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Nutrition & Childhood Rheumatic Conditions

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February 27, 2021

A spiral-bound notebook with a pen resting on it, and a computer mouse connected to the desk. The notebook has a list of topics written on it.

-JIA 101
-UVEITIS
-MENTAL
HEALTH

Today We Will...

- Review the knowledge about diets and nutrition for treating arthritis and some other rheumatic conditions
- Discuss healthy eating for the entire family

Background 101

- There are many rheumatic conditions like JIA, SLE and JDM
- We do not know the “pathogenesis” or what causes these rheumatic conditions
- It is thought to involve genetics, the immune system/response and the environment (e.g. food, gut microbiota)

Term	Definition
Autoimmunity	A response by the immune system against an antigen (proteins and polysaccharides in the body)
Autoimmune disease	Condition that results from an abnormal immune response in an area of the body; can be organ specific or systemic
Inflammatory disorder	Condition that most often involves the immune system resulting in inflammation

Terminology

- At this time, there are no cures for any rheumatic condition
- So the goal for your Rheumatology team is to “treat” the condition
- The words *treatment*, *therapy*, *management*, *care* and *intervention* are often interchanged but in general imply the same meaning

Recipe for Treatment

1. Reduce disease activity & associated symptoms (e.g. inflammation, pain, stiffness)
2. Prevent side effects (e.g. joint damage)
3. Improve quality of life

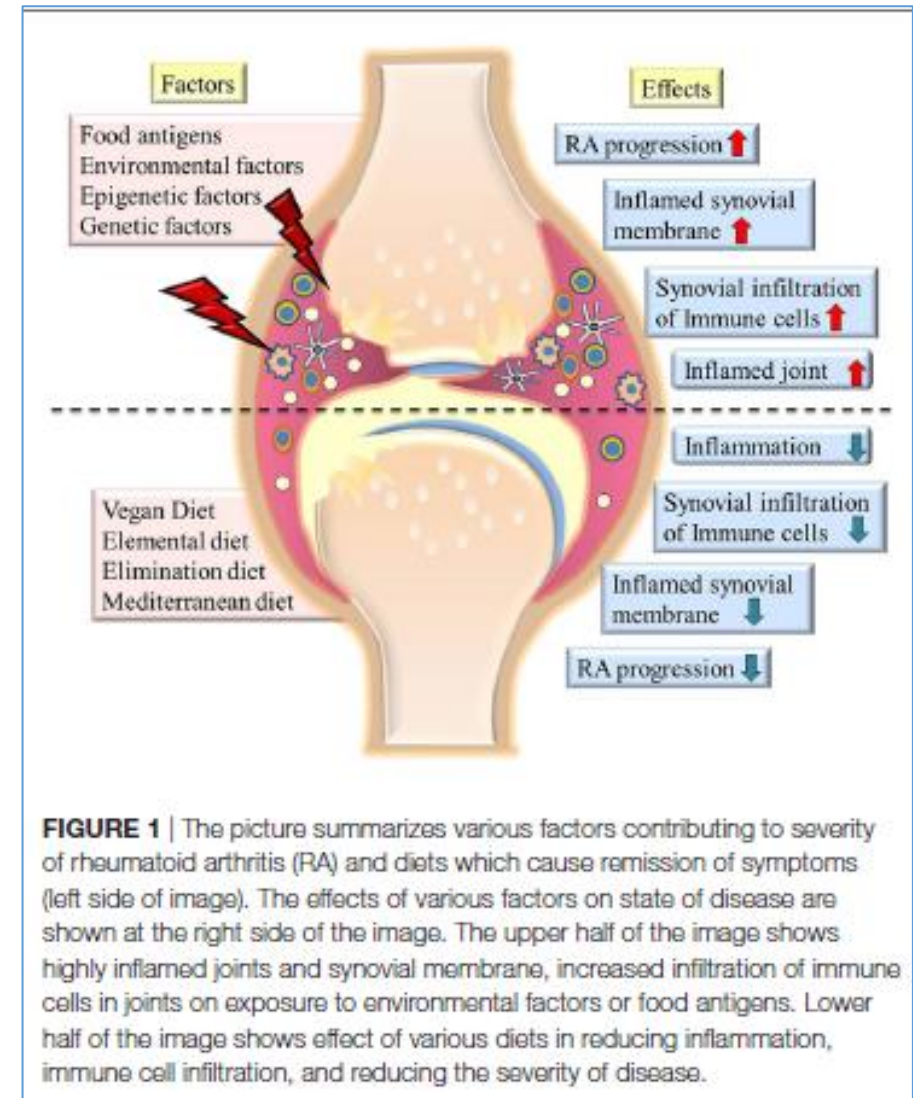
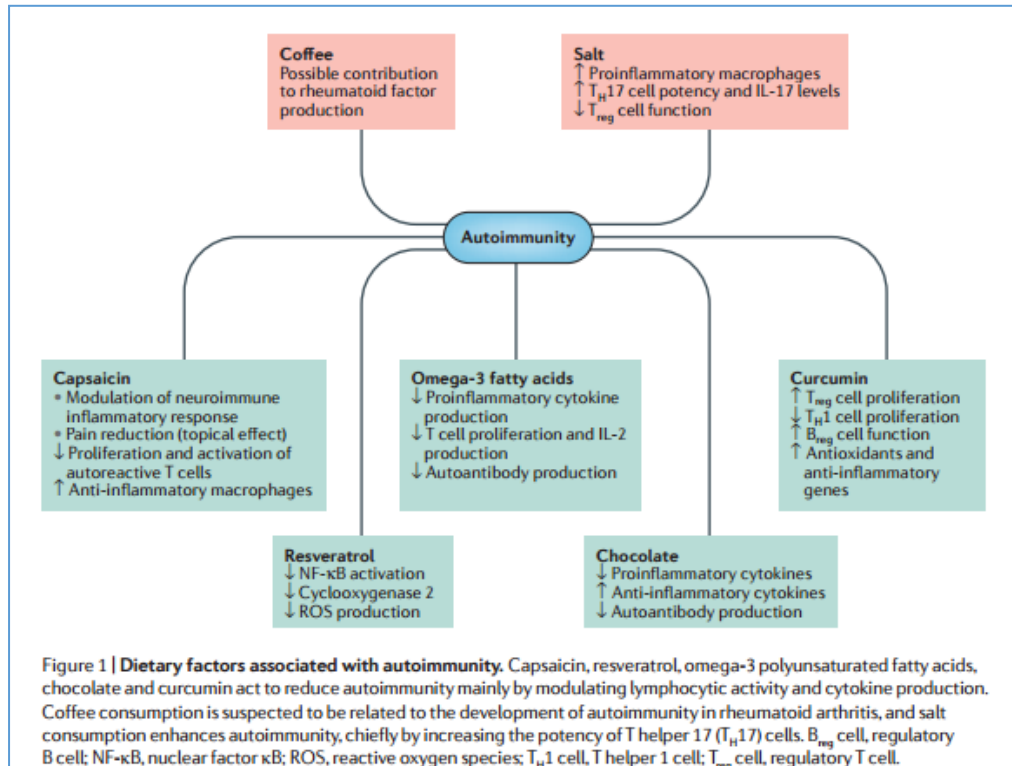
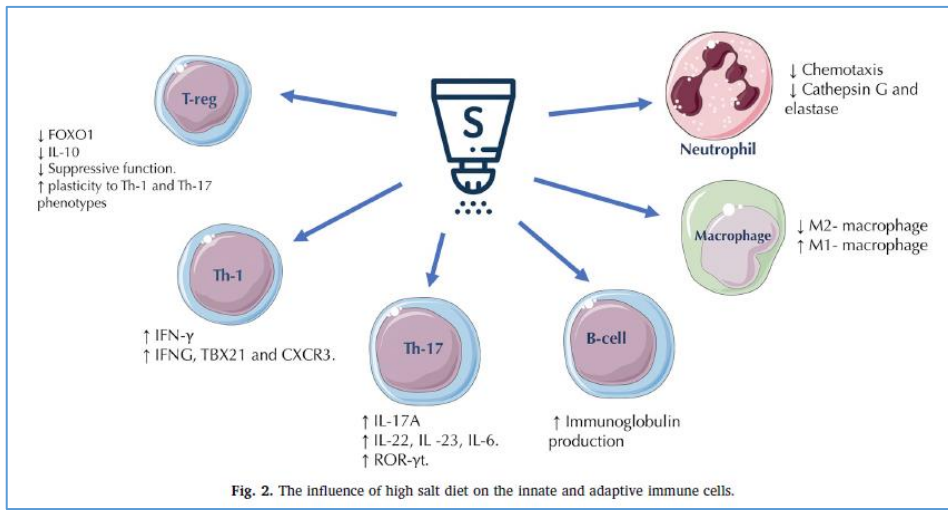


