

VITAL

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NEWS, VIEWS & INFORMATION FOR NUTRITIONAL PROFESSIONALS

Research updates

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 mla nutrition

Exercise and a protein supplement building muscle in older women

EDITORIAL

In this issue of *Vital*, the findings from two MLA-funded studies are discussed.

In selecting research for funding, MLA seeks advice from key stakeholders to ensure findings are relevant and that they contribute to improving public health in Australia. Our processes for selecting research for funding are described at www.themainmeal.com.au/researchprogram

The studies reported in this issue support increasing evidence that it is the combination of nutrition, physical activity and physiological health factors that determines health outcomes.

Cooking skills are another important component of healthy eating. The Connected Cooking report enclosed with this issue of *Vital* provides useful insights on where people seek information on food and cooking.

As always, we encourage your feedback and ideas for future issues.



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The muscle loss associated with ageing impacts on quality of life in the elderly. Fortunately, research shows that this loss can be reversed. With the right exercise program muscle mass and strength can be increased, and, according to the results from the Women's Healthy Ageing and Muscle (WHAM) study, when protein is added to the exercise regimen, lean muscle mass and muscle strength gains are increased further.

The average adult loses around 250g of muscle every year between the ages of 30 and 60. Losses accelerate after the age of 65, so by the age of 80, our muscle mass is typically less than a third of young adult values. This loss, commonly referred to as sarcopenia, contributes significantly to many common chronic diseases. Sarcopenia also impacts on functional mobility, independence and the risk of falls and fractures.

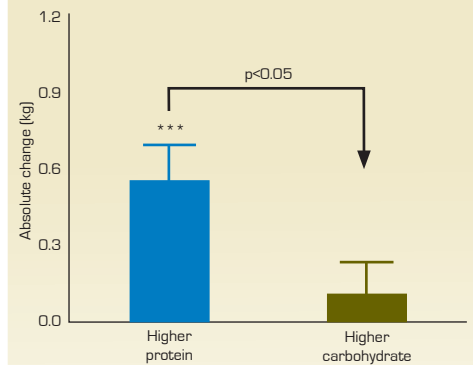
We tend to become less physically active as we age and, following the 'use it or lose it' rule this decline in activity results in an accelerated loss in muscle mass. At the same time age-related changes are happening at a cellular level, explains Professor Robin Daly, lead researcher on the WHAM study. "Throughout our life muscles are constantly being remodeled. They are broken down and built up again in an ongoing process of rejuvenation. However, as we age this balance tips. Muscle is broken down and not rebuilt at the same rate. The result is a loss of muscle mass."

Research has shown that resistance training can build muscle, but among the elderly the response to resistance training is variable. "Part of this variation may relate to each individual's dietary status, particularly their levels of dietary protein intake," explains Daly.

Another factor impacting on muscle loss in the elderly is vitamin D status. Vitamin D is thought to act on muscles in a number of ways: it can have a direct effect on muscle by promoting muscle protein synthesis; and it can also act to reduce inflammation. There is evidence that



Graph 1: Mean absolute change in total body lean mass



vitamin D supplementation can suppress the release of C-reactive protein and other pro-inflammatory markers, which have been linked to many chronic diseases and also to accelerated muscle loss. Vitamin D deficiency is common, particularly among the elderly. "Depending on the cut-off used to define deficiency, up to 90 per cent of adults aged 75+ years could be deficient," says Professor Daly, who is soon to publish a paper that looks at vitamin D levels across the Australian population.

