CSIRO PROTEIN PLUS

NUTRITION AND EXERCISE PLAN

The latest research on dietary protein, and how to evenly distribute it across the day to maximise health benefits

115 higher-protein recipes for breakfast, lunch and dinner, plus a program of resistance exercises you can do at home

Advice on how to improve your body composition for better weight management and healthier ageing

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The role of proteins

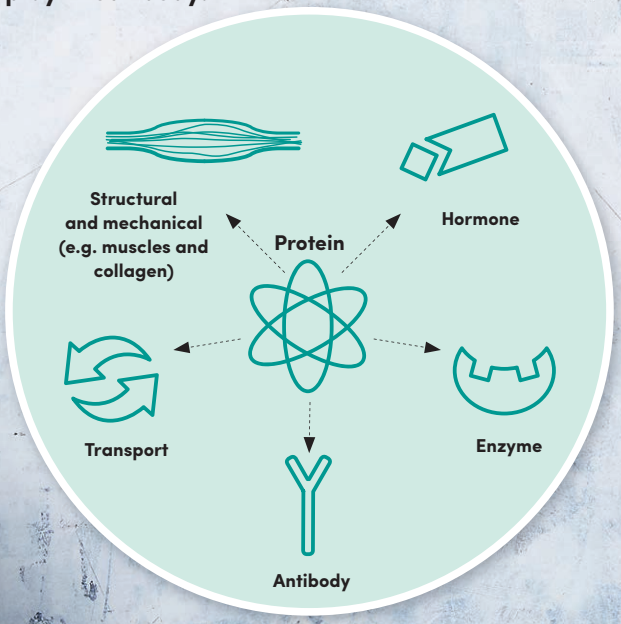
Often described as the 'building blocks' of the body, proteins are large, complex molecules that have many diverse roles in our body, all of which are essential for life.

Proteins do most of the work in our cells, and play a key role in how our organs function. Our bodies use protein to build, maintain, repair and replace tissues. Our muscles are made of protein, and our other tissues contain a protein called collagen, which acts like a glue to connect and support our muscles, bones, tendons, ligaments, cartilage, blood vessels, organs and even our skin.

Some of our hormones are proteins, and our food is digested by enzymes, which are also proteins. Our immune system produces proteins called antibodies to fight bacterial infections. Oxygen is transported through our bloodstream by the protein haemoglobin.

Our body can make, or 'synthesise', all of these different proteins. But to do this, it needs to be supplied with all the necessary ingredients, in the form of dietary protein from the foods we eat. Dietary proteins are found in both animal and plant foods.

Here are some of the roles proteins play in our body:



Dietary proteins

All proteins are made up of long chains of amino acids, which twist into 3D shapes. Each protein has a unique shape that gives it a distinct function — similar to the way in which the shape of a key will fit just one lock. The 'recipe' for each protein is coded in our DNA.

There are 20 different amino acids, and our body combines them in unique ways to make all the proteins we need to survive. Of these 20 amino acids, our bodies can make 11, and so we call these non-essential (these are alanine, arginine, asparagine, aspartate, cysteine, glutamate, glutamine, glycine, proline, serine and tyrosine). The other nine are called essential amino acids, because it's **essential** that we get them through the food that we eat. These are histidine, isoleucine, leucine, lysine, methionine, phenylalanine, threonine, tryptophan and valine.

Not all dietary proteins are alike

The dietary proteins we eat are digested by enzymes, called proteases, into short strings of amino acids (peptides) and single amino acids. This process begins in the stomach and continues in the small intestine, where amino acids are absorbed into the circulation and are then used for protein synthesis (making new proteins). The 'quality' of the protein in different foods depends on:

1. whether or not it contains any/all of the nine essential amino acids our body needs to synthesise new proteins, and
2. the relative ease of digestibility in the stomach and small intestine, along with its absorption — in other words, how much of the protein consumed is actually taken up into the body.

