

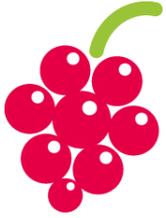


# **Can diet really make a difference to heart, joint and bone health?**

Sally Temple

Nutritionist, Nuffield Health

May 2016



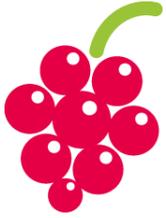
# Agenda

- What is Nutritional Therapy?
- Diet and Nutrients for:
  - Cardiovascular Health
  - Joints
  - Bone



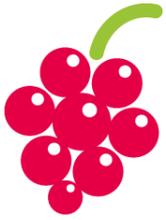
# What is Nutritional Therapy?

- Science based approach to diet and nutritional supplementation
- Focus on macro and micronutrients
- Functional medicine approach where we look at system imbalances e.g. digestion, immune system, hormones,
- Carry out testing using reputable laboratories e.g. metabolic, digestive and hormones
- Produce a specific health plan tailored to the individuals needs and lifestyle



# Research Based

- Where possible Nutritional Therapy is based on scientific research.
- This presentation is fully referenced
- Limitations in research e.g. funding, synergy between nutrients, length of time needed to see a difference, biochemical differences

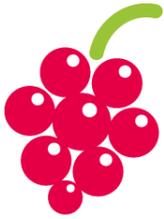


# Nutritional Supplements

- Diet priority
- Where looking to address an imbalance supplements are often very effective.
- These might be at a therapeutic dose to make a difference
- **Contra-indications with food, medication and other supplements must always be checked.**

# Cardiovascular Health





# DASH Diet

- A diet combining fruit and vegetables with foods such as fish, poultry and nuts
- “can protect you against heart attack”
- RCT with meals provided- predicted 10 year impact
- Key factors that make a difference - Low saturated fat, fruits and vegetables, low salt

[J Clin Exp Cardiol.](#) 2016 Apr;7(4). pii: 433. Epub 2016 Apr 24. **Role of Dietary Components in Modulating Hypertension.** [Feyh A<sup>1</sup>](#), [Bracero L<sup>1</sup>](#), [Lakhani HV<sup>2</sup>](#), [Santhanam P<sup>1</sup>](#), [Shapiro JI<sup>1</sup>](#), [Khitan Z<sup>1</sup>](#), [Sodhi K<sup>3</sup>](#).

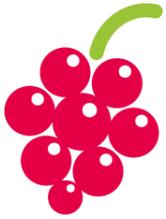
[Obes Rev.](#) 2016 May;17(5):442-54. doi: 10.1111/obr.12391. Epub 2016 Mar 15. **The effect of dietary approaches to stop hypertension (DASH) diet on weight and body composition in adults: a systematic review and meta-analysis of randomized controlled clinical trials.** [Soltani S<sup>1</sup>](#), [Shirani F<sup>2</sup>](#), [Chitsazi MJ<sup>3,4</sup>](#), [Salehi-Abargouei A<sup>3,4</sup>](#)



# Mediterranean Diet

- Eating primarily plant-based foods, such as fruits and vegetables, whole grains, legumes and nuts
- Healthy fats e.g. olive oil
- Using herbs and spices instead of salt to flavour foods
- Limiting red meat to no more than a few times a month
- Eating fish and poultry at least twice a week
- Enjoying meals with family and friends
- Drinking red wine in moderation (optional)
- Getting plenty of exercise

- [Atherosclerosis](#). 2016 Mar;246:87-93. doi: 10.1016/j.atherosclerosis.2015.12.025. Epub 2015 Dec 18. **Metabolic syndrome, adherence to the Mediterranean diet and 10-year cardiovascular disease incidence: The ATTICA study.** [Kastorini CM<sup>1</sup>](#), [Panagiotakos DB<sup>2</sup>](#), [Chrysohoou C<sup>3</sup>](#), [Georgousopoulou E<sup>1</sup>](#), [Pitaraki E<sup>1</sup>](#), [Puddu PE<sup>4</sup>](#), [Tousoulis D<sup>3</sup>](#), [Stefanadis C<sup>3</sup>](#), [Pitsavos J<sup>1</sup>](#). 2016 Mar 9. pii: jn219147. [Epub ahead of print] **Intervention Trials with the Mediterranean Diet in Cardiovascular Prevention: Understanding Potential Mechanisms through Metabolomic Profiling.**
- [Martínez-González MA<sup>1</sup>](#), [Ruiz-Canela M<sup>2</sup>](#), [Hruby A<sup>3</sup>](#), [Liang L<sup>4</sup>](#), [Trichopoulou A<sup>5</sup>](#), [Hu FB<sup>6</sup>](#). Mechanisms postulated to mediate these benefits include the reduction of low-grade inflammation, increased adiponectin concentrations, decreased blood coagulation, enhanced endothelial function, lower oxidative stress, lower concentrations of oxidized LDL, and improved apolipoprotein profiles. However, the metabolic pathways through which the Mediterranean diet influences CVD risk remain largely unknown
- [Cochrane Database Syst Rev](#). 2013 Aug 12;8:CD009825. doi: 10.1002/14651858.CD009825.pub2. **'Mediterranean' dietary pattern for the primary prevention of cardiovascular disease.**
- [Rees K<sup>1</sup>](#), [Hartley L](#), [Flowers N](#), [Clarke A](#), [Hooper L](#), [Thorogood M](#), [Stranges S](#). Favourable results on cvd risk factors. [C<sup>3</sup>](#); [ATTICA Study Group](#). Beneficial role of med diet
- Sofi F, et al. Adherence to Mediterranean diet and health status: Meta-analysis. *BMJ*. 2008;337:a1344.
- Mitrou PN, et al. Mediterranean dietary pattern and prediction of all-cause mortality in a U.S. population. *Archives of Internal Medicine*. 2007;167:2461.
- Monounsaturated fats. American Heart Association. [http://www.heart.org/HEARTORG/HealthyLiving/HealthyEating/Nutrition/Monounsaturated-Fats\\_UCM\\_301460\\_Article.jsp#.VrkGZtjbJmW](http://www.heart.org/HEARTORG/HealthyLiving/HealthyEating/Nutrition/Monounsaturated-Fats_UCM_301460_Article.jsp#.VrkGZtjbJmW). Accessed Feb. 8, 2016.
- Zeratsky KA. Mayo Clinic, Rochester, Minn. Feb. 29, 2016.
- Crous-Bou M, et al. Mediterranean diet and telomere length in Nurses' Health Study: Population based cohort study. *Mediterranean diet and telomere length in Nurses' Health Study: Population based cohort study.* *BMJ*. 2014;349:g6674.