The study

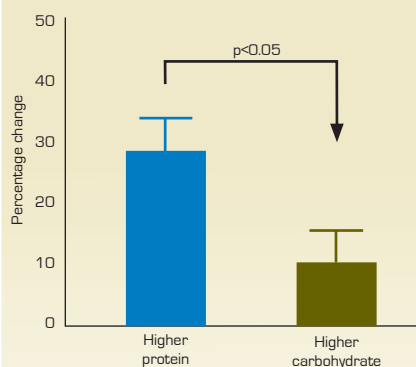
- 4-month randomised, controlled, parallel-group design.
- 100 elderly women, aged 60+ living in retirement villages randomised into two groups:
- Group P (higher protein) increased dietary protein to 1.3g/kg/d by eating trimmed red meat (160g cooked/day)
- Group C (higher carbohydrate) consumed additional carbohydrate and a protein intake equivalent to the current estimated average requirement (EAR) of 0.75g/kg/d for elderly women. Their diet was higher in carbohydrate.
- Diets were similar in energy throughout the study.
- Both groups received resistance training (45-60 minutes twice per week)
- Both groups were supplemented with vitamin D (vitamin D3 1000 IU/day)

Assessment

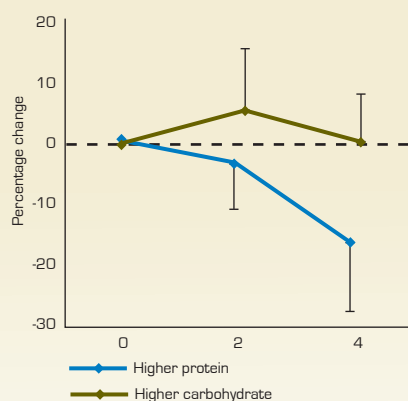
- Diet: 24 hour diet recalls every 4 weeks
- Body composition: height, weight, BMI, DXA (lean mass, fat mass and % body fat) and

Protein boost: for women

Graph 2: Mean percent change in muscle strength



Graph 3: Mean percent change in serum IL-6 (inflammatory marker)



pQCT (muscle and fat cross-sectional areas of the non-dominant distal femur).

- Muscle function, strength and power: Four square step test, timed up and go test, 30-second sit to stand test, 3 repetition maximum leg extension test.
- Biochemical: blood pressure, blood samples were collected at baseline, 2 and 4 months to analyse serum IL-6, IL-10, TNF-alpha, adiponectin, IGF-1, vitamin B12, folate, vitamin D, homocysteine, lipids, glucose and urinary urea, sodium, potassium and creatinine.

Study results

- All women in the study increased their muscle mass and strength, and saw improvements in dynamic balance, gait and function.
- The gains in muscle mass and strength were significantly greater in Group P.
- Group P had lower levels of inflammation (IL-6) and higher levels of insulin-like growth factor-1 (IGF-1) after training, which helps promote muscle growth.
- There were no significant between-group differences for the change in total body fat mass or percentage body fat. However, in Group P there was a significant decrease in total body fat mass and percent body fat.
- Consumption of additional protein in the form of meat was associated with a reduction in blood pressure, cholesterol and lipoproteins, with no adverse impact on kidney function.



Tips for meeting vitamin D requirements from sunlight:

- Summer: a walk with face and arms exposed for 6–9 minutes* at morning or afternoon tea, most days.
 - Winter: a walk outside at lunchtime for 7–29 minutes* with as much bare skin exposed as feasible, most days.
- * Exposure times vary depending on latitude and people with darker skin are likely to need 3–6 times longer exposures.

Reference

Position Statement: Vitamin D and adult bone health in Australia and New Zealand: a position statement. *Med J Aust* 2005; 182 (6):281–285

IMPLICATIONS

Mechanisms

Professor Daly suggests that one of the mechanisms for the benefits seen in Group P may be related to the reduction in inflammation.

This is the first study to look at the influence of additional protein through the consumption of red meat and resistance training on inflammation markers.

IL-6, a pro-inflammatory marker known to be related to muscle loss, was lower in Group P after 4 months training. At the same time this group had higher levels of the hormone IGF-1, which is an important muscle growth factor. “Both of these support the concept that increased protein intake through trimmed red meat with resistance training is beneficial in producing muscle gain.”

Dietary protein intake

“The only difference between the two groups was the amount of protein they ate and the difference in the outcomes was quite remarkable,” says Professor Daly. “The key finding of WHAM is that the benefits of resistance training can be enhanced with a diet of increased protein through trimmed red meat.”

