were both significantly reduced (P=0.003 and P=0.022 respectively), more so in the high onion diet group. There was no change in HDL cholesterol or triglycerides.³⁴ Although another study found no change in cholesterol in those with diabetes.³⁵ This evidence is supported by studies investigating onion components such as onion juice (100ml/day for 8 weeks) significantly decreased waist circumference, total and LDL cholesterol and protected against LDL oxidation (all p < 0.05).³⁶

Seven animal studies investigating onions/ onion extracts/ dehydrated onion - including diabetic animal models - saw positive results on blood lipids.³⁷⁻⁴³ Although another three animal studies found no difference in cholesterol.⁴⁴⁻⁴⁶

Further evidence links onion components with potential positive effects on **platelet aggregation and endothelial function**. An onion soup, rich in water-soluble quercetin (69mg), inhibited aspects of collagen-stimulated platelet aggregation soon after consumption.⁴⁷ Reduced platelet stickiness and blood pressure were also found in a group of healthy subjects 5 hours after consuming an onion-olive-oil maceration capsule.⁴⁸ When four capsules were taken daily over a week, this resulted in a drop in systolic blood pressure and improved blood viscosity.⁴⁹

HEART HEALTH

CLINICAL TRIALS SHOW THAT ONIONS MAY IMPROVE TOTAL AND LDL CHOLESTEROL, AND BLOOD PRESSURE - ALL RISK FACTORS FOR HEART DISEASE.

ONION HEALTH BENEFITS CONT.

Onion extract supplements containing 51 mg of quercetin (equivalent to approximately 100g of onions) for 30 days significantly improved postprandial endothelial dysfunction.⁵⁰ Overweight and obese women with high blood pressure, taking onion peel extract supplements saw a reduction in blood pressure ($P=0.022$)⁵¹ and improve endothelial function ($P=0.002$).⁵² Although another study found no effect of onion peel extracts on blood pressure and endothelial function.⁵³

Animal studies using onion extracts or onion juice have also shown improvements in endothelial dysfunction⁵⁴ and anti-thrombotic effects.^{55,56}

Diabetes

No association has been found between onion consumption and Type 2 diabetes risk.³³ Six clinical trials however have investigated onions' effects on diabetes markers. For instance, 28 people with diabetes (14 Type 1 and 14 Type 2) consuming 100g of sliced onion had significantly **reduce blood glucose** levels four hours after the test meal in both groups ($P < 0.005$).⁵⁷ Studies from the 1980s found similar results, including 20 people eating 3 x 20g portions of onion a day for a week, resulted in a 4% reduction in blood glucose ($P < 0.05$)³⁵ and another where onion consumers were able to reduce their diabetes medications.⁵⁸

A study of 56 breast cancer patients, following a round of chemotherapy, were randomised into groups consuming 100 - 160g a day of onion ("high onion" group) or 30 - 40g a day ("low onion" group) for 8 weeks. Daily high consumption resulted in a significant decrease in **fasting blood glucose** ($P < 0.001$) and **insulin levels** ($P < 0.05$) in comparison with the low onion group. **Insulin resistance** was also significantly reduced and **insulin sensitivity** improved.⁵⁹ The women's PCOS study noted above however saw no change in blood glucose levels in this non-diabetic population.³⁴

These human studies are supported by nine animal studies that also found in onions, juice or extracts rich in quercetin, a reduction in blood glucose levels and/or improvements in insulin resistance through up regulation of **glucose transport** in cells and reduced oxidative stress.⁶⁰⁻⁶⁸

Specific onion compounds appear to reduce blood glucose and/or improve insulin secretion. For instance, allyl propyl disulphide a volatile oil,^{69,70} amino acid sulfoxides S-methylcysteine sulfoxide and S-allylcysteine sulfoxide,⁷¹⁻⁷³ flavonols quercetin⁷⁴ and kaempferol,⁷⁵ and diphenylamine,⁷⁶ appear to effect glucose metabolism,^{57,71} **carbohydrate enzymes** α -amylase and α -glucosidase,^{77,78} **glucose cell utilisation** and transport^{57,74,79,80} and even possibly **regeneration of pancreatic cells**.⁶⁰