Table 2 The use of products considered complementary alternative medicine (CAM) among adolescents with inflammatory bowel disease (IBD, n = 97) and juvenile idiopathic arthritis (JIA, n = 50)

	IBD patients using CAM	JIA patients using CAM
No. of patients using CAM (percentage of respondents with the given diagnosis)	52 (54%)	19 (38%)
	The proportions of the products used that are considered CAM (among CAM users)	
Probiotics	62%	58%
Multivitamin products	54%	42%
Minerals and trace elements*	37%	21%
Omega-3 and -6 products	23%	37%
Supplementary nutrition products for athletes	12%	0%
Mind-body medicine	7.7%	0%
Body-based practices and energy medicine	3.8%	5.3%

The differences between the IBD and JIA groups are not statistically significant.

*iron and calcium substitutions excluded.

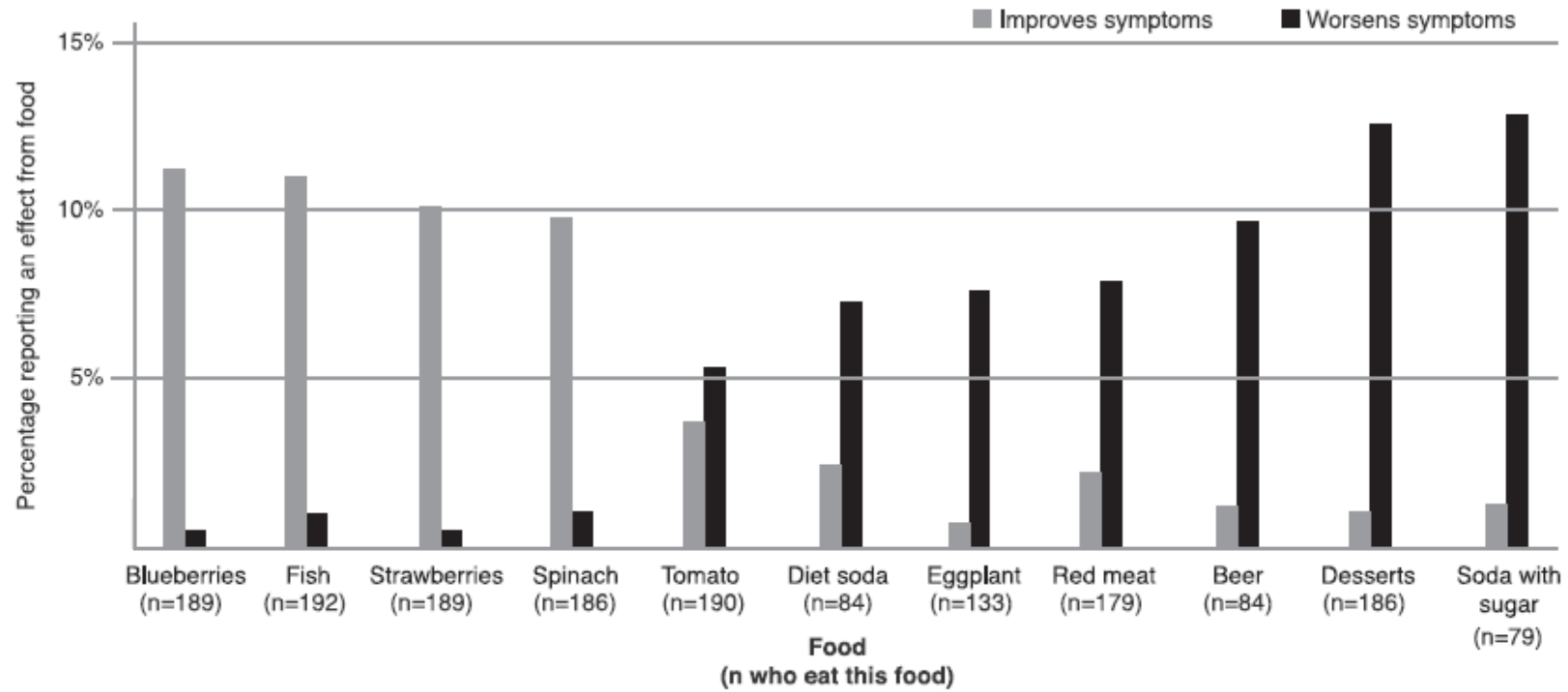


Figure 1. Foods that study subjects reported most often as affecting their rheumatoid arthritis symptoms.