NHMRC guidelines on protein intake for women are 0.75–0.94g/kg/day. “More and more research on older adults suggests that these levels are inadequate to maintain the balance between the breakdown and buildup of muscle,” says Professor Daly. “Some people think the optimum level is more like 1.2–1.5g/kg/day. We aimed to get Group P to a dose of around 1.3g/kg/day.”

Exercise strategies

More challenging than increasing protein in the diets of the elderly is the provision of appropriate exercise opportunities. “Many exercise programs designed for older adults are ineffective because they fail to adequately load the muscles”, explains Professor Daly, “and the muscle gains plateau after a short period of training. To maximise the gain, weights needs to be continually increased to progressively overload muscles.” A key to compliance in this study was the exercise trainers came to the women in the retirement villages to run the small group exercise classes. Professor Daly suggests “there is an opportunity to run community programs for the elderly that combine progressive resistance training with dietary advice”.

Meat in the diet:

making it easy for the elderly

Eating habits change with ageing and it is important to offer healthy meal solutions that meet nutritional requirements in the elderly

Both the Blue Mountains Eye study [Vital #41] and MLA's *Main Meal Repertoires* research indicate that meals eaten by the elderly are simpler and less varied. Conveniently packaged and cheap meals are consumed more regularly and foods that are harder to chew, such as meat, decline in meal frequency. Driving these changes are factors such as convenience, health, dental issues, and household budget. For men there is the added challenge of a skills shortage after a lifetime of being cooked for; and for women a lack of interest in cooking after decades of catering responsibilities.

Even when skills and interest are there, it can still be difficult to cook for one. Recipes are typically designed for four, which can leave singles eating leftovers of a dish until they are heartily sick of it. To help older people meet their nutritional requirements, particularly for protein, it's important to offer practical ways of overcoming the barriers to healthy eating. One solution is to cook a foundation meal, which can be frozen into single-serve portions and adapted into a range of interesting, different meals. Here is one idea for mince.

Easy Mince

500g lean beef mince
2 tsp oil
1 small onion, chopped
1 medium carrot, diced
1 stick celery, diced
1 cove garlic, crushed, optional
1 tbsp oyster or Worcestershire sauce
1 tbsp tomato paste
¾ cup water or beef stock

Heat a nonstick pan, add the oil and fry the onion, carrot and celery for a few minutes, then add the garlic if using and fry until fragrant and soft. Add the beef mince and brown, breaking up the clumps of meat with the edge of wooden spoon so that the meat cooks in fine pieces. Add the water or stock, tomato paste and oyster or Worcestershire sauce. Bring to the boil, turn the heat to low and simmer, covered for about 20 minutes to let the flavors develop.



Make one batch of savoury mince and there are many ways to turn it into different dinners, such as Chilli Tacos.

Variations

Easy Mince = Curry

Add curry powder or curry paste to taste to a serve of Easy Mince, along with a handful of tinned, rinsed chickpeas and a handful of frozen green peas or spinach. Before serving squeeze some fresh lemon juice over the top. Serve with steamed basmati rice, a dollop of natural yoghurt, fresh coriander leaves and chutney.

Easy Mince = Stuffed capsicum

Mix a serve of Easy Mince with about the same amount of leftover cooked rice and a few sliced black olives. Cut the top from a red capsicum and scoop out the seeds and white membrane. Stuff with the Easy Mince mixture and bake for 45 minutes in a moderate oven, or until the capsicum is soft.

Easy Mince = Pasta bake

Add a tin of tomatoes to a serve of Easy Mince and cook to combine the flavours. Cook penne pasta for half the time recommended on the pack, then drain, mix with the sauce, pile into a casserole dish,

top with grated cheese and bake until the top is golden and crispy. Serve with a salad.

Easy Mince = Mexican tacos

To a serve of Easy Mince add half a tin of drained kidney beans, half a teaspoon of paprika and chilli to taste. Cook for 10 minutes to allow the flavors to mix. Serve in a taco shell or warm tortilla with shredded iceberg lettuce, slices of avocado and diced tomato.

