

Roasting Nuts PRACTICE ISSUE EVIDENCE SUMMARY

Best Practice Issue (state as a question, PICO):	
Does the consumption of roasted nuts compared to raw nuts provide the same cardiovascular benefits?	
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Purpose: (goals, scope, intended users, settings, and patient/client groups)	
Purpose: To provide consistent information to clients regarding the benefits of nut consumption on cardiovascular health. Goals: Same as above. Users: Health Care Professionals Settings: Ambulatory Care, Primary Care, Public Health Patient/client group: Adults	
Definitions:	
For the purposes of this document, nuts include almonds, pistachios, and other tree nuts as well as peanuts.	
Evidence Review: (Please list type and grade of evidence reviewed)	
For the management of hyperlipidemia, nut consumption (50-100g or 1.5 to 3.5 servings) five times or more per week is recommended (PEN, Level A).	
<p>The heart healthy benefits of nut consumption are attributed to the fatty acid profile of nuts, as well as their bioactive compounds. The health benefits of nuts is thought to be due to their macronutrients (plant protein and fibre), micronutrients (potassium, calcium, magnesium, and tocopherols), and phytochemicals (phytoesters, phenolic compounds, resveratrol, and arginine) (Kris-Etherton et al., 2008).</p> <p>Nutrient composition changes caused by heat treatment have been found to be both potentially beneficial and detrimental to health (Yaacoub et al., 2008; Chukwumah et al., 2007; Amrein et al., 2005).</p> <p><i>Phytochemicals</i></p> <ul style="list-style-type: none"> -The flavenoid content of raw and boiled peanuts with skin has been found to be significantly higher than raw, dry-roasted and oil-roasted peanuts with skin removed. This difference is attributed to the retainment of peanut skin in the raw and boiled peanuts, which is high in proanthocyanidins. -There was no significant difference in polyphenol content between raw and roasted peanuts. Polyphenol content of boiled peanuts (with skin) was significantly higher than raw (with and without skin) and roasted peanuts (without skin). It was suggested that the difference is due to the retainment of peanut skin, as well as the release of bound polyphenols during the boiling process, which was subsequently absorbed into the peanut itself. -Isoflavone composition - Biochanin A and genistein were not significantly different between raw and roasted peanuts. Daidzin was not detectable in raw peanuts, but was found in roasted and boiled peanuts. Trans-Resveratrol was found only in the boiled peanuts (Chukwumah et al., 2007). <p><i>Lipid oxidation</i></p> <ul style="list-style-type: none"> -High heat used during the processing of nuts has the potential to develop lipid oxidation products, which include <i>trans</i> fatty acids. <i>Trans</i> fatty acids, while not present in raw nuts, were found to be significantly higher in roasted pistachios, peanuts, and almonds (0.5-0.9g/100g). -<i>Trans</i> fat is known to increase LDL cholesterol and decrease HDL cholesterol, potentially leading to increased cardiovascular disease risk. -While roasting temperature was found to substantially increase lipid oxidation, roasting time had less of an 	

effect on lipid oxidation. It is therefore recommended to roast nuts at a moderate temperature (130-150°C), for a longer period of time, rather than roasting at high heat for a shorter period of time (Yaacoub et al., 2008).

Acrylamide

-Acrylamide has been identified as a probable carcinogen to humans. The amount of free asparagine in almonds makes them more susceptible to the Maillard reaction, which results in acrylamide formation. Time and temperature are known determinants of acrylamide formation in foods. Hence, darkly roasted almonds were found to have a much higher amount of acrylamide than lightly roasted almonds. The amount of acrylamide that is initially formed after processing was found to decrease over time. Acrylamide content of almonds therefore differs widely depending on roasting time and temperature, as well as length of time after processing.

-It was observed that almonds processed under roasting temperatures of 140-180°C led to the accelerated production of acrylamide. It is therefore recommended to roast almonds below 140°C (Amrein et al., 2005).

Recommendations:

There is currently insufficient evidence that clearly points to the benefits of roasted over raw nuts, or vice versa. However, the current evidence suggests the following:

- Consumption of peanuts with the skin is ideal, as peanuts without the skin are lower in the phytochemicals that are associated with heart health benefits.
- Boiled peanuts are higher in phytochemicals than either roasted or raw peanuts.
- Consumers should be aware that oil-roasted nuts and dry-roasted nuts are processed differently. Oil-roasted nuts are blanched in an oven and then deep-fried in oil, while dry-roasted nuts are blanched and roasted in an oven.
- Due to the wide range of *trans* fatty acids and acrylamide that could be potentially be present in roasted nuts, it may be prudent for consumers to buy raw nuts and roast their own at home (at temperatures below 140°C), so that they may control the temperature of the roasting process, resulting in lower amounts of trans fat and acrylamide in the final product.

Practice Changes:

Dietitians will use this information to inform their clients and other health care professionals as appropriate.

Anticipated Impact:

None

Recommendation for implementation:

These guidelines are to be used as reference when educating clients and other health care professionals on consuming/preparing roasted nuts.

References:

Amrein TM, Lukac H, Anres L, Rainer P, Escher F, Amado R. Acrylamide in roasted almonds and hazelnuts. *Journal of Agricultural and Food Chemistry* 2005; 53 (20): 7819-7825.

Chukwumah Y, Walker L, Vogler B, Verghese, M. Changes in the phytochemical composition and profile of raw, boiled, and roasted peanuts. *Journal of Agricultural and Food Chemistry* 2007; 55 (22): 9266-9273.

Kris-Etherton PM, Hu FB, Ros E, Sabate, J. The role of tree nuts and peanuts in the prevention of coronary heart disease: multiple potential mechanisms. *The Journal of Nutrition* 2008; 138: 1746S-1751S.

PEN Cardiovascular Disease Evidence Summary 2009.

Yaacoub R, Saliba R, Nsouli B, Khalaf G, Birlouez-Aragon I. Formation of lipid oxidation and isomerization products during processing of nuts and sesame seeds. *Journal of Agricultural and Food Chemistry* 2008; 56 (16): 7082-7090.

These recommendations are being reviewed by:

Primary Care RD Practice Council

Approved April 23, 2010