TABLE 2. DIET CHOICES IN 79 PATIENTS WHO EVER TRIED A SPECIAL DIET

<i>Variables</i>	<i>All respondents, n (%)</i>
Number of special diets a child tried to improve arthritis	
1	33 (42)
2	28 (36)
3 or 4	17 (22)
Diets ever tried ^a	
Gluten-free	52 (22)
Anti-inflammatory	32 (13)
Lactose-free	20 (8)
Other	12 (5)
Paleo	10 (4)
Vegetarian	10 (4)
Vegan	6 (3)
Specific carbohydrate	2 (1)

^aA gluten-free diet excludes the protein gluten found in grains such as wheat, barley, rye. An anti-inflammatory diet is composed of fruits and vegetables, whole grains, plant-based proteins, fatty fish, and fresh herbs and spices. A lactose-free diet excludes food products containing lactose, mainly dairy products. A paleo diet includes lean meats, fish, fruits, vegetables, nuts and seeds and avoids grains, dairy, legumes, potato, refined sugar, and salt. A vegetarian diet excludes meat, fish, poultry, and may allow eggs (Ovo-vegetarian) or dairy products (Lacto-vegetarian) or both (Lacto-ovo vegetarian). A vegan diet excludes meat, poultry, fish, eggs, and dairy products. A specific carbohydrate diet severely limits most carbohydrates (primarily grains, starches, dairy, and sugars) and allows only specific carbohydrates from fresh fruits, honey, and home-made yogurt fermented longer than 24 h.

Epidemiology

- Largely described in rheumatoid arthritis (RA)
 - Epidemiological studies in juvenile idiopathic arthritis (JIA) have focused mainly on genetics

↑ Risk of Developing RA	↓ Risk of Developing RA
• Red meat	• Fruits (citrus) and vegetables
• Refined sugar	• Fiber/whole grains
• Coffee	• Fish (omega-3)
• Suboptimal vitamin D status (SLE, JIA)	• Mediterranean diet
• Smoking	• Alcohol (red wine; resveratrol)

Diets to Treat Rheumatic Conditions

Citation	Comments
Rennie KL, et al (2003)	<ul style="list-style-type: none">• Supplementation with omega-3 fats demonstrates improvement in symptoms• No evidence for antioxidant supplementation• Inconsistent results with diets and/or avoidance of food(s)
Cochrane review (Hagen KB, et al 2009)	<ul style="list-style-type: none">• Including >800 patients• Fasting followed by vegetarian and/or Mediterranean diet may improve pain vs ordinary diet• No clear consensus regarding role of vegan and elimination diets
Tedeschi S, et al (2016)	<ul style="list-style-type: none">• Beneficial effect of moderate to high doses of omega-3 fats• Vitamin D does not seem to influence outcomes• Strict adherence to Mediterranean diet seems to have a slight benefit (Scandinavian results)
Alwarith J, et al (2019)	<ul style="list-style-type: none">• Diets rich in vegetables, fruits and fiber associated lower BMI and have been shown to help reduce pain and inflammation in some patients• Dietary fibers found in plant-based diet can increase gut diversity which may help understand pathogenesis of RA• Further studies needed to evaluate effectiveness and quality of life

Supplements to Treat Rheumatic Conditions

Summary

- **Vitamin D**
 - Vitamin D deficiency linked to autoimmune disorders
 - Levels are important for immune health, not just bones
- Recommendation:
 - Supplement to achieve optimal serum levels (arguably 70 nmol/L)
- **Polyunsaturated fatty acids (PUFAs)**
 - Omega-3: EPA and DHA from fish; ALA from plants
 - Omega-6: AA
 - Therapeutic role in reducing pain, stiffness, disease activity in RA
 - Improvement in clinical symptoms and disease activity in lupus
 - In general considered benign but more studies needed to determine efficacious and safe doses
- Recommendation:
 - Supplement with 3-6 grams daily; total from food and supplement

Summary

- **Curcumin**

- Turmeric polyphenol (active ingredient) derived from *Curcuma Longa*
- Role in improving symptoms in RA and osteoarthritis but mechanism unclear
- Recommendation:
 - Generally regarded as safe but no clear dosing guidelines

- **Glucosamine**

- Amino monosaccharide (naturally occurring)
- Mechanisms for anti-inflammatory properties poorly understood
- Role in managing symptoms in osteoarthritis
- Recommendation:
 - Generally regarded as safe but no clear dosing guidelines

- **Probiotics**

- Research to date shows no consistent or significant impact on patient laboratory results or symptom outcomes
- Recommendation:
 - More studies needed in RA and other rheumatic conditions

Supplements Continued

- The role of supplements to **treat** rheumatic conditions is not the same as supplements needed to **meet** nutritional needs
- For example:
 - In Canada, many children and adolescents are not meeting recommended calcium needs (AI; adequate intake) for growth and development from food and/or drink
 - In Canada, it is difficult to reach optimal vitamin D levels without supplements
 - A child with sensory issues may experience very selective eating habits, which reduces variety from all foods in the diet and may benefit from a multivitamin

Diet Also Matters...

- Patients with rheumatic conditions are at risk of malnutrition/poor nutritional status
- Malnutrition has been described in pediatrics:
 - Prevalence of poor nutritional status ranges between 4-50% of patients with JIA and lower among patients with lupus
 - Prevalence of over-nutrition is between 5-30% in JIA and about 25% in lupus (data may be outdated as overweight and obesity rates have increased in Canada)

Malnutrition

Condition that results from a diet (and disease) that does not provide adequate macronutrients (calories from carbohydrates, proteins and fats) and/or micronutrients (vitamins and minerals)

Includes both **under-nutrition** (often associated with poor growth and/or weight loss in children) and **over-nutrition** (overweight and obesity)

Inflammation may increase your risk of malnutrition:

- Reduced intake
 - TMJ involvement
 - Poor appetite
 - Fullness (constipation due less activity)
- Wasting
 - Active inflammation
 - Lack mobility & less activity
- Increased energy needs
 - Active inflammation
- Medications
 - Increases appetite

Malnutrition may in turn:

- Exacerbate flares and related symptoms (pain)
- Affect immunity and influence body's normal defenses
- Affect ability to heal
- **Affect ability to grow and develop**
- **Influence quality of life and mental health**

The Evidence Suggests

“Diets”

- Khanna S, et al (2017) provided a review of foods that may have a therapeutic benefit in RA
 - Mediterranean diet

TABLE 2 | Recommended anti-inflammatory food chart.