Dietary proteins that come from animal sources (for example, meat, dairy foods and eggs) are considered high quality because they contain all nine essential amino acids in high amounts, and they are more readily digested, absorbed and used by the body. In addition to being protein-rich, they are also nutrient-dense; collectively they provide a good source of iron, zinc, omega-3 fats, vitamin B12 and calcium.

Most vegetable proteins (apart from soy protein) are considered lower quality because they lack one or more of the essential amino acids. Plant proteins are also **less efficiently absorbed by our gut**. This is because they typically contain a significant amount of dietary fibre and compounds, which can reduce the body's ability to access, digest and utilise the protein.

However, people who follow a vegetarian diet can generally meet their protein needs by choosing from a wide variety of protein-rich plant-based foods. You can read more about plant-based diets on page 26.

EMERGING PROTEIN SCIENCE: Measuring protein quality

A new measure of protein quality called Digestible Indispensable Amino Acid Score (DIAAS) has recently been developed by the Food and Agriculture Organization (FAO) of the United Nations. DIAAS is now the accepted method of assessing the quality of dietary protein. It takes into account individual essential amino acids, along with the extent to which the protein is digested and the amino acids become available to the body. A score is assigned which can be used to rank different protein foods. Only a few foods have had their DIAAS score calculated so far but, as this area of science grows, we can build our understanding of how to feed our growing global population sustainably using a variety of different plant and animal protein sources and achieving the most favourable health outcomes.

Protein helps boost metabolism

There are three main uses for energy in our body. The biggest proportion of our body's energy goes towards our **basal metabolic rate** — the energy our body uses even when it is at rest, to keep us alive.

The second (and most variable) component is the amount of energy used for physical activity.

The smallest component is the energy needed to digest, absorb and metabolise nutrients from our food and beverages. This is called the **thermic effect of food** (TEF). Approximately 10% of the kilojoules we consume are used for food digestion and the metabolism of absorbed nutrients.

The TEF for different food components varies. **Fats and carbohydrates** are very easy to metabolise, and so they have a lower thermic effect; approximately 5–15% of kilojoules consumed are used for fat and carbohydrate digestion. **Protein** requires more energy to digest and absorb, so it has a larger thermic effect; approximately 20–35% of kilojoules consumed are required to digest and metabolise protein.

There are some additional factors that can also help to increase the TEF, albeit in small ways. The thermic effect of food is higher:

* in the morning, compared with the evening
* when following a regular meal pattern
* in people participating in regular aerobic and resistance exercise.

Putting this information together, to maximise this natural thermic effect, there is some advantage to enjoying a reasonable-sized breakfast, having meals at regular times of the day, and ensuring that meals are relatively high in protein. This advantage relates to more kilojoules being used for food digestion and metabolism.

But remember, this is a relatively small effect. Consuming fewer kilojoules overall has a much bigger impact in creating an energy deficit to achieve weight loss.

In summary, higher protein diets are advantageous for weight loss by helping control appetite and cravings, and contributing to an energy deficit. Pages 48–49 provide sample meal plans for higher-protein diets for weight loss.

The higher protein recipes in Part Three and the resistance exercises in Part Four are a good starting point for people wanting to take steps towards healthy ageing.

Cheesy scramble with asparagus

Preparation: 15 minutes ✱ **Cooking:** 6 minutes
Difficulty: Easy

B

SERVES 4

light olive oil spray, for cooking
8 large eggs
480 g reduced-fat cottage cheese
2 bunches asparagus, trimmed
28 g flaked almonds
1 teaspoon cumin seeds
½ cup flat-leaf parsley leaves
½ cup small basil leaves
1 tablespoon finely chopped chives
4 x 40 g slices multigrain bread, toasted

Lightly spray a large non-stick frying pan with olive oil and heat over medium heat. Preheat the oven grill to high.

Place the eggs and cottage cheese in a large bowl and whisk with a fork. Season with freshly ground black pepper. Add to the frying pan and cook, gently stirring occasionally, for 3 minutes or until the egg is softly set.