# Avocado

- $\frac{1}{2}$  an avocado provides a range of nutrients and also boosts absorption of fat soluble vitamins from other foods that are eaten alongside
- There are eight preliminary clinical studies showing that avocado consumption helps support cardiovascular health.
- Other reports show avocado helpful for weight management and healthy aging

[Crit Rev Food Sci Nutr](#). 2013;53(7):738-50. doi: 10.1080/10408398.2011.556759. **Hass avocado composition and potential health effects.** [Dreher ML](#)<sup>1</sup>, [Davenport AJ](#)



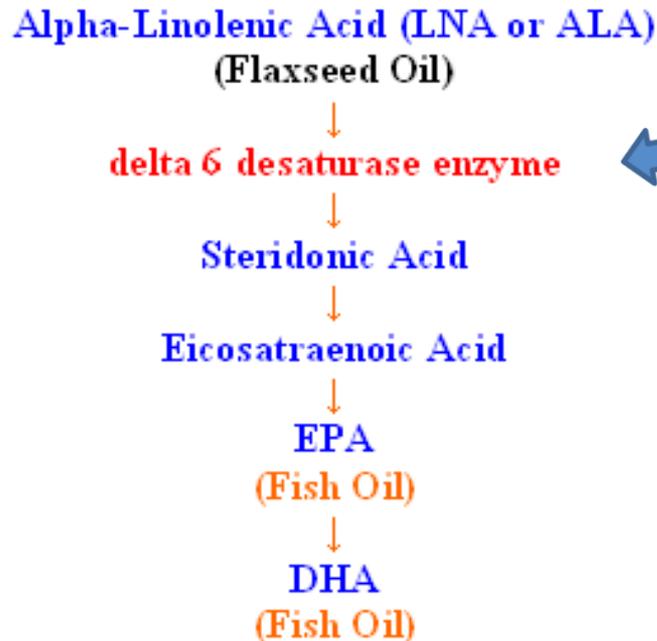
# Omega 3 fatty acids

- Omega-3 fatty acids are a type of unsaturated fatty acids that has a number of therapeutic benefits
- Reducing inflammation which can damage blood vessels contributing to heart disease.
- Specific cardiovascular health benefits associated with Omega-3 fatty acids include:
  - decrease triglycerides
  - lower blood pressure
  - reduce blood clotting
  - decrease stroke and heart failure risk,
  - reduce irregular heartbeats
  - reduces cholesterol

Eating at least one to two servings a week of fish, particularly fish that's rich in omega-3 fatty acids, appears to reduce the risk of heart disease, particularly sudden cardiac death

# Omega 3

## Omega 3 Fatty Acids



0.2 – 21% ALA is converted to EPA

## ALA - Flax & walnut

### Influencing factors

- Intake of meat, dairy
- Insulin
- Atopy
- Hormone medication
- B vitamin deficiency
- Aging

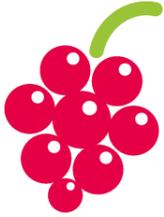
**EPA & DHA - Oily Fish,  
Seaweed, Spirulina**

# Omega 3 Supplementation

Are some strong contra-indications here

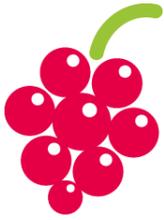
- Omega 3 supplement e.g. oily fish, krill
- Vegetarian and Vegan source – Algae based
- Quality makes a difference





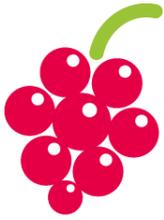
# Omega 3 References

- Zheng J, et al. Fish consumption and CHD mortality: An updated meta-analysis of seventeen cohort studies. *Public Health Nutrition*. 2011;15:725.
- Mozaffarian D, et al. Plasma phospholipid long-chain omega-3 fatty acids and total and cause-specific mortality in older adults. *Annals of Internal Medicine*. 2013;158:515.
- Fish 101. American Heart Association. [http://www.heart.org/HEARTORG/GettingHealthy/NutritionCenter/Fish-101\\_UCM\\_305986\\_Article.jsp](http://www.heart.org/HEARTORG/GettingHealthy/NutritionCenter/Fish-101_UCM_305986_Article.jsp). Accessed July 19, 2013.
- De Goede J, et al. The role of fatty acids from fish in the prevention of stroke. *BMJ*. 2012;345:e7219.
- Mozaffarian D. Fish oil and marine omega-3 fatty acids. <http://www.uptodate.com/home>. Accessed July 19, 2013.
- Chowdhury R, et al. Association between fish consumption, long chain omega 3 fatty acids, and risk of cerebrovascular disease: Systematic review and meta-analysis. *BMJ*. 2012;345:e6698.
- Djousse L, et al. Fish consumption, omega-3 fatty acids and risk of heart failure: A meta-analysis. *Clinical Nutrition*. 2012;31:846.
- Mercury in fish and shellfish: EPA and FDA advice for women who might become pregnant, women who are pregnant, nursing mothers. U.S. Food and Drug Administration and Environmental Protection Agency. <http://www.fda.gov/Food/FoodborneIllnessContaminants/Metals/ucm351781.htm>. July 19, 2013.
- Weaver KL, et al. The content of favorable and unfavorable polyunsaturated fatty acids found in commonly eaten fish. *Journal of the American Dietetic Association*. 2008;108:1178.
- Cole DW, et al. Aquaculture: Environmental, toxicological and health issues. *International Journal of Hygiene and Environmental Health*. 2009;212:369.
- Roncaglioni MC, et al. n-3 fatty acids in patients with multiple cardiovascular risk factors. *New England Journal of Medicine*. 2013;368:19.
- Brasky TM, et al. Plasma phospholipid fatty acids and prostate cancer risk in the SELECT trial. *Journal of the National Cancer Institute*. 2013;105:1132.
- Chua ME, et al. The relevance of serum levels of long chain omega-3 polyunsaturated fatty acids and prostate cancer risk: A meta-analysis. *Canadian Urological Association Journal*. 2013;7:E333.
- Prostaglandins Leukot Essent Fatty Acids. 1998 Jun;58(6):417-20. Dual influence of aging and vitamin B6 deficiency on delta-6-desaturation of essential fatty acids in rat liver microsomes. Bordonni A<sup>1</sup>, Hrelia S, Lorenzini A, Bergami R, Cabrini L, Biagi PL, Tolomelli B.



# Oxidative Stress

- Oxidative stress is responsible for the pathophysiology of various cardiovascular disorders
- Caused by the production of Reactive Oxygen Species/ Free Radicals from metabolism and respiration
- Range of Anti Oxidants that have been found to have beneficial effects
- Food sources on the whole are most effectively absorbed.



# Vitamin C and E

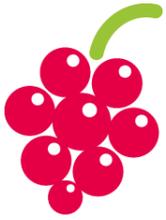
## Vitamin C

- Increases circulation and protects cholesterol from oxidation
- Food - cantaloupe, citrus fruits, kiwi fruit, mango, papaya, pineapple, strawberries, raspberries, blueberries, and cranberries, watermelon, peppers

## Vitamin E

- Regulates blood lipid levels, protects LDL cholesterol from oxidative damage, lessons progression of atherosclerosis
- Food – sunflower seeds, almonds, avocado, asparagus, green leafy vegetables

[Eur Rev Med Pharmacol Sci](#). 2014 Oct;18(20):3091-6. Cardiovascular diseases: oxidative damage and antioxidant protection. [Zhang PY<sup>1</sup>](#), [Xu X](#), [Li XC](#).