Fruits	Dried plums, grapefruits, grapes, blueberries, pomegranate, mango (seasonal fruit), banana, peaches, apples
Cereals	Whole oatmeal, whole wheat bread, whole flattened rice
Legumes	Black soybean, black gram
Whole grains	Wheat, rice, oats, corn, rye, barley, millets, sorghum, canary seed
Spices	Ginger, turmeric
Herbs	Sallaki, ashwagandha
Oils	Olive oil, fish oil, borage seed oil (in encapsulated form)
Miscellaneous	Yogurt (curd), green tea, basil (tulsi) tea

Prednisone “Diet”

- Recommendations focus on healthy eating and preventing too much weight gain

Recommendation	Guidelines
Monitor caloric intake	Pediatrics: <ul style="list-style-type: none">• Meet gender and age based energy needs• Support linear growth
Adequate protein	Minimum 1 gram/kg/day
Reduce simple starches/sugars	Aim for 75% of total carbohydrates as complex, fiber rich carbohydrates
Monitor total fat	Fat <30% total calories Saturated fats <10% total fat
Monitor sodium	1.5-2.0 grams/day
Calcium	Meet adequate intake (AI) for age
Vitamin D	At least 600 IU/day or higher to reach optimal levels

Vegetables, Vegetables, Vegetables



Considerations

Season and availability (choose frozen)

Preparation method (grill, fry, roast)

Add flavour (olive oil, maple syrup, herbs)

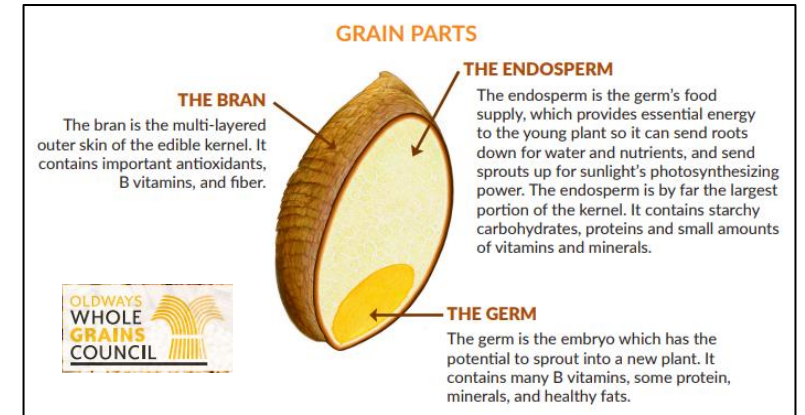
Mix with starches

Layer into meals

Important for everyone!!!

Whole Grains

- A whole grain is a grain of any cereals (any grass that is grown for its edible “can eat” parts) or pseudocereals (any non-grass that is grown for its edible parts e.g. amaranth, quinoa and buckwheat) that contains *endosperm*, *germ* and *bran*



Examples of Whole Grains	
Wild, black or red rice	Quinoa
Whole oats	Buckwheat (kasha)
Barley (not pearl barley)	Rye
Teff	Millet

Plant Proteins



Plant Protein Sources

Grains

- Quinoa, whole oats

Pulses

- Also known as legumes
- Includes beans, chick peas, lentils, peas
 - Soybean: tofu, tempeh, edamame
- **Peanuts**

Nuts

- Also known as tree nuts
- Includes almonds, brazil nuts, cashews, chestnuts, hazelnuts, macadamia, pecans, pine nuts, pistachio, walnuts

Seeds

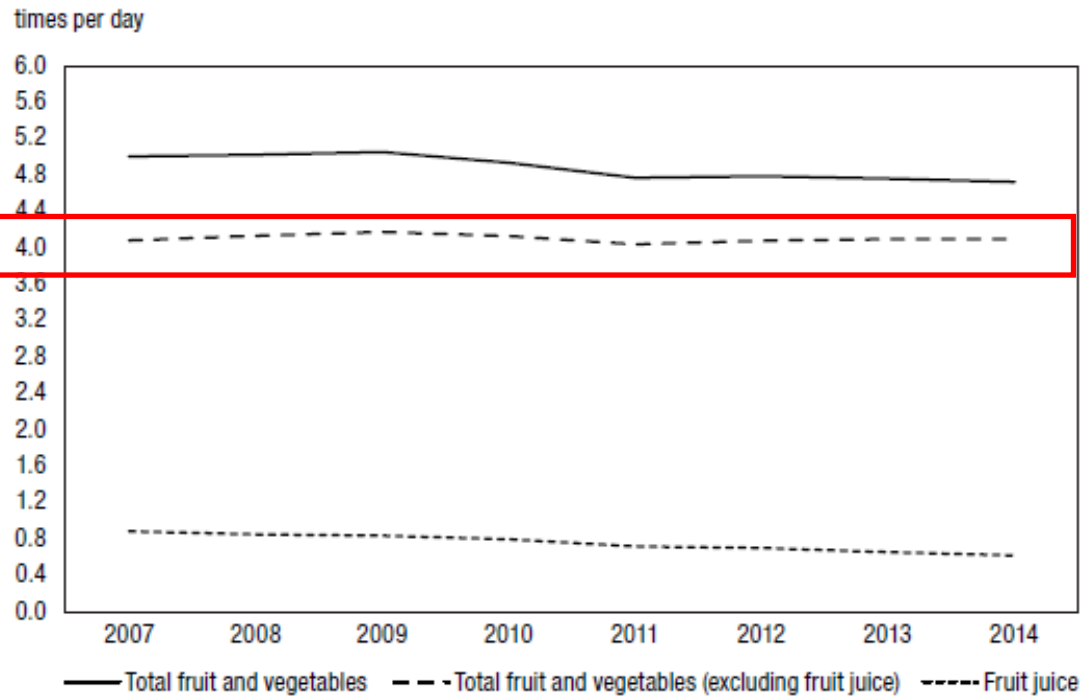
- Chia, corn, flax, hemp, pumpkin, sesame, sunflower

Other

- Nutritional yeast, spirulina

What are Canadians Eating?

Figure 1
Average frequency of fruit and vegetable consumption, by food grouping, household population 12 and older, Canada, 2007 to 2014



Note: Age-standardized to July 1, 2014 Canadian population.
Source: Canadian Community Health Survey—Annual Component, 2007 to 2014.

- 46% Canadians believe they have excellent/very good eating habits
- Snacking contributes to nearly 23% total daily energy intake, 27% among younger children aged 2-5 years

Table 1. The percentage of Canadian children and adolescents (2- to 18-years-old) and adults (19-years-old and above) across whole-grain consumption patterns.

	Children and Adolescents (%) (n = 6,395,152) *	Adults (%) (n = 27,061,760) *
The Lowest (WGCs: 0% to 20%)	63.8	59.2
Low (WGCs: 20% to 40%)	15.6	12.4
Balanced (WGCs: 40% to 60%)	8.5	8.8
High (WGCs: 60% to 80%)	5.1	5.4
The Highest (WGCs ≥ 80%)	3.4	7.3
'Minimal grain' Consumers (total grain intake < 1 serving/day)	3.6	6.2

WGCs—the share of whole grain intakes from the total daily grain intake. * n = population size.