Meanwhile, place the asparagus on a non-stick baking tray and lightly spray with olive oil. Cook under the grill for 1 minute. Turn over and sprinkle with the almonds and cumin seeds, then spray with a little more oil and return to the grill for a further 2 minutes or until just tender and golden.

Divide the scrambled egg and asparagus among serving plates and sprinkle with the parsley, basil and chives. Serve warm with toast.

UNITS PER SERVE Grains **1** ✱ Meat and alternatives **1** ✱ Fruit **0** ✱ Vegetables **0.5** ✱ Dairy **1** ✱ Fats and oils **1**

Haloumi and sprout quinoa with spiced yoghurt

Preparation: 20 minutes ✱ **Cooking:** 20 minutes
Difficulty: Easy

B

SERVES 4

200 g low-fat natural Greek-style yoghurt
1 tablespoon peri peri sauce
2 tablespoons finely chopped chives
1 cup (190 g) quinoa, well rinsed
light olive oil spray, for cooking
280 g haloumi, thickly sliced (see Notes)
4 medium yellow squash, thickly sliced into rounds
1 red onion, sliced into rings
300 g Brussels sprouts, trimmed and very thinly sliced
4 red radishes, very thinly sliced into rounds
28 g slivered almonds, toasted
mint leaves and lemon wedges, to serve

Preheat a large chargrill pan over high heat.

Combine the yoghurt, peri peri sauce and chives in a bowl. Cover and chill until ready to serve.

Cook the quinoa in a saucepan of boiling water over high heat for 15–18 minutes or until tender. Drain well, then transfer to a large heatproof bowl.

Meanwhile, lightly spray the haloumi, squash and onion on all sides with olive oil. Chargrill, in batches, for 2–3 minutes or until tender and golden.

Divide the quinoa and sprouts amongst four serving bowls. Lay the chargrilled haloumi, vegetables and radish on top and season with freshly ground black pepper. Sprinkle over the almonds and mint leaves and serve with the peri peri yoghurt and lemon wedges alongside.

NOTES

If you want to reduce the salt content of the haloumi, place the slices in a bowl of water for 30 minutes to steep. Drain before use.

UNITS PER SERVE Grains **2** ✱ Meat and alternatives **0** ✱ Fruit **0** ✱ Vegetables **2.5** ✱ Dairy **2** ✱ Fats and oils **1**

Sweet and sour crunchy chicken

Preparation: 20 minutes ✱ **Cooking:** 10 minutes
Difficulty: Easy

SERVES 4

1 tablespoon cornflour
1 large egg
1 tablespoon salt-reduced soy sauce
550 g lean chicken tenderloins, halved diagonally
1 tablespoon sunflower oil
1 large red onion, chopped
3 cloves garlic, crushed
5 cm piece ginger, cut into thin matchsticks
1 green capsicum, seeded and chopped
250 g cherry tomatoes, halved
2 tablespoons salt-reduced tomato sauce
1 tablespoon salt-reduced hoisin sauce
1 tablespoon white wine vinegar
3 cups mixed steamed greens (such as snowpeas, sugar snap peas and broccolini)
finely sliced spring onion and red chilli, to serve (optional)

Using a fork, whisk the cornflour, egg and soy sauce in a bowl until well combined. Add the chicken pieces and turn to coat on all sides.

Heat the sunflower oil in a large wok over high heat, add the chicken and stir-fry for 3 minutes or until crispy and light golden. Add the onion, garlic, ginger and capsicum and stir-fry for a further 3 minutes.

Add the tomatoes, tomato sauce, hoisin and vinegar and toss to combine, then immediately remove the wok from the heat.

Divide the steamed vegetables among serving bowls, top with the sweet and sour chicken and serve with finely sliced spring onion and red chilli, if using.

UNITS PER SERVE Grains **0** ✱ Meat and alternatives **1.5** ✱ Fruit **0** ✱ Vegetables **3.5** ✱ Dairy **0** ✱ Fats and oils **1**