Fats in Diet

Fatty acids (FA), the main form of dietary fat, are mainly found in foods as triglyceride form (Vannice & Rasmussen, 2014). Vannice and Rasmussen (2014) noted the importance of recognizing individual fatty acids (as opposed to referring to them in groups e.g. monounsaturated, saturated, etc.) as they have different functions. FAs are categorized by their saturation, hydrocarbon chain length, and by their carbon bonds (no double bonds, saturated fatty acids or SFA; one double bond, monounsaturated fatty acid or MUFA; more than one double bond, polyunsaturated fatty acid or PUFA; double bonds cris or trans fatty acids, TFA) (Vannice & Rasmussen, 2014). Two PUFA subcategories are n-3 and n-6 which depend on the position of the first double bond (Vannice & Rasmussen, 2014).

It is common to refer to the recommended total fat intake for the average healthy adult. The Institute of Medicine and Food and Agriculture Organization of the United Nations (FAO) recommended 20-35% dietary fat in daily ene The National Cholesterol Education Program and the American Heart Association recommended 25-35% fat in daily calories (Vannice & Rasmussen, 2014). A low-fat diet would be less than 20% calories out of total daily intake; moderate-fat is 20-35%; and high-fat is greater than 35% (Vannice & Rasmussen, 2014). Vannice and Rasmussen (2014) noted that instead of focusing only on reducing total fat, it may be more beneficial to reduce certain types of fat and recognize the individual fatty acids and their specific roles in maintaining the human body and their impact on obesity and chronic diseases.

Vannice and Rasmussen (2014) noted that stearic acid and palmitic acid are both saturated fats, yet they have different effects on circulating low-density lipoprotein (LDL) cholesterol. The difference between the position of the first double bond, PUFAs n-3 or n-6, creates a significant difference in biological function--vasoconstriction or vasodilation (Vannice & Rasmussen, 2014). PUFAs at room temperature are liquid and often referred to as oils (Vannice & Rasmussen, 2014). PUFAs n-3 and n-6 are essential nutrients as the human body cannot synthesize them (Vannice & Rasmussen, 2014). Alpha-linolenic acid (ALA) and linolenic acid (LA) are the most abundant FAs (Vannice & Rasmussen, 2014). ALA can be found in plant foods like nuts (especially walnuts), flax, chia, hemp seeds, and vegetable oils (e.g. canola, soybean) (Vannice & Rasmussen, 2014). Stearidonic acid (SDA) occur in small amounts in a few plant sources (e.g. echium, black currant), and in the United States genetically altered soybeans produce oil containing SDA n-3 (Vannice & Rasmussen, 2014). Eicosapentaenoic acid (EPA), docosapentaenoic acid (DPA), and docosahexaenoic acid (DHA) are found in fatty fish and seafood such as salmon, sardines, tuna, herring, and trout (Vannice & Rasmussen, 2014).

ALA n-3 is used for beta-oxidation and only a small part of it is used to convert into longer-chain FAs (Vannice & Rasmussen, 2014). Some ALA converts to EPA and less ALA converts to DHA (both mechanisms limited by the enzymes desaturase and elongase). The interest in SDA from genetically altered soybeans is because SDA more readily converts to EPA (Vannice & Rasmussen, 2014). EPA n-3 and arachidonic acid n-6 (ARA) function as eicosanoids to maintain homeostasis (Vannice & Rasmussen, 2014). EPA, ARA, and DHA contribute to gene expression, cytokine activity, cell signaling, and immune modulation (Vannice & Rasmussen, 2014). Prostaglandins made from ARA work as vasoconstrictors and promote platelet aggregation; prostaglandins made from EPA work as vasodilators and anti-aggregators;

eicosanoids from ARA contribute to both pro-inflammatory and anti-inflammatory (Vannice & Rasmussen, 2014).

MUFAs are common and may be found in oils from vegetable, seed, and nuts as well as in meat and dairy (Vannice & Rasmussen, 2014). Oleic acid is easily found in olive and canola oils, avocados, and almonds (Vannice & Rasmussen, 2014). Oleic acid is also found in 30% of the FAs in beef; over 20% of the FAs in soybean and corn oil are also oleic acid (Vannice & Rasmussen, 2014). MUFAs have been associated with some reduction in LDL cholesterol, triglycerides, and increasing high-density lipoproteins (HDL). MUFA intake may have some benefits when replacing carbohydrate and saturated fats (Vannice & Rasmussen, 2014).

While most SFAs come from animal sources such as meats, eggs, and dairy, they are also available in naturally saturated vegetable oils (Vannice & Rasmussen, 2014). Coconut oil has 87% of its FAs as SFAs (Vannice & Rasmussen, 2014). SFAs are common in the typical American diet. The American Heart Association and American College of Cardiology recommend that 5-6% of daily calories come from SFAs for more success with lowering lipids (Vannice & Rasmussen, 2014). FAO recommended no more than 10% of daily calories be SFAs, and if possible replace more SFAs with PUFAs (Vannice & Rasmussen, 2014). SFAs tend to increase risk of coronary heart disease and cardiovascular disease (Vannice & Rasmussen, 2014).

Hydrogenated fats/oils make up TFAs. TFAs are extremely common to "junk food" (processed bakery items, chips, etc.) and they increase the risk of coronary heart disease, metabolic syndrome, and diabetes (Vannice & Rasmussen, 2014). The recommendation is to avoid TFAs altogether if possible, and substitute TFAs with carbohydrate, SFAs, or PUFAs (best option) (Vannice & Rasmussen, 2014).

My personal insight is that dietary fats are much more complicated than saying "good fat" vs. "bad fat". Recognizing the individual fatty acids and their specific contribution gave me a much greater appreciation for balance in all things and how little we actually know and understand about the mysteries of the human body.

Reference

Vannice, G., & Rasmussen, H. (2014). From the academy: Position of the Academy of Nutrition and Dietetics: Dietary fatty acids for healthy adults. *Journal of The Academy Of Nutrition and Dietetics, 114,* 136-153.