Weight Management

There is no epidemiology linking onion consumption with a reduced risk of overweight and/or obesity. Clinical studies show mixed results. A twin study, comparing the intakes of flavonoid antioxidants and their subclasses between the twins and their fat mass, found the twin that ate more flavonol rich foods including a 60g serve of onion had a **reduced fat mass** (P=0.01). Assessing all 2734 women, those with higher intakes of flavonols (found in onions) were associated with lower fat mass and **reduced central adiposity**.⁸¹

One quercetin-rich onion extract supplement study found significantly reduced weight and percentage of body fat,⁸² although another study saw no change in anthropometrics in overweight people.⁸³ Two animal studies saw a drop in body weight and/or fat mass of the animals consuming onion and extracts.^{62,68} Although a third study found no difference in weight of rats after consuming onion powder.⁸⁴

Effects on weight are related to functions of quercetin for instance quercetin containing onion peel extracts change mouse white fat cells characteristics to those of **brown-like fat cells**, which may increase thermogenesis and help burn more fat.⁸⁵ Others found extracts reduce fat mass development and fat cell contents,^{73,86,87} and **down regulate genes** involved in fat mass development.⁸⁷ Adiponectin gene expression in adipose tissue is boosted and fat mass reduced.⁸⁸ Other compounds such as onions' volatile oils suppress high fat diet-induced body weight gain and tend to decrease fat mass in rats.⁸⁹ Similarly, amino acid sulfoxides reduced body weight in rats.⁹⁰

HEALTHY WEIGHT

HALF AN ONION (75G)
PROVIDES AROUND 100KJ
- A GOOD OPTION FOR A
VEGGIE-RICH, KILOJOULE-
CONTROLLED DIET.



ONION HEALTH BENEFITS CONT.

Cancer

High onion eaters generally have less cancer risk compared to no or low onion eaters (see table below).

The mechanisms to explain this are still being investigated. The natural chemical compounds in onions such as the amino acid sulfoxides and their breakdown derivatives appear to induce

liver detoxification enzyme systems and influence cancer cell arrest cycles and apoptosis (cell death) in cancer cell models.¹⁰³ While it was thought quercetin may help protect DNA, a study in 36 adults consuming a 150g onion cake (containing 89.7mg quercetin) resulted in no change in DNA damage markers.¹⁰⁴

Cancer	% Risk Reduction onion consumers versus no or low consumers
Head and neck	17% with 3 or more portions a week ⁹¹
Oral cavity and pharynx	85% ⁹²
Laryngeal	83% ⁹² 30% ⁹¹
Upper aerodigestive tract	28% ⁹³
Oesophageal	88% ⁹²
Gastric	45% with more than 2 portions a week ⁹⁴ 9% with each 20g a day increase in allium ⁹⁵ 50% with ½ an onion a day ⁹⁶
Colorectal	56% ⁹² 15% ⁹⁷ No association ⁹⁸
Breast	25% ⁹² Reduced risk ⁹⁹ No association ¹⁰⁰
Ovarian	73% ⁹²
Endometrial	60% with more than 160g a week ¹⁰¹ 19% with 80g a week ¹⁰¹
Prostate Prostate enlargement	71% ⁹² 60% ¹⁰²
Renal cell	38% ⁹²

Bone health

Fascinating new research shows onions may help older women protect their bones. Women over 50 years of age, who were peri – or post – menopausal, and who ate onions at least once a day, had an overall **bone density** 5% greater than those who ate onions once a month or less ($P < 0.03$). Compared to those that never ate onions, older women who ate onions the most frequently had a **20% reduced risk of hip fracture**.¹⁰⁵ Animal studies have uncovered that quercetin and amino acid sulfoxides reduce the formation of osteoclasts (the cells that breakdown bone) thus helping to maintain bone density.¹⁰⁶⁻¹¹² Quercetin also has phytoestrogen effects so may help form new bone.¹¹³

HIGH ONION EATERS
GENERALLY HAVE REDUCED
CANCER RISK COMPARED
TO NO OR LOW
ONION EATERS.