Easy Mince = Beef and sweet potato pie

Peel and boil a potato and half a sweet potato. Mash with a little butter and hot milk and season to taste. Pile a serve of Easy Mince into an ovenproof dish and top with the mash. Dot with little pieces of margarine and bake until golden on top and hot all the way through.

Easy Mince = Lunch special

Heat a serve of Easy Mince and add a teaspoon of Dijon mustard. Serve on toast and scatter chopped fresh parsley over the top.

Iron deficiency: prevalence in young women

Iron deficiency is a common nutrition deficiency amongst women, says Helen O'Connor, senior lecturer in nutrition at the University of Sydney's Faculty of Health Science, yet there is little evidence about its prevalence in young Australian women.

Prevalence of iron deficiency of 10.6% has been reported in women aged 25–50 and 32% in a convenience sample of normal-weight students.^{1,2}

With increasing rates of obesity in young women (see *Vital* #49) and evidence suggesting higher levels of iron deficiency, also called hypoferrremia or anaemia of inflammation, in obesity (see *Vital* #43 and #45), Helen O'Connor and her group were interested in looking at the prevalence of iron deficiency in overweight young women. Obesity is associated with chronic inflammation which is thought to affect iron metabolism.

THE STUDY

Participants:

- 118 young women, aged 18–25
- BMI \geq 27.5
- Non-vegetarian
- Exclusions: iron supplementation, blood donations, smoking, appetite suppressants, pregnancy, lactation

Assessment:

- Iron: Fasting Haemoglobin, serum iron, transferrin saturation, ferritin, soluble transferrin receptor (sTfR), sTfR-Ferritin Index
- Inflammation: Fasting C-reactive protein (CRP)
- Body composition (height, weight, BMI, waist circumference, DXA (sub-sample n=69))
- Red meat portion size and number of servings/week

Table 1: Prevalence of iron deficiency in Australian women

Study	Age (years)	Cut-off (Ferritin) $\mu\text{g/L}$	Prevalence %
AusDiab ¹	25–50	<12	10.6
Fayet ²	18–35	<15	34.0
O'Connor ³	18–25	<15	16.9

Study results

• Iron

Almost 17% of the sample were iron deficient (see Table 1) which was somewhat higher than levels reported in the AusDiab study but lower than levels reported by Fayet et al in their convenience sample of normal weight students.^{1,2}

• Inflammation

Levels of inflammation were low in this convenience sample and there was little evidence of hypoferrremia, suggesting that iron deficiency in these overweight young women was related to simple iron deficiency rather than hypoferrremia.

“This was most likely due to the modest levels of obesity and waist circumference in the young women sampled and relatively low level of inflammation assessed though C-reactive protein (CRP)”, said Dr O'Connor. “There appears to be a greater disturbance in iron status markers with more extreme levels of obesity (BMI > 35 kgm²) and some studies show an association with greater abdominal fat”, said Dr O'Connor. In this study, only 40 participants had BMIs greater than 35 and levels of CRP above the normal range.

• Diet

The level of ferritin was lower in those with lowest red meat intakes (see graph 1).

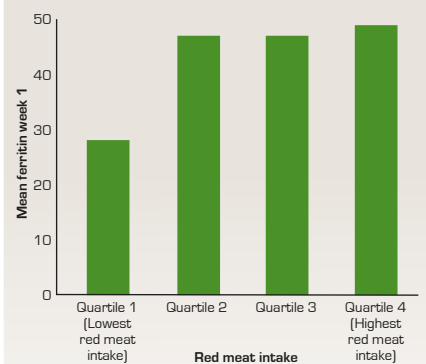
Implications

• Assessing iron status

O'Connor suggests that in obese women, iron status should be part of the physical assessment.

Since ferritin is elevated by inflammation, it is not a useful indicator of iron deficiency in the presence of infection or in the obese. Soluble transferrin receptor concentration is not elevated in response to inflammation. Consequently, soluble transferrin receptor (sTfR) and the ratio of sTfR:log ferritin is recommended to determine if an individual has underlying iron deficiency masked by elevated ferritin.