# Lycopene

- Strong in-vitro results that reduces CVD risk
- Stimulates LDL degradation
- Best as food
- Some supplement benefit seen for hypertension
- Dietary fat aids absorption
- Cooking increases availability of lycopene
- Most benefit for healthy individuals
- Food sources – tomatoes, guava, watermelon and pink grapefruit



# Other Anti-Oxidants

## Grapeseed

- Strengthens blood vessel connective tissue and capillaries

## Pine Bark

- Enhances microcirculation, decrease vascular inflammation

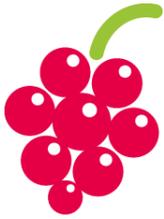
## Bilberry

- Reduces inflammation and LDL oxidation

## CoQ10

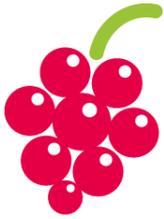
- A RCT (double blind) showed that CoQ10 improves cardiovascular symptoms and reduces major adverse cardio vascular events.
- Cochrane review says more research needed
- Statins can reduce coQ10 plasma concentration.
- Some people experience muscle weakness or similar side effects with statins and exercise.
- Coenzyme Q10 in these instances can be beneficial

- [Cochrane Database Syst Rev](#). 2014 Jun 2;6:CD008684. doi: 10.1002/14651858.CD008684.pub2., Coenzyme Q10 for heart failure. [Madmani ME<sup>1</sup>](#), [Yusuf Solaiman A](#), [Tamr Agha K](#), [Madmani Y](#), [Shahrour Y](#), [Essali A](#), [Kadro W](#).
- [JACC Heart Fail](#). 2014 Dec;2(6):641-9. doi: 10.1016/j.jchf.2014.06.008. Epub 2014 Oct 1. The effect of coenzyme Q10 on morbidity and mortality in chronic heart failure: results from Q-SYMBIO: a randomized double-blind trial. [Mortensen SA<sup>1</sup>](#), [Rosenfeldt L<sup>2</sup>](#), [Kumar A<sup>3</sup>](#), [Dolliner P<sup>4</sup>](#), [Filipiak KJ<sup>5</sup>](#), [Pella D<sup>6</sup>](#), [Alehagen U<sup>7</sup>](#), [Steurer G<sup>4</sup>](#), [Littarru GP<sup>8</sup>](#); Q-SYMBIO Study Investigators.



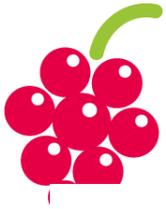
# Gut Bacteria

- Research is suggesting that the profile of your gut bacteria is associated with cardiovascular events risk
- Specific strain *Lactobacillus Plantarium* was found to be particularly cardioprotective
- Research in this area is ongoing
  
- [PLoS One](#). 2013;8(1):e54461. doi: 10.1371/journal.pone.0054461. Epub 2013 Jan 25. **Blood microbiota dysbiosis is associated with the onset of cardiovascular events in a large general population: the D.E.S.I.R. study.** [Amar J<sup>1</sup>](#), [Lange C](#), [Payros G](#), [Garret C](#), [Chabo C](#), [Lantieri O](#), [Courtney M](#), [Marre M](#), [Charles MA](#), [Balkau B](#), [Burcelin R](#); D.E.S.I.R. Study Group.
  
- [Benef Microbes](#). 2015;6(3):233-43. doi: 10.3920/BM2014.0035. **Impact of probiotic *Lactobacillus plantarum* TENSIA in different dairy products on anthropometric and blood biochemical indices of healthy adults.** [Hütt P<sup>1</sup>](#), [Songisepp E<sup>2</sup>](#), [Rätsep M<sup>2</sup>](#), [Mahlapuu R<sup>3</sup>](#), [Kilk K<sup>3</sup>](#), [Mikelsaar M<sup>4</sup>](#).

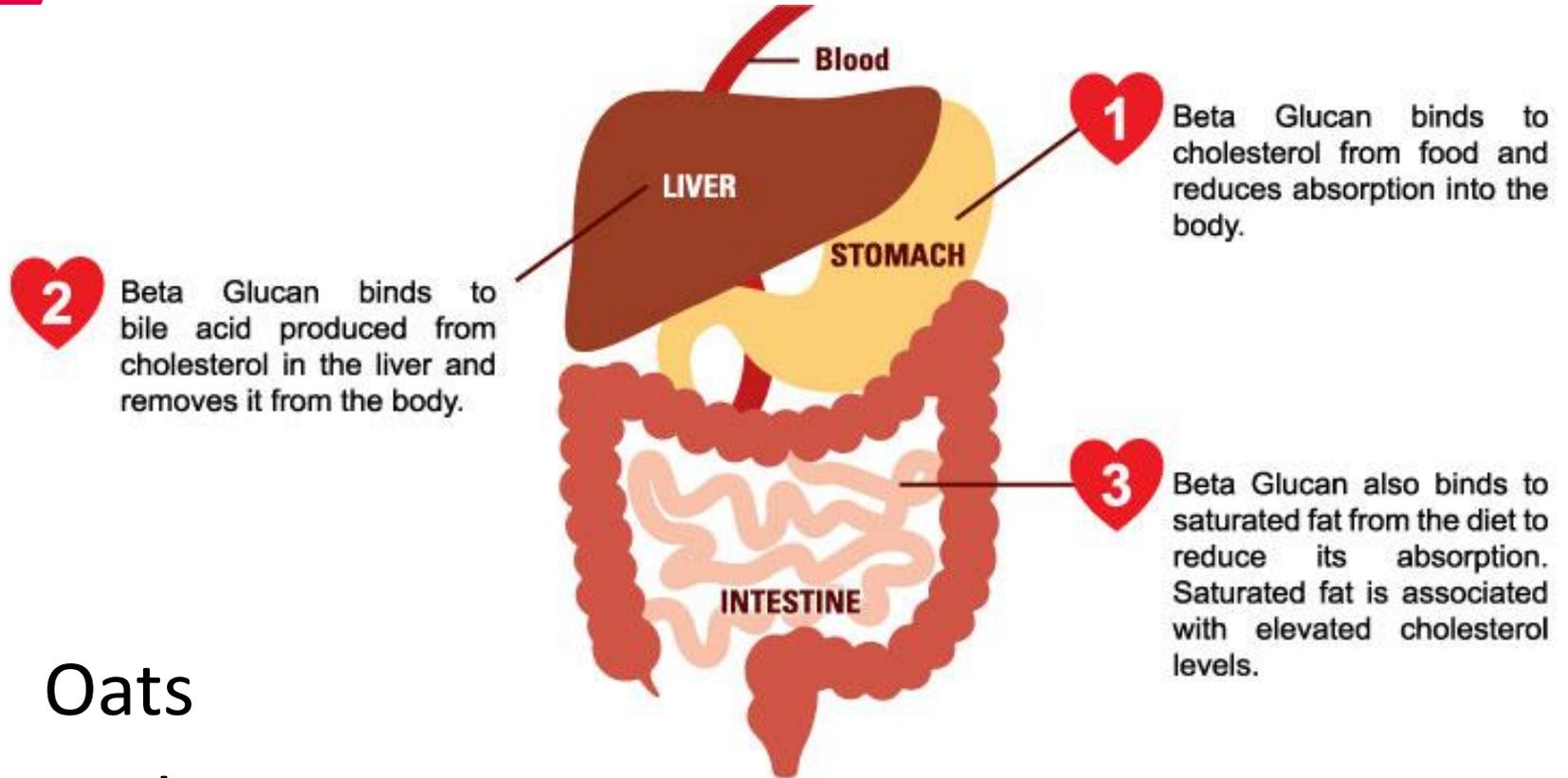


# Plant Sterols

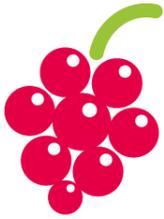
- Plant sterols and stanols have a function in plants rather like that of cholesterol in humans. A high intake of these substances impairs uptake of cholesterol from the gut.
- They reduce total and LDL cholesterol and lower triglyceride levels
- Scientific evidence suggests that eating between 1.5g and 2.4g of plant sterols each day can significantly reduce LDL by up to 10%.
- Added to some foods and also available as a supplement
- <https://heartuk.org.uk/cholesterol-and-diet/healthy-eating/plant-sterols-and-stanols#sthash.fzyJ1s2K.dpuf>