SELECTING & ENJOYING

Best pick

- Choose onions that are clean and firm with shiny, dry tissue-thin skins
- The 'necks' should be tight and dry
- If they are overly dry, discoloured or have soft wet spots on them - they aren't fresh

Store alone and in the dark

- Onions are best kept in a cool, dark, dry area. Keep them in a mesh bag (or similar) so they get good air circulation
- Storing onions and potatoes together accelerates the spoiling of each vegetable – store separately
- Don't keep onions in the refrigerator for long periods of time as the cold temperature softens them
- If you only use part of the onion, it can be wrapped and refrigerated for up to four days.



WHY DO ONIONS MAKE YOU CRY?

Onions make you cry thanks to a chemical reaction that starts in the ground. Onions grow with the bulb partially in the ground, where the roots absorb sulfur from the soil and store it as an amino acid sulfoxide. When an onion is cut, it releases enzymes, which set off a chain reaction that releases volatile gases into the air. The gases quickly find their way into the eyes and the fumes mix with water there to form sulphenic acid. Nerves in the cornea react to the irritant sending a message to the brain to activate the tear glands. Tears form to wash the offending chemical out of the eye and that's why you cry.^{114,115}

No more tears

To avoid tearing up while cutting onions, you could try one of the following methods:

- Put onions in the fridge or freezer a short time before cutting them
- Cut them under the stove hood/vent
- Cut the onion with the centre tube aiming away from you, have a fan blowing from behind the onion to keep blowing the irritating gas away
- Add vinegar to the chopping board – the acid denatures the enzymes
- Avoid cutting off the root section as the concentration of these chemicals is the highest nearest the root.¹¹⁶ Cut up to the root but otherwise leave the root intact.
- Blanch the onions first or cut while under water, iced water or running water. However, this may increase the likelihood of cutting yourself, so be extra careful.
- Use a sharp knife - this makes cutting easier and faster
- Wear sealed goggles!

CUTTING ONIONS UNDER WATER MAY ALSO REDUCE THE AMINO ACID SULFOXIDE COMPOUNDS RESPONSIBLE FOR ONIONS DISTINCTIVE FLAVOUR. SO, FOR A GREAT TASTING ONION A FEW MINUTES OF TEARS MAY BE WORTH IT.



DOES COOKING ONIONS CHANGE THEIR NUTRITION?

Cooking does impact the nutrient content of onions. To maximise the levels of antioxidant compounds and water-soluble vitamins in onions and their availability for absorption:

- Avoid peeling too many layers off an onion as antioxidant levels are higher in the outer layer,¹⁸
- Don't cut and store onions, cook onions soon after cutting,
- Avoid cutting and soaking in water unless the water is included in the dish,
- When cooking onions in liquids consume the liquid as well e.g. a gravy, stock, soup, stew, or steam and microwave instead,
- Use a variety of cooking methods with quick cooking times e.g. stir fry, microwave and steam,
- When frying, stir fry to preserve nutrient content rather than deep fry¹¹⁷
- Try fermenting onions with other vegetables.

Using a variety of cooking methods, as well as enjoying some onion raw, will help maximise nutrient levels available for absorption and maintain antioxidant capacity.^{118,119}



THE SECRET TO A GOOD DICE

1. Cut the onion in half lengthways



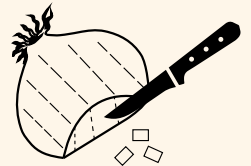
3. Peel off outer skin & make parallel cuts from end



2. Slice off one end



4. Make cuts across onion



FOR MORE USAGE TIPS AND RECIPE IDEAS VISIT
WWW.AUSTRALIANONIONS.COM.AU



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Hort Innovation

This project has been funded by Hort Innovation, using the Australian Onion Industry research and development levy and contributions from the Australian Government. Hort Innovation is the grower-owned, not-for-profit research and development corporation for Australian horticulture.

This report has been written by Teri Lichtenstein and Lisa Yates Accredited Practising Dietitians for health professional educational purposes only and should not be considered medical advice. Please see your health care provider for individualised medical advice if required. May 2019.