Snacks



snack noun

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\ˈsnak\

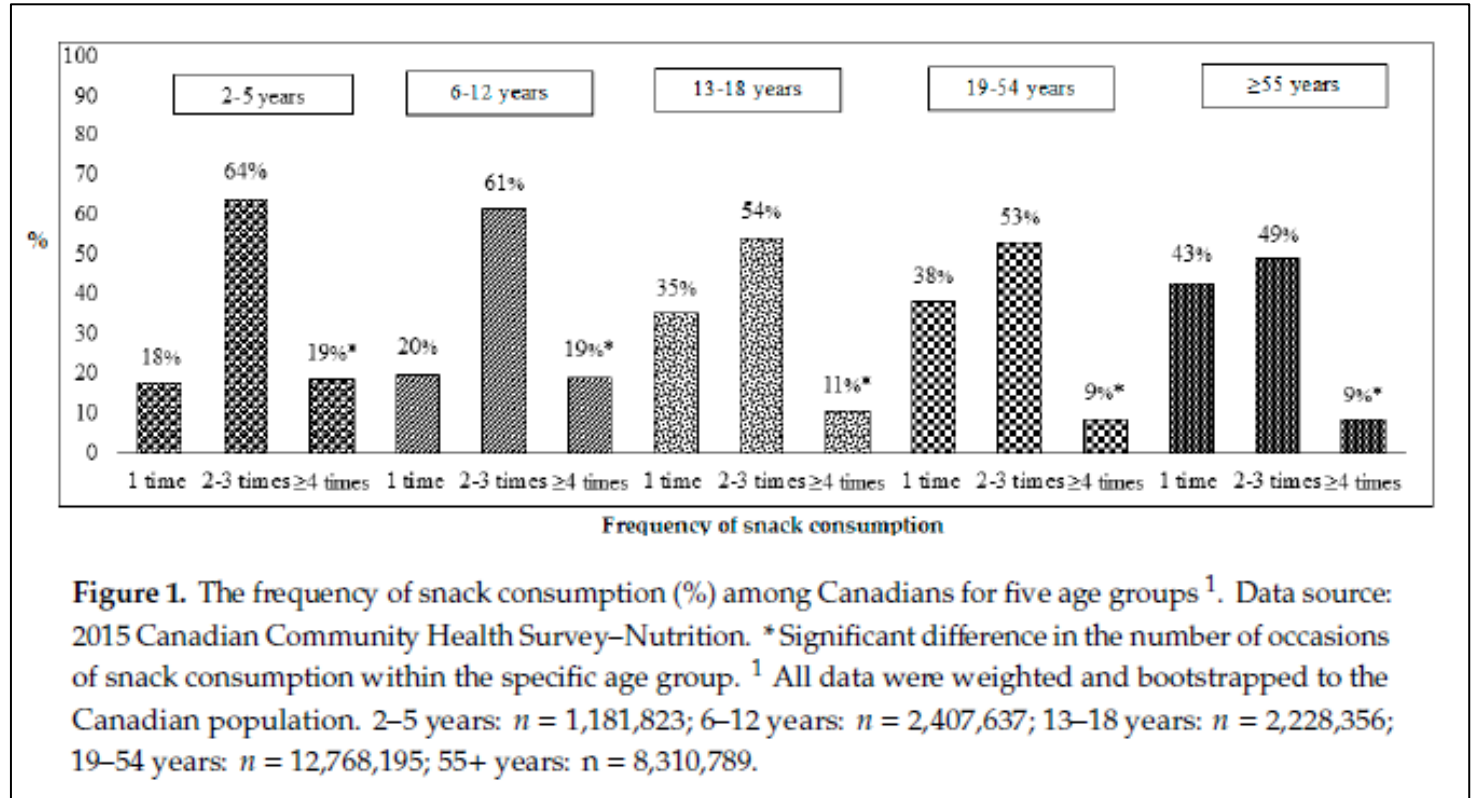
Definition of *snack* (Entry 1 of 2)

: a light meal : food eaten between regular meals
also : food suitable for *snacking*

treat noun

Definition of *treat* (Entry 2 of 2)

- 1 **a** : the act of providing another with free food, drink, or entertainment
// dinner will be my treat
- b** : an entertainment given without expense to those invited
- 2 : an especially unexpected source of joy, delight, or amusement
// seeing her again was a treat



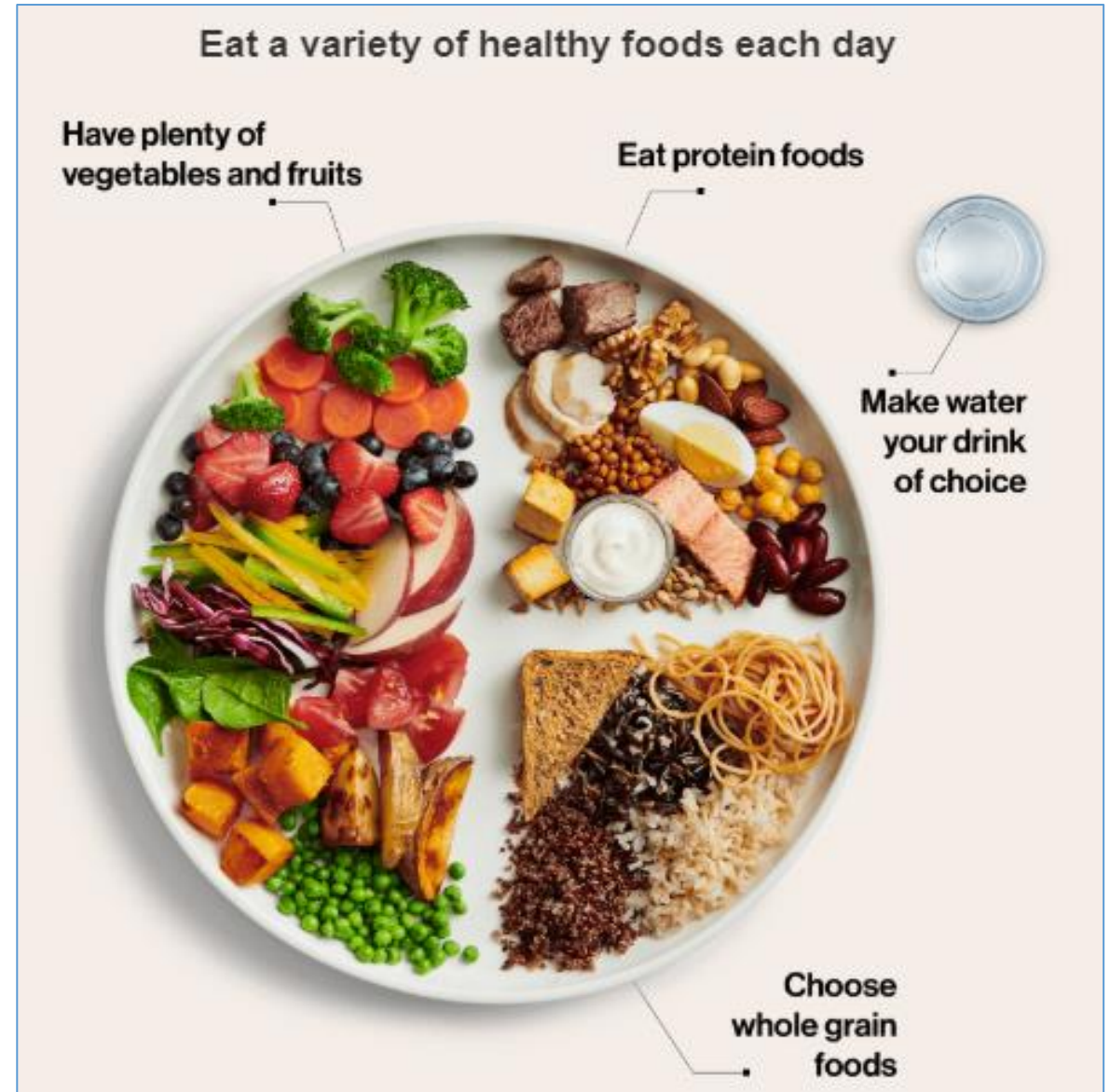
3.4. Nutrient Contribution (%) of Snack, Breakfast/Brunch, Lunch, and Dinner to Daily Intake