# Beta Glucans

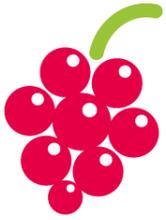


- Oats
- Barley
- Mushrooms



# Insulin Resistance

- Where cells of the body become resistant to insulin. May be part of metabolic syndrome and associated with higher risk of developing heart disease.
- Results in lower uptake of fatty acids by the cells resulting in elevated triglycerides
- Supporting with a blood sugar balancing diet is important
  - 3 meals a day
  - Eat protein with each meal – including breakfast
  - Reduce white carbohydrates and sugar

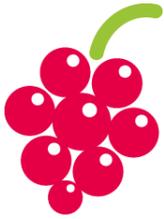


# Homocysteine

- Elevated is a strong risk factor for CVD
- Can increase atherosclerosis
- Induce thrombosis
- Impact on fat metabolism
- Role of methylated B2, B6, B12, Folate, TMG

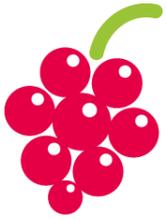
# Joint Health & Osteoarthritis





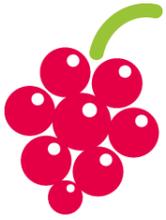
# Joint Health Diet

- Warmbrand Diet
  - Excludes meat, dairy, chemicals, sugar, eggs, processed food
  - Very hard to adhere to!
  - Dates 1950 – 1970 with mainly anecdotal evidence
- Avoiding Nightshade vegetables
  - Impact of solanine compounds on joint health
  - Found in tomatoes, potatoes, peppers, aubergine
  - Some limited research which shows limited benefits with many people not seeing a difference
- Allergies or intolerances may aggravate symptoms



# Joint Health Nutrients

- Focus on 7 most effective nutrients
- Some food and some are best from nutritional supplement options either creams, tablets, tinctures or teas.
- Work by:
  - Reducing inflammation via
    - Antioxidants & polyphenols
    - Fatty acids
  - Stimulate production of collagen and proteoglycans
  - Providing vitamin co-factors needed to sustain joint health

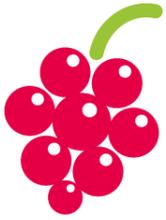


# Antioxidants & Polyphenols

- Especially red peppers, citrus fruits, kiwis, berries, herbs, cocoa
- High dietary intake of antioxidants and polyphenols may reduce the risk of cartilage loss and osteoarthritis progression
- [Food Nutr Res](#). 2015 Oct 5;59:29311. doi: 10.3402/fnr.v59.29311. eCollection 2015.
- **The impact of polyphenols on chondrocyte growth and survival: a preliminary report.**
- [Fernández-Arroyo S<sup>1,2</sup>](#), [Huete-Toral F<sup>3</sup>](#), [Pérez de Lara MJ<sup>3</sup>](#), [de la Luz Cádiz-Gurrea M<sup>4,5</sup>](#), [Legeai-Mallet L<sup>6</sup>](#), [Micol V<sup>7</sup>](#), [Segura-Carretero A<sup>4,5</sup>](#), [Joven J<sup>1,8</sup>](#), [Pintor](#)
- [Arthritis Rheum](#). 1996 Apr;39(4):648-56. Do antioxidant micronutrients protect against the development and progression of knee osteoarthritis? [McAlindon TE<sup>1</sup>](#), [Jacques P](#), [Zhang Y](#), [Hannan MT](#), [Aliabadi P](#), [Weissman B](#), [Rush D](#), [Levy D](#), [Felson DT](#).



<i>Food</i>	<i>Food group</i>	<i>Polyphenols <sup>a</sup></i>		<i>Polyphenols AE <sup>a</sup></i>		<i>Antioxidants <sup>b</sup></i>	
		<i>Content</i>	<i>Rank</i>	<i>Content</i>	<i>Rank</i>	<i>Content</i>	<i>Rank</i>
Cloves	Seasonings	15188	1	15188	1	16047	1
Peppermint, dried	Seasonings	11960	2	7920	2	980	26
Star anise	Seasonings	5460	3	5460	3	1810	16
Cocoa powder	Cocoa products	3448	4	3294	4	1104	24
Mexican oregano, dried	Seasonings	2319	5	2137	5	—	—
Celery seed	Seasonings	2094	6	1007	10	—	—
Black chokeberry	Fruits	1756	7	1432	7	1752	17
Dark chocolate	Cocoa products	1664	8	1618	6	1860	13
Flaxseed meal	Seeds	1528 <sup>c</sup>	9	1220 <sup>c</sup>	8	—	—
Black elderberry	Fruits	1359	10	804	13	1950	12
Chestnut	Seeds	1215	11	1215	9	2757	9
Common sage, dried	Seasonings	1207	12	893	12	2920	8
Rosemary, dried	Seasonings	1018	13	522	14	2519	10
Spearmint, dried	Seasonings	956	14	491	18	6575	3
Common thyme, dried	Seasonings	878	15	464	19	1815	15
Lowbush blueberry	Fruits	836	16	496	15	471	35
Blackcurrant	Fruits	758	17	464	20	821	29
Capers	Seasonings	654	18	389	21	3600	6
Black olive	Vegetables	569	19	320	22	117	53
Highbush blueberry	Fruits	560	20	295	23	205	40
Hazelnut	Seeds	495	21	493	16	687	30
Pecan nut	Seeds	493	22	493	17	1816	14
Soy flour	Seeds	466	23	267	27	—	—
Plum	Fruits	377	24	285	24	411	35
Green olive	Vegetables	346	25	233	28	161	47
Sweet basil, dried	Seasonings	322	26	166	34	4317	4
Curry, powder	Seasonings	285	27	285	25	1075	25
Sweet cherry	Fruits	274	28	145	38	144	48
Globe artichoke heads	Vegetables	260	29	154	35	1142	23
Blackberry	Fruits	260	30	180	33	570	31
Roasted soybean	Seeds	246	31	153	36	—	—
Milk chocolate	Cocoa products	236	32	236	27	854	28
Strawberry	Fruits	235	33	205	29	268	36



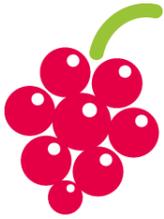
# Pomegranate Juice

- Can improve physical function and stiffness, decrease breakdown cartilage enzymes and increase antioxidant status in patients with knee osteoarthritis.