Graph 1: Ferritin levels by red meat intake



• Causes of iron deficiency

Iron deficiency in young women is most commonly related to either heavy menstrual bleeding or low intakes of meat, fish and poultry.⁴

In the Fayet study, three-quarters of the normal weight women were dieting and the lowest mean food group frequency was for meat, fish and poultry and the highest for breads and cereals.² Where energy intake is restricted, it is difficult to meet dietary iron requirements unless careful choices are made. This may explain the higher prevalence of iron deficiency reported in this study where subjects with low iron stores reported eating red meat less than 3 to 4 times a week (*Vital* #38).

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1. Ahmed F, Coyne T, Dobson A, McClintock C. Iron status among Australian adults: findings of a population based study in Queensland, Australia. *Asia Pac J Clin Nutr.* 2008; 17(1):40–47.
2. Fayet F, Samman S. Eating behaviour and biomarkers of nutritional status in female university students. *Nutrition Society of Australia Abstracts* 2007.
3. Cheng HL, Bryant CE, O'Connor HT, et al. Iron status of overweight and obese young women presenting for weight management. 2011, the University of Sydney, awaiting publication.
4. Heath AL, Skeaff CM, Williams S, Gibson RS. The role of blood loss and diet in the aetiology of mild iron deficiency in premenopausal adult New Zealand women. *Public Health Nutr.* 2001; 4: 197–206.

Connected Cooking: useful resources

Cooking skills are an important component of healthy eating and the following resources can help address this.

Connected Cooking is a new study commissioned by MLA to understand where main meal preparers find inspiration for meals and information about food and cooking. We were particularly interested in understanding the role of digital media and whether this was replacing traditional media.

The findings from this study extend our understanding of what Australians eat for dinner and their main meal repertoire reported in *Last Nights' Dinner* and *Main Meal Repertoires*.

We know from the *Main Meal Repertoires* research that those with low cooking confidence and skill have the most limited repertoire and consume the fewest vegetables. Research is currently being conducted to understand what cooking skills are required to support healthy eating and determine gaps in the cooking skills of main meal preparers.

Connected Cooking provides useful insights into how best to communicate advice on how to prepare healthy meals. It is clear from this research that different types of media perform different roles and hence a combination is required to effectively drive change towards healthy meals.



New 'Beef Essentials' iPhone app

A great beef meal is easy to perfect with the new 'Beef Essentials' iPhone app.

If you have ever found yourself wondering which cut of beef would be best for the recipe you want to cook, or which way to cook a particular cut of beef that you have in the fridge... then 'Beef Essentials' is for you.

Whether you're a novice cook or an experienced one, choosing the right cut of beef for the right cooking method can be a bit tricky.

With 'Beef Essentials', not only can you find the best beef cuts for delicious roasts, stir-fries, casseroles, BBQs and pan-fries, it also provides hints that take the guess work out of preparing beef, to provide you with the confidence to serve the perfect meal every time.

'Beef Essentials' also has cooking timers that help you in the kitchen with reminders at the key times.

The steak timer will make you the master of entertaining. All you have to do is select the cut, the thickness and whether you want it rare, medium rare, medium etc and the timer will tell you when to turn it, remove it from heat, rest it and then it's time to eat it!

The perfect steak every time thanks to 'Beef Essentials'.



Download the free
"Beef Essentials" iPhone app
from itunes today

HELPING MEN BUST A GUT

Belly Busting for Blokes is a new book that aims to help men reduce their waist and improve their life. It offers sensible and practical advice on what to eat, including how to harness the hunger-busting power of protein and low GI carbs in a balanced eating plan. It encourages men to conquer the kitchen and master the basics. Man-favourites, such as chilli, steak, roast, spag-bol, curry, lamb shanks and burgers are tweaked for good health in easy to follow recipes.

A website offers back-up and inspirational stories from men following the program.



Belly Busting for Blokes (New Holland RRP \$24.95) by Nicole Senior APD and Veronica Cuskelly is available from bookshops, department stores and online at www.greatideas.net.au More information at www.bellybusting.com.au

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