Table 2 represents the distribution of nutrient contributions to daily intake from meal occasions. Snacking contributed to 22.7% of total daily energy intake in the Canadian population. In terms of

Healthy Eating: Take 1

Recommendations by Health Canada

- Eat whole fresh foods more often = limit eating highly processed /packaged foods
- Eat plenty of vegetables and fruits
- Choose whole grain foods
- Choose more plant based sources of protein
- Choose water as your drink
- Understand and use food labels



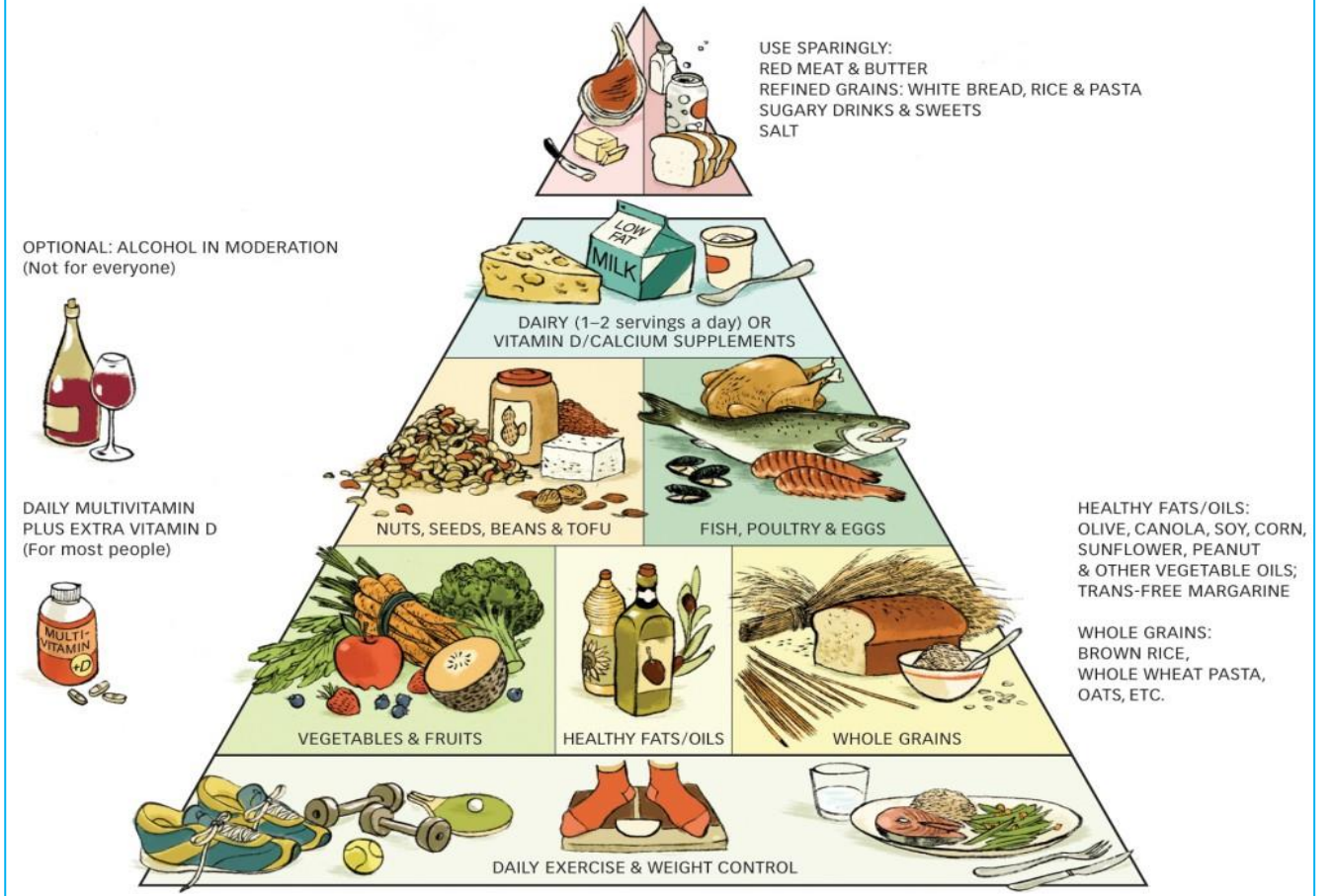
Healthy Eating: Take 2

Recommendations

- Eat whole fresh foods more often = limit eating highly processed /packaged foods
- Eat plenty of vegetables and fruits
- Choose whole grain foods
- Choose more plant based sources of protein
- Exercise and weight control

THE HEALTHY EATING PYRAMID

Department of Nutrition, Harvard School of Public Health



Copyright © 2008. For more information about The Healthy Eating Pyramid, please see The Nutrition Source, Department of Nutrition, Harvard T.H. Chan School of Public Health, www.thenutritionsource.org, and **and** Eat, Drink, and Be Healthy, by Walter C. Willett, M.D., and Patrick J. Skerrett (2005), Free Press/Simon & Schuster Inc."