[J Sci Food Agric.](#) 2016 Jan 25. doi: 10.1002/jsfa.7647. [Epub ahead of print]

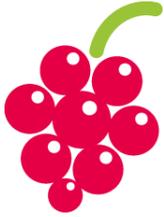
**The effect of pomegranate juice on clinical signs, matrix metalloproteinases and antioxidant status in patients with knee osteoarthritis.**

[Ghoochani N](#)<sup>1</sup>, [Karandish M](#)<sup>1</sup>, [Mowla K](#)<sup>2</sup>, [Haghighizadeh MH](#)<sup>3</sup>, [Jalali MT](#)<sup>4</sup>.



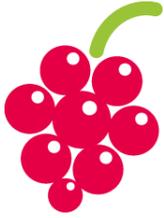
# Rosehip

- Rosehip extract contains polyphenols and anthocyanins to help relieve joint inflammation and prevent joint damage.
- Rich in vitamin C
- Trials have used 5g of ground rosehip a day but dose otherwise not well studied
- Rosnagel K, Roll S, Willich SN. [The clinical effectiveness of rosehip powder in participants with osteoarthritis. A systematic review.] *MMW – Fortschritte der Medizin* 2007; 149(11):51–56. [Article in German].
- Chrubasik C, Duke RK, Chrubasik S. The evidence for clinical efficacy of rose hip and seed: a systematic review. *Phytotherapy Research* 2006; 20(1):1–3.
- Rein E, Kharazmi A, Winther K. A herbal remedy, Hyben Vital (stand. powder of a subspecies of *Rosa canina* fruits), reduces pain and improves general wellbeing in participants with osteoarthritis – a double-blind, placebo-controlled, randomised trial. *Phytomedicine* 2004; 11(5):383–91.
- Warholm O, Skaar S, Hedman E, Molmen HM, Eik L. The effects of a standardized herbal remedy made from a subtype of *Rosa canina* in participants with osteoarthritis: a double-blind, randomised, placebo-controlled clinical trial. *Current Therapeutic Research* 2003; 64:21–31.
- Willich SN, Rossangel K, Roll S, Wagner A, Mune O, Erlendson J, Kharazmi A, Sörensen H, Winther K. Rose hip herbal remedy in participants with rheumatoid arthritis – a randomised controlled trial. *Phytomedicine* 2010; 17:87–93.
- Winther K, Apel K, Thamsborg G. A powder made from seeds and shells of a rosehip subspecies (*Rosa canina*) reduces symptoms of knee and hip osteoarthritis: a randomised, double-blind, placebo-con



# Cayenne

- Scores 5/5 for effectiveness on Arthritis UK research summary
- Reduces pain signals from nerve endings to the brain and reduces inflammation
- Double-blind trials have shown that topical use of cayenne extract creams reduces pain and tenderness caused by osteoarthritis.
- Apply 4 times a day for 2-4 weeks then reduce to twice a day.
- Products containing capsaicin oleoresin are more effective
- McCarthy GM, McCarty DJ. Effect of topical capsaicin in the therapy of painful osteoarthritis of the hands. *J Rheumatol* 1992;19:604-7.
- Altman RD, Aven A, Holmburg CE, et al. Capsaicin cream 0.025% as monotherapy for osteoarthritis: a double-blind study. *Sem Arth Rheum* 1994;23(Suppl 3):25-33.
- Deal CL, Schnitzer TJ, Lipstein E, et al. Treatment of arthritis with topical capsaicin: A double-blind trial. *Clin Ther* 1991;13:383-95.
- Schnitzer T, Morton C, Coker S. Topical capsaicin therapy for osteoarthritis pain: achieving a maintenance regimen. *Sem Arth Rheum* 1994;23(Suppl 3):34-40.
- Deal CL. The use of topical capsaicin in managing arthritis pain: a clinician's perspective. *Sem Arth Rheum* 1994;23(Suppl 3):48-52.
- Zhang WY, Li Wan Po A. The effectiveness of topically applied capsaicin. A meta-analysis. *European Journal of Clinical Pharmacology* 1994; 46(6):517-22.
- Altman RD, Aven A, Holmburg CE, Pfeifer LM, Sack M, Young GT. Capsaicin cream 0.025% as monotherapy for osteoarthritis: a double-blind study. *Seminars in Arthritis & Rheumatology* 1994; 23(Suppl):25-33.
- McCleane G. The analgesic efficacy of topical capsaicin is enhanced by glyceryl trinitrate in painful osteoarthritis: a randomised, double-blind, placebo-controlled study. *European Journal of Pain* 2000; 4(4):355-60.
- Mason L, Moore RA, Derry S, Edwards JE, McQuay HJ. Systematic review of topical capsaicin for the treatment of chronic pain. *British Medical Journal* 2004; 328(7446):991.
- Gemmell HA, Jacobson BH, Hayes BM. Effect of a topical herbal cream on osteoarthritis of the hand and knee: a pilot study. *Journal of Manipulative & Physiological Therapeutics* 2003; 26(5):315-23.
- Kosuwon W, Sirichatiwapee W, Wisanuyotin T, Jeeravipoolvarn P, Laupattarakasem W. Efficacy of symptomatic control of knee osteoarthritis with 0.0125% of capsaicin versus placebo. *Journal of the Medical Association of Thailand* 2010; 93(10):1188-95.



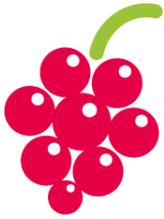
# Ginger

- Reduces the production of several chemical substances that promote joint inflammation.
- Ginger also contains salicylates which can play a role in relieving pain and discomfort.
- Double blind placebo trials have shown improvements over placebo
- Research is with 510mg daily taken in divided doses
  
- Srivastava KC, Mustafa T. Ginger (*Zingiber officinale*) in rheumatism and musculoskeletal disorders. *Med Hypoth* 1992;39:342-8.
- Bliddal H, Rosetzky A, Schlichting P, et al. A randomized, placebo-controlled crossover study of ginger extracts and ibuprofen in osteoarthritis. *Osteoarthritis Cartilage* 2000;8:9-12.
- Altman RD, Marcussen KC. Effects of a ginger extract on knee pain in patients with osteoarthritis. *Arthritis Rheum* 2001;44:2531-8.
- Bliddal H, Rosetzky A, Schlichting P, Weidner MS, Andersen LA, Ibfelt HH et al. A randomised, placebo-controlled, cross-over study of ginger extracts and ibuprofen in osteoarthritis. *Osteoarthritis Cartilage* 2000; 8(1):9–12
- Wigler I, Grotto I, Caspi D, Yaron M. The effects of Zintona EC (a ginger extract) on symptomatic gonarthrosis. *Osteoarthritis Cartilage* 2003; 11(11):783–9.