Healthy Eating: Take 3

“Diets”

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Fruits	Dried plums, grapefruits, grapes, blueberries, pomegranate, mango (seasonal fruit), banana, peaches, apples
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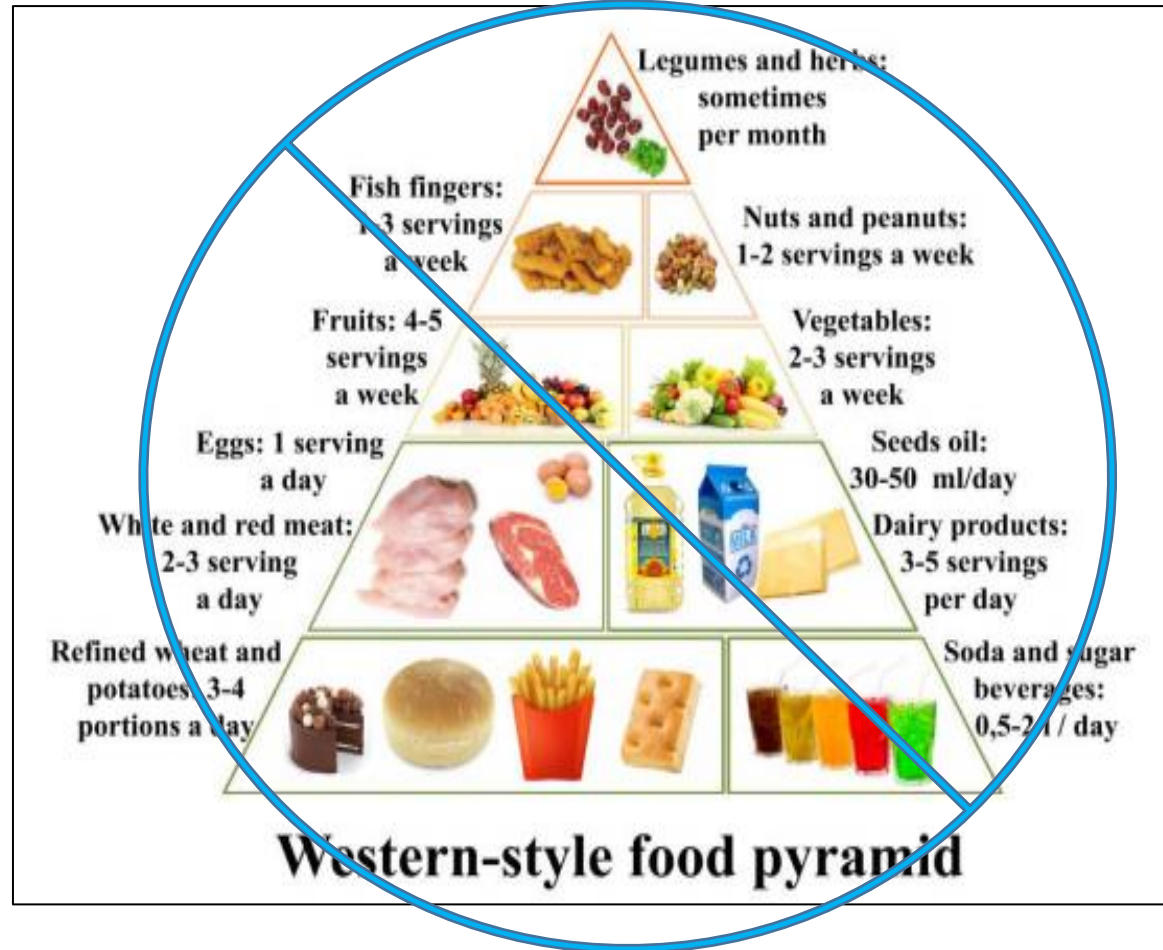
Prednisone “Diet”

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Reduce simple starches/sugars	Aim for 75% of total carbohydrates as complex, fiber rich carbohydrates
Monitor total fat	Fat <30% total calories Saturated fats <10% total fat
Monitor sodium	1.5-2.0 grams/day
Calcium	Meet adequate intake (AI) for age
Vitamin D	At least 600 IU/day or higher to reach optimal levels

Adapted from Manual of Clinical Dietetics (ADA), 2000

The Opposite of Healthy Eating



Snacks vs Treats



Snack Ideas	
Nut or seed butter protein balls/bars <ul style="list-style-type: none">• Add a few chocolate chips	Muffin in a mug <ul style="list-style-type: none">• Quick cook oats + egg + nut butter
Egg muffins	Yogurt parfait (homemade granola)
Lettuce wraps <ul style="list-style-type: none">• Add vegetables, avocado and any source of protein	Quesadilla/tortilla scrambles <ul style="list-style-type: none">• Eggs, beans, dairy, vegetables & melt
Smoothies	Skewers (savoury and/or sweet)
Chia seed pudding <ul style="list-style-type: none">• Add fruits and cocoa	Dips (with vegetables or fruit) <ul style="list-style-type: none">• Beans, chick peas, dairy
Sushi rolls	Nut free trail mixes <ul style="list-style-type: none">• Popcorn, gluten-free pretzels, dried fruit

Strategies for Successful Healthy Eating

Considerations

- Make healthy eating a priority
 - Do it together, as a family
 - Avoid isolating a person with a rheumatic condition
- Plan and budget
 - Shop for foods on sale
 - Buy in bulk
 - Buy in season
- Grocery shop with company
 - Avoid buying from shelves, choose fresh or frozen
- Use leftovers
- Use the internet for recipes and sharing experiences
- Batch cook
 - Use the freezer
 - Try pickling
- Cook more at home
- Maintain sleep hygiene
- Remember to be physically active

Mindful Eating

- Be present
 - Minimize distractions like electronics
 - With companions
- Slow down
 - Chew more
 - Take smaller bites
 - Put fork down between bites
- Use your senses
 - Close your eyes to taste
- Listen to your body's cues
 - Drink before you feel thirsty
 - Eat when you feel hungry
- Try to maintain a routine

“Take-Out” Messages



- At this time there is some evidence that diet can help manage arthritis, maybe other rheumatic conditions
 - Mainly as adjunctive therapy
 - Some diets are associated with improved symptoms and/or disease activity
 - The Mediterranean diet = healthy eating
 - Little evidence for multiple food elimination diets
 - More research is needed with respect to the gluten-free diet and vegetarian/vegan diet
- Enjoy healthy eating together!

References

- Ricciuto A, Sherman PM and Laxer RM. Gut microbiota in chronic inflammatory disorders: A focus on pediatric inflammatory bowel diseases and juvenile idiopathic arthritis. *Clin Immunol.* 2020. 215: 108415
- Liu E and Perl A. Pathogenesis and treatment of autoimmune rheumatic diseases. *Curr Opin Rheumatol.* 2020. 31(3): 307-315.
- Nousiainen P, Merras-Salmio L, Aalto K, et al. Complementary and alternative medicine use in adolescents with inflammatory bowel disease and juvenile idiopathic arthritis. *BMC Complem Alt Med.* 2014;14:124-131.
- Tedeschi SK, Frits M, Cui J, et al. Diet and rheumatoid arthritis symptoms: survey results from a rheumatoid arthritis registry. *Arthritis Care & Research.* 2017;69(12):1920-1925.
- McIntyre Little E, Grevich S, Huber JL, et al. Parental perception of dietary intervention in juvenile idiopathic arthritis. *J Alt Complem Med.* 2019;25(6):643-647.
- Semerano L, Julia C, Aitisha O, et al. Nutrition and chronic inflammatory rheumatic disease. *Joint Bone Spine.* 2017; 84:547-552.
- He J, Wang Y, Feng M, et al. Dietary intake and risk of rheumatoid arthritis - a cross section multicenter study. *Clinical Rheumatology.* 2016; 35:2901-2908.
- Sabbagh Z, Markland J and Vatanparast H. Vitamin D status is associated with disease activity among rheumatology outpatients. *Nutrients* 2013; 5:2268-2275.
- Oliver JE and Silman AJ. What epidemiology has told us about risk factors and aetiopathogenesis in rheumatic diseases. *Arth Res Therapy.* 2009;11:223-235.