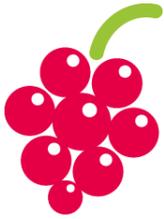
# Pine Bark Extract

- Pycnogenol® in UK, taken in capsule form
- Benefit from bioflavonoids providing anti-inflammatory and anti-oxidant effect
- RCTs have shown increase in joint function, reduction in pain and also reduction in gut symptoms
- Belcaro G, Cesarone MR, Errichi S, Zulli C, Errichi BM, Vinciguerra G et al. Treatment of osteoarthritis with Pycnogenol. The SVOS (San Valentino Osteo-arthrosis Study). Evaluation of signs, symptoms, physical performance and vascular aspects. *Phytotherapy Research* 2008; 22(4):518–23.



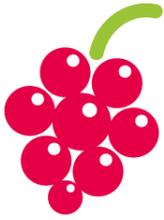
# Celadrin

- Fatty Acids chelated/ combined for maximum improvement of joint health
  - Celadrin improves cell fluidity and elasticity resulting in improved cushioning for bones and joints
  - RCTs have resulted in reduction in aches and pains, improved flexibility vs placebo
  - 2 x RCTs
- Hesslink R Jr, Armstrong D 3rd, Nagendran MV, Sreevatsan S, Barathur R. Cetylated fatty acids improve knee function in participants with osteoarthritis. *Journal of Rheumatology* 2002; 29(8):1708–12.
  - Kraemer WJ, Ratamess NA, Anderson JA, Maresh CM, Tiberio DP, Joyce ME et al. Effect of a cetylated fatty acid topical cream on functional mobility and quality of life of participants with osteoarthritis. *Journal of Rheumatology* 2004; 31(4):767–74.



# Green Lipped Mussel

- Contains omega 3 which provides anti-inflammatory effect
- Helps to maintain joint cell structure and function
- Evidence that it can be effective when taken alongside paracetamol or a non-steroidal anti-inflammatory
- Tablet or cream
- Don't take with anti-coagulant drugs
  
- Cobb CS, Ernst E. Systematic review of a marine nutraceutical supplement in clinical trials for arthritis: the effectiveness of the New Zealand green-lipped mussel *Perna canaliculus*. *Clinical Rheumatology* 2006; 25(3):275–84.
- Brien S, Prescott P, Coghlan B, Bashir N, Lewith G. Systematic review of the nutritional supplement *Perna canaliculus* (green-lipped mussel) in the treatment of osteoarthritis. *QJM* 2008; 101(3):167–79.



# L-Carnitine

- A new study has shown a potential benefit of supplementing with L-carnitine for women with OA of the knee. This could be of benefit for those who find fats difficult to absorb because L-carnitine is a co-factor in fat metabolism
- [J Am Coll Nutr.](#) 2016 Mar 2:1-7. [Epub ahead of print]
- **Effects of L-Carnitine Supplementation on Serum Inflammatory Factors and Matrix Metalloproteinase Enzymes in Females with Knee Osteoarthritis: A Randomized, Double-Blind, Placebo-Controlled Pilot Study.**
- [Malek Mahdavi A<sup>1</sup>](#), [Mahdavi R<sup>1</sup>](#), [Kolahi S<sup>1</sup>](#).



# Vitamin D

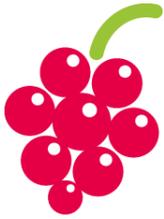
- Low intake and low serum levels of vitamin D each appear to be associated with an increased risk for progression of osteoarthritis of the knee.
- Good to get your vitamin D levels tested which is easily done via your GP (or can be done privately if you prefer)
- [Ann Intern Med.](#) 1996 Sep 1;125(5):353-9. **Relation of dietary intake and serum levels of vitamin D to progression of osteoarthritis of the knee among participants in the Framingham Study.** [McAlindon TE](#)<sup>1</sup>, [Felson DT](#), [Zhang Y](#), [Hannan MT](#), [Aliabadi P](#), [Weissman B](#), [Rush D](#), [Wilson PW](#), [Jacques P](#).

In agreement with your GP...



# SAMe

- Research suggests that SAMe can provide the same level of pain relief as non-steroidal anti-inflammatory drugs
  - Stimulates the production of collagen and proteoglycans (which are the major building blocks of cartilage)
  - Reduces pain and stiffness with results significantly better than placebo
  - Contra-indications – do NOT take if you have depression or are taking any anti-depressants or anti-coagulants.
- 
- Najm WI, Reinsch S, Hoehler F, Tobis JS, Harvey PW. S-adenosyl methionine (SAMe) versus celecoxib for the treatment of osteoarthritis symptoms: a double-blind cross-over trial. *BMC Musculoskeletal Disorders* 2004; 26:5–6.
  - Kim J, Lee EY, Koh E, Cha H, Yoo B, Lee CK, Lee YL, Ryu H, Lee KH, Song YW. Comparative clinical trial of S-adenosylmethionine versus nabumetone for the treatment of knee osteoarthritis: an 8-week, multicenter, randomised, doubleblind, double-dummy, phase IV study in Korean participants. *Clinical Therapeutics* 2009; 31(12):2860–72
  - Soeken KL, Lee WL, Bausell RB, Agelli M, Berman BM. Safety and efficacy of S-adenosylmethio



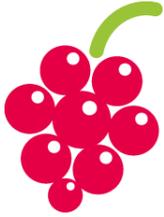
# Niacin (B3)

- Benefits obtained only at a very high dose given in a time release form so only suitable by prescription and under medical supervision because there can be serious side effects
- Increases joint mobility, increases muscle strength and decreases fatigue
- Also beneficial for reduction in cholesterol
- Goldberg A, Alagona P Jr, Capuzzi DM, et al. Multiple-dose efficacy and safety of an extended-release form of niacin in the management of hyperlipidemia. *Am J Cardiol* 2000;85:1100-5.
- Jonas WB, Rapoza CP, Blair WF. The effect of niacinamide on osteoarthritis: a pilot study. *Inflamm Res* 1996;45:330-4.



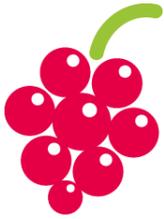
# Worth considering

- Cats Claw – tea or tincture. More effective than placebo (do not take if you have an auto immune condition)
  - Devils Claw – can be very effective but some safety concerns
  - Chondroitin – research is mixed and overall doesn't show clinically significant results
  - Glucosamine – as with chondroitin. Better results with glucosamine sulphate than glucosamine hydrochloride. Theory - building block needed by the body to manufacture specialised molecules called glycosaminoglycans, found in cartilage.
- 
- Piscoya J, Rodriguez Z, Bustamante SA, et al. Efficacy and safety of freeze-dried cat's claw in osteoarthritis of the knee: mechanisms of action of the species *Uncaria guianensis*. *Inflamm Res* 2001;50:442-8



# Chondroitin References

- Pavelka K, Coste P, Géher P, Krejci G. Efficacy and safety of piascaline 300 versus chondroitin sulphate in a 6 months' treatment plus 2 months' observation in participants with osteoarthritis of the knee. *Clinical Rheumatology* 2010; 29: 659–70.
- Reichenbach S, Sterchi R, Scherer M, Trelle S, Burgi E, Burgi U et al. Meta-analysis: chondroitin for osteoarthritis of the knee or hip. *Annals of Internal Medicine* 2007; 146(8):580–90.
- Kahan A, Uebelhart D, De Vathaire F, Delmas PD, Reginster J. Long-term effects of chondroitins 4 and 6 sulfate on knee osteoarthritis: the study on osteoarthritis progression prevention, a 2-year, randomised, double-blind, placebo-controlled trial. *Arthritis & Rheumatism* 2009; 60(2):524–33.
- Sawitzke AD, Shi H, Finco M, Dunlop DD, Harris CL, Singer NG, Bradley JD, Silver D, Jackson CG, Lane NE, Oddis CV, Wolfe F, Lisse J, Furst DE, Bingham CO, Reda DJ, Moskowitz RW, Williams HJ, Clegg DO. Clinical efficacy and safety of glucosamine, chondroitin sulphate, their combination, celecoxib or placebo taken to treat osteoarthritis of the knee: 2-year results from GAIT. *Annals of the Rheumatic Diseases* 2010; 69:1459–64.
- Wandel S, Jüni P, Tendal B, Nuesch E, Villiger PM, Welton NJ, Reichenbach S, Trelle S. Effects of glucosamine, chondroitin, or placebo in participants with osteoarthritis

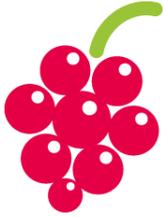


# Future Research

- Amino acids are now being explored because of the potential to modulate the immune system providing benefits for OA
- Worth keeping an eye out on future papers as initial research is positive
- [Amino Acids](#). 2016 Apr;48(4):907-14. doi: 10.1007/s00726-015-2168-x. Epub 2016 Jan 14. **Alterations of amino acid metabolism in osteoarthritis: its implications for nutrition and health.** [Li Y<sup>1</sup>](#), [Xiao W<sup>1</sup>](#), [Luo W<sup>1</sup>](#), [Zeng C<sup>1</sup>](#), [Deng Z<sup>1</sup>](#), [Ren W<sup>2</sup>](#), [Wu G<sup>3</sup>](#), [Lei G<sup>4</sup>](#).

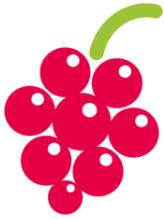
# Bone Health





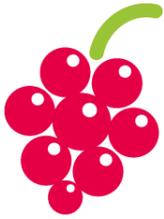
# Protein

- Higher protein diets are associated with greater bone mass and fewer fractures but only when there is sufficient calcium intake
- Alongside eating sufficient protein the body needs plenty of fruits and vegetables
- Concern has centred around protein making the blood too acidic thus drawing calcium out of the bones. This effect appears to be mitigated by eating plenty of fruits and vegetables
- A portion of protein with each meal with plenty of fruits and vegetables
- Open Heart. 2016 Mar 22;3(1):e000325. doi: 10.1136/openhrt-2015-000325. eCollection 2016. Nutritional strategies for skeletal and cardiovascular health: hard bones, soft arteries, rather than vice versa. O'Keefe JH<sup>1</sup>, Bergman N<sup>2</sup>, Carrera-Bastos P<sup>3</sup>, Fontes-Villalba M<sup>3</sup>, DiNicolantonio JJ<sup>1</sup>, Cordain L<sup>4</sup>.
- Feskanich D, Willett WC, Stampfer MJ, Colditz GA. Protein consumption and bone fractures in women. *Am J Epidemiol* 1996;143:472-9.
- Robert P Heaney and Donald K Layman *Amount and Type of Protein influences bone health. Am J Clin Nutr May 2008 ,vol. 87 no. 5 1567S-1570S*
- J Biol Regul Homeost Agents. 2015 Jul-Sep;29(3):729-36., NORMAL NUTRITIONAL COMPONENTS AND EFFECTS ON BONE METABOLISM IN PREVENTION OF OSTEOPOROSIS, Testa G1, Pavone V1, Mangano S1, Riccioli M1, Arancio A1, Evola FR1, Avonda S1, Sessa G1.



# Bone Broth

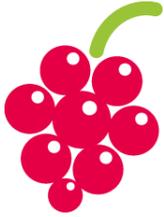
- Bone Broths/ stocks are mineral rich food sources that are used in traditional Asian countries like China and Korea in place of dairy products
- Broths that are made by simmering bones and a variety of vegetables for an hour or longer are a fantastic source of calcium and other minerals that can be used to keep your bones strong and flexible.
- Mineral dense food source in a form that is easily absorbed by the body
- Is also delicious!



# Caffeine

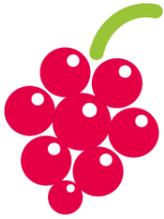


- Caffeine increases urinary loss of calcium
- Caffeine intake has been linked to increased risk of hip fractures and to a lower bone mass in women who consumed inadequate calcium.
- Tea
  - Tea consumption has been linked to osteoporosis in some studies but others have reported that tea drinkers have a *lower* risk of osteoporosis.
  - It is possible that the calcium-losing effect of caffeine in tea is overridden by other constituents of tea, such as flavonoids.
- Summary – enjoy the odd cup but don't over do it!!
- Kanis J, Johnell O, Gullberg B, et al. Risk factors for hip fracture in men from southern Europe: the MEDOS study. *Mediterranean Osteoporosis Study. Osteoporos Int* 1999;9:45-54.
- Hegarty VM, May HM, Khaw KT. Tea drinking and bone mineral density in older women. *Am J Clin Nutr* 2000;71:1003-7.
- Kao PC, P'eng FK. How to reduce the risk factors of osteoporosis in Asia. *Chung Hua I Hsueh Tsa Chih (Taipei)* 1995;55:209-13 [review].



# Fizzy drinks

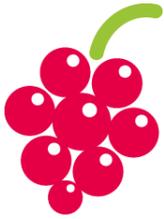
- Drinking fizzy drinks regularly has been linked to an increase incidence of bone fractures
  - Likely to be due phosphoric acid, a substance found in many fizzy drinks, particularly colas which can significantly reduce levels of calcium in the blood
  - Interestingly one study shows that this has a bigger impact on women than men.
- 
- Wyshak G, Frisch RE. Carbonated beverages, dietary calcium, the dietary calcium/phosphorus ratio, and bone fractures in girls and boys. *J Adolescent Health* 1994;15:210-5.
  - Smith S, Swain J, Brown EM, et al. A preliminary report of the short-term effect of carbonated beverage consumption on calcium metabolism in normal women. *Arch Intern Med* 1989;149:2517-9.
  - Mazariegos-Ramos E, Guerrero-Romero F, Rodríguez-Morán F, et al. Consumption of soft drinks with phosphoric acid as a risk factor for the development of hypocalcemia in children: a case-control study. *J Pediatr* 1995;126:940-2.
  - Tucker KL, Morita K, Qiao N, Hannan MT, Cupples LA, Kiel DP. Colas, but not other carbonated beverages, are associated with low bone mineral density in older women: The Framingham Osteoporosis Study. *Am J Clin Nutr* 2006;84:936-942.