References Continued

- Pedersen M, Stripp C, Klarlund M, et al. Diet and risk of rheumatoid arthritis in a prospective cohort. *Journal of Rheumatology*. 2005. 32: 1249-1252.
- Rennie KL, Hughes J, Lang R, et al. Nutritional management of rheumatoid arthritis: a review of the evidence. *Journal of Human Nutrition and Dietetics*. 2003; 16:97-109.
- Hagen KB, Byfuglien MG, Falzon L, et al. Dietary interventions for rheumatoid arthritis. *Cochrane Database of Systematic Reviews*. 2009; Issue 1. Art. No.: CD006400. DOI: 10.1002/14651858.CD006400.pub2.
- Tedeschi SK and Costenbader KH. Is there a role for diet in the therapy of rheumatoid arthritis? *Current Rheumatology Reports*. 2016; 18: 23-32.
- Alwarith J, Kahleova H, Rembert E, et al. Nutrition Interventions in Rheumatoid Arthritis: The Potential Use of Plant-Based Diets. A Review. *Frontiers in Nutrition*. 2019;6(141):1-11.
- Khanna S, Sagar Jaiswal K and Gupta B. Managing rheumatoid arthritis with dietary interventions. *Frontiers in Nutrition*. 2017 Nov 8; 4:52. doi: 10.3389/fnut.2017.00052.
- Sharif K, Amital H and Shoenfeld Y. The role of dietary sodium in autoimmune diseases: the salty truth. *Autoimmun Rev*. 2018;17:1069-1073.
- Dahan S, Segal Y and Shoenfeld Y. Dietary factors in rheumatic autoimmune diseases: a recipe for therapy? *Nature Reviews Rheumatology*. 2017; 13:348-358.
- Gioxari A, Kaliora AC, Marantidou F, et al. Intake of w-3 polyunsaturated fatty acids in patients with rheumatoid arthritis: a systematic review and meta-analysis. *Nutrition*. 2018; 45:114-124.

References Continued

- Abdulrazaq M, Innes JK and Calder PC. Effect of w-3 polyunsaturated fatty acids on arthritic pain: a systematic review. *Nutrition*. 2017; 39-40:57-66.
- Akbar U, Yang M, Kurian D, et al. Omega-3 fatty acids in rheumatic diseases. *Journal of Clinical Rheumatology*. 2017; 23(6):330-339.
- Franco AS, Freitas T, Bernardo WM, et al. Vitamin D supplementation and disease activity in patients with immune-mediated rheumatic diseases. *Medicine*. 2017; 96:23-32.
- Lee YH and Bae SC. Vitamin D level in rheumatoid arthritis and its correlation with the disease activity: a meta-analysis. *Clinical and Experimental Rheumatology*. 2016; 34:827-833.
- Hewlings SJ and Kalman DS. Curcumin: a review of its effects on human health. *Foods*. 2017;6.92; doi:10.3390/foods6100092.
- Runhaar J, Rozendaal RM, van Middelkoop M, et al. Subgroup analyses of the effectiveness of oral glucosamine for knee and hip osteoarthritis: a systematic review and individual patient data meta-analysis from the OA trial bank. *Annals in Rheumatic Diseases*. 2017; 76:1862-1869.
- Bolognesi G, Belcaro G, Feragalli B, et al. Movardol® (N-acetylglucosamine, Boswellia serrata, ginger) supplementation in the management of knee osteoarthritis: preliminary results from a 6-month registry study. *European Review for Medical and Pharmacological Sciences*. 2016; 20:5198-5204.
- Shehzad A, Rehman G and Lee YS. Curcumin in inflammatory diseases. *Biofactors*. 2013; 39(1):69-77.

References Continued

- Someya A, Ikegami T, Sakamoto K, et al. Glucosamine downregulates the IL-1 β -induced expression of proinflammatory cytokine genes in human synovial MH7A cells by O-GlcNAc modification-dependent and independent mechanisms. *PLOS One*. 2016; 11(10): e0165158. Doi:10.1371/journal.pone.0165158.
- Mohammed AT, Khattab M, Ahmed AM, et al. The therapeutic effect of probiotics on rheumatoid arthritis: a systematic review and meta-analysis of randomized control trials. *Clinical Rheumatology*. 2017; 36:2697-2707.
- Schorpion A and Kolasinski SL. Can probiotic supplements improve outcomes in rheumatoid arthritis? *Current Rheumatology Reports*. 2017; 19:73-80.
- Bacon MC, White PH, Raiten DJ, et al. Nutritional status and growth in juvenile rheumatoid arthritis. *Seminars in arthritis and rheumatism*. 1990; 20(2):97-106.
- Haugen MA, Hoyeraal HM, Larsen S, et al. Nutrient intake and nutritional status in children with juvenile chronic arthritis. *Scandinavian journal of rheumatology*. 1992;21(4):165-70.
- Lofthouse CM, Azad F, Baildam EM, et al. Measuring the nutritional status of children with juvenile idiopathic arthritis using the bioelectrical impedance method. *Rheumatology*. 2002 Oct;41(10):1172-7.
- Caetano MC, Ortiz TT, Terreri MT, et al. Inadequate dietary intake of children and adolescents with juvenile idiopathic arthritis and systemic lupus erythematosus. *J Pediatr (Rio J)*. 2009 Nov-Dec;85(6):509-15.
- Rizzello R, Spisni E, Giovanardi E, et al. Implications of the westernized diet in the onset and progression of IBD. *Nutrients*. 2019. 11(5):1033. doi: 10.3390/nu11051033.

References Continued

- Colapinto CK, Graham J and St-Pierre S. Trends and correlates of frequency of fruit and vegetable consumption, 2007 to 2014. *Health Reports*. 2018; 29(1):9-14.
- Slater JJ and Mudryj AN. Self-perceived eating habits and food skills of Canadians. *Journal of Nutrition Education and Behaviour*. 2016; 48(7):486-495.
- Vatanparast H, Islam N, Prakash Patil R, et al. Snack consumption patterns among Canadians. *Nutrients*. 2019; 11:1152-1164.
- Hosseini SH, Jones JM and Vatanparast H. Association between grain intake, nutrient intake, and diet quality of Canadians: evidence from the Canadian Community Health Survey-Nutrition 2015. *Nutrients*. 2019; 11:1937-1952.