# Calcium

- Calcium on its own is unlikely to lead to a clinically significant reduction in risk of fracture
- Evidence also shows that calcium is best absorbed from food sources
- Food sources – dairy, green leafy vegetables, almonds, sesame seeds, enhanced milks, broccoli, soya, tofu, edamame beans, figs, oranges, tinned fish

- [Integr Med \(Encinitas\)](#). 2015 Feb;14(1):34-9. Proper Calcium Use: Vitamin K2 as a Promoter of Bone and Cardiovascular Health. [Maresz K](#)<sup>1</sup>.
- [BMJ](#). 2015 Sep 29;351:h4825. doi: 10.1136/bmj.h4825. Calcium supplements do not prevent fractures. [Michaëlsson K](#)<sup>1</sup>.
- [BMJ](#). 2015 Sep 29;351:h4183. doi: 10.1136/bmj.h4183. Calcium intake and bone mineral density: systematic review and meta-analysis. [Tai V](#)<sup>1</sup>, [Leung W](#)<sup>2</sup>, [Grey A](#)<sup>1</sup>, [Reid IR](#)<sup>1</sup>, [Bolland MJ](#)<sup>3</sup>.
- [BMJ](#). 2015 Oct 21;351:h5477. doi: 10.1136/bmj.h5477. Vitamin D supplements may be needed when calcium supplements are not. [Rhein H](#)<sup>1</sup>.
- [Cleve Clin J Med](#). 2016 Apr;83(4):281-8. doi: 10.3949/ccjm.83a.15066. Drugs that may harm bone: Mitigating the risk. [Hant FN](#)<sup>1</sup>, [Bolster MB](#)<sup>2,3</sup>.
- [Open Heart](#). 2016 Mar 22;3(1):e000325. doi: 10.1136/openhrt-2015-000325. eCollection 2016. Nutritional strategies for skeletal and cardiovascular health: hard bones, soft arteries, rather than vice versa. [O'Keefe JH](#)<sup>1</sup>, [Bergman N](#)<sup>2</sup>, [Carrera-Bastos P](#)<sup>3</sup>, [Fontes-Villaiba M](#)<sup>3</sup>, [DiNicolantonio JJ](#)<sup>1</sup>, [Cordain L](#)<sup>4</sup>.



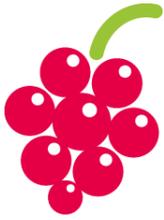
# Other Vitamins

## Vitamin D

- Increases calcium absorption and increases bone strength.
- Works with calcium to prevent musculoskeletal causes of falls and therefore fractures.
- Also prevents drug induced adverse effects on bone
- *Dose - 400 to 800 IU daily depending on age, sun exposure, and dietary sources*

## Magnesium

- Can halt bone loss and increase bone mass
- Food sources: pumpkin seeds, sunflower seeds, swiss chard, quinoa, cashew nuts, spinach
- *Dose - Adults: 250 mg up to 750 mg daily*



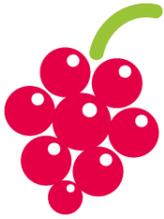
# Other Vitamins

## Vitamin K

- Increases bone formation and correlates with increased bone density.
- It offsets the cardiovascular risks associated with taking calcium supplements on their own.
- 2 types of vitamin K
  - K1 – Green Leafy Veg
  - K2 – Natto, fermented foods, raw cheese

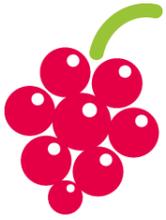
## Phosphorous

- important factor in bone metabolism so good to include in your bone health protocol
- Food sources include scallops, sardines and pumpkin seeds



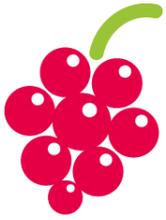
# Soya & Isoflavones

- Isoflavones are phyto estrogens and have been found to protect against bone mineral loss. In one study the effect on bone density was similar to that of conventional hormone-replacement therapy
  - Can improve bone density in established cases of osteoporosis
- Soya is a good food source of Isoflavones. Try fermented soya products like tofu, natto and miso to improve absorption of these compounds
- Red Clover supplementation has been found to reduce bone loss from the spine
- Atkinson C, Compston JE, Day NE, et al. The effects of phytoestrogen isoflavones on bone density in women: a double-blind, randomized, placebo-controlled trial. *Am J Clin Nutr* 2004;79:326-33.
- Alexandersen P, Toussaint A, Christiansen C, et al. Ipriflavone in the treatment of postmenopausal osteoporosis: a randomized controlled trial. *JAMA* 2001;285:1482-88.
- Climacteric. 2006 Aug;9(4):245-63., Soy and red clover for mid-life and aging. Geller SE<sup>1</sup>, Studee L.



# Ipriflavone

- Promotes the incorporation of calcium into bone and inhibits bone breakdown.
- Many clinical trials, including numerous double-blind trials, have consistently shown that long-term treatment with 600 mg of ipriflavone per day, along with 1,000 mg supplemental calcium, is both safe and effective in halting bone loss in postmenopausal women.

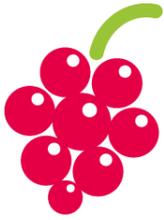


# Omega 3

Again...



- [Clin Obstet Gynecol.](#) 2013 Dec;56(4):703-10. doi: 10.1097/GRF.0b013e3182a9d15a. **Osteoporosis prevention and management: nonpharmacologic and lifestyle options.** [Christianson MS<sup>1</sup>](#), [Shen W.](#)
- [Adv Nutr.](#) 2016 Mar 15;7(2):299-312. doi: 10.3945/an.115.009472. Print 2016 Mar. **PUFAs, Bone Mineral Density, and Fragility Fracture: Findings from Human Studies.** [Longo AB<sup>1</sup>](#), [Ward WE<sup>2</sup>](#).



# Probiotics

Inflammation in the gut can lead to bone loss.

- Healthful probiotic balance helps to reduce this inflammation
- Probiotics also improves bone strength by:
  - Increasing calcium and magnesium absorption
  - Reducing the impact of dietary phytates which limit mineral absorption
  - Enhance absorption of phytoestrogens
- ***Probiotic rich foods: Yoghurt, Kefir, Sauer kraut, Olives, Miso***
- ***Many different probiotic nutritional supplements but seek advice to find the right one for you***

- Br J Nutr. 2015 Dec 28;114(12):1993-2015. doi: 10.1017/S0007114515003864. Epub 2015 Oct 7. **Scientific evidence for health effects attributed to the consumption of probiotics and prebiotics: an update for current perspectives and future challenges.** [Martinez RC<sup>1</sup>](#), [Bedani R<sup>2</sup>](#), [Saad SM<sup>2</sup>](#).
- Michigan State University. "Natural probiotic for osteoporosis? Building healthy bones takes guts." ScienceDaily. ScienceDaily, 14 February 2013.
- Parvanch, K. et al., "Effect of probiotics supplementation on bone mineral content and bone mass density". *The Scientific World Journal*, Vol. 0214 (2014), Article ID 595962
- Scholtz-Ahrens, K et al., "Prebiotics, probiotics and synbiotics affect mineral absorption, bone mineral content and bone structure". *J Nutr.* Vol 137, no 3 8385-8465, March 2007.



# End of whistle-stop tour of nutrients for heart, joint and bone health!

Any questions come up and see me  
or email  
[sally.temple@nuffieldhealth.com](mailto:sally.temple@nuffieldhealth.com)