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Message: from the President of BioNatural Healing College (BNHC)



Greetings!

First and foremost, I am extremely thankful to Almighty God for granting me this opportunity to present the BioNatural Healing College (BNHC), BNHC E-Magazine to our dear readers. Also, I would like to thank you all, especially the dear readers who send us their valuable feedback and support. The information in this magazine is solely for educational purposes.

We hope this BNHC- E-Magazine will be useful to you based on the contribution and dedication of many other respected researchers and colleagues around the globe. Thanking and wish you all the best health and prosperous life.

Best regards,

Dr. Nadir Sidiqi Ph.D.



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BioNatural Healing College Stands on Seven Core Pillar Foundations as follows:

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Dietary Fats: In the Quality of Health Particularly Osteoarthritis

By Dr. Nadir Sidiqi Ph.D.

Introduction: The author incorporated one of the research projects from his second doctoral degree (Natural Medicine) which significantly is concerned with understanding dietary fat intake's effect on every person's health and the consequences of obesity and health problems. Fat is a complex and complicated fatty issue by its nature with much debate and various viewpoints among scientists and nutritionists. Whether we obtain dietary fats from animal products or plant products, understanding the healthy dietary fats source is important, because that goes to our body, and provides energy at the rate of 9 kcal energy per gram, as compared to protein, and carbohydrates which provide 4 kcal per gram and some part of that fats accumulate in human body's tissues. That is a concerning issue for every individual, especially at the abdominal and waist part of the body. Worldwide, the prevalence of overweight and obesity (body mass index (BMI) $>25 \text{ kg/m}^2$) has increased in both children and adults since 1980¹. In 2014, 1.9 billion adults were overweight, and 600 million adults were obese, representing 39 percent and 13 percent of the global adult population respectively². This means that more than half of the adult population on the planet is fatter than necessary for optimal health. Additionally, 42 million children younger than 5 years of age were overweight or obese in 2013³. Questions arise in our mind: Why is getting overweight or obese? What is wrong with our diet and lifestyle? How can we have a healthy lifestyle? To answer these questions requires hard work (such as a healthy diet, exercise, stress management, and getting enough sleep) and an integral approach through lifestyle changes.

Understanding fats and genes in the body: The authors of the book “Low Fat Living” explain how important is to understand the concept by recognizing that we’re each fighting an uphill battle against our own biology. The Low-Fat Living Program helps us unravel two mysteries that boggle most fat-fighters: how to turn off the switches for fat making and how to turn on the switches for fat-burning. What happens to the human body when you switch off the fat makers and switch on the fat burners? Why are human cells storing fat sometimes and releasing it other times? Why do you have to be careful about eating carbohydrates as well as fat? And why do you have to keep an eye on calories as well? The authors of the book focus on the crux of the problem the way the human brain and body adjust energy and metabolism in response to the choices a person makes. All day long, from the moment a person awakens in the morning until he or she climbs into bed at night, switches are going on and off making fat or burning it. Not just at mealtimes, and not only during formal fitness sessions but all day, every day.

Scientists at the University of British Columbia have discovered a gene that directly controls the production of fat cells and the growth of those cells, which are precursors to obesity. As reported that gene can be found in every cell of the body and encodes a protein called 14-3-3zeta. Silencing the gene in mice resulted in a 50 percent reduction in the amount of unhealthy, white fat that is associated with obesity, heart disease, and diabetes. Despite the mice consuming the same amount of food, however, the scientists not only identified zeta as the operative protein but demonstrated a clear cause-and-effect between 14-3-3zeta and accumulation. We get through the multiplication of our fat cells and through the growth of father individual fat cells. However, the zeta protein affects both the number of cells and plays a role in the growth cycle of these cells. It is early yet, but scientists speculate that there could be possible to suppress the gene or to develop a drug that could block the protein and thus prevent fat accumulation in people who are on the way to becoming overweight.

This research must go through many challenges and there is a large gap between theory and practice⁴. Similarly, researchers funded by the National Institutes of Health are studying lipids to learn more about normal and abnormal biology. Good fat, store energy, insulate us and protect our vital organs. Fats act as messengers, helping proteins do their jobs. Fatty acids also start chemical reactions involved in growth, immune function, reproduction, and other aspects of metabolism. One of the important issues to understand is that the cycle of making, breaking, storing and mobilizing fats is at the core of how humans and all animals regulate their energy. An imbalance in any step can result in health problems such as obesity, heart disease, and diabetes. For instance, having too many triglycerides in our bloodstream raises our risk of clogged arteries, high blood pressure that can lead to heart attack and stroke. However, fats have breaking down during digestion, they are shipped out to cells through the bloodstream. Some of the fat gets used for energy right away. The rest is stored inside cells in blobs called lipid droplets. For example, when we need extra energy, when we exercise our bodies use enzymes called lipases to break down the stored triglycerides.

The cell's power plants, mitochondria, can then create more of the body's main energy source: adenosine triphosphate, (ATP). Recently, researchers explained the workings of a lipid called an omega-3 fatty acid the active ingredient in cod liver oil, which has been touted for decades as a treatment for eczema, arthritis, and heart disease. Two types of these lipids blocked the activity of a protein called COX, which assists in converting an omega-6 fatty acid into pain-signaling prostaglandin molecules. These molecules are involved in information, which is a common element of many diseases, therefore, omega-3 fatty acids could have tremendous therapeutic potential⁵. Indeed, in overeating habits, excess food becomes excess energy, which is converted into stored fat, ultimately, leading to weight gain.

When it is needed, stored fat is utilized as the major energy supply leading to weight loss. Scientists describe this mechanism used by humans to deal with food excess control by PPAR (peroxisome proliferator-activated receptor) genes are master regulators of this process. These three genes include PPARG, PPARA, and PPARD, for example, the PPARG gene makes the protein PPAR γ . The PPARA gene makes the protein PPAR α . The PPARD gene makes the protein PPAR δ . In the presence of excess energy, PPAR γ triggers its storage by promoting fat synthesis. PPAR α promotes fat burning in the liver to release stored energy. PPAR δ (also known as PPAR β or PPAR β/o) promotes fat synthesis in the liver while initiating fat burning in muscle. The interplay of these three PPARs, modulated by environmental factors such as food, exercise, and medication, plays a critical role in regulating energy storage and supply in the human body. In addition, PPARs are also involved in adipogenesis (fat tissue growth) and osteogenesis (bone tissue growth) as reported by the website (GB HealthWatch). Let us consider in the first place from the source of dietary fats point of view in the development of osteoarthritis.

Dietary fats and osteoarthritis: Among the dietary fats, especially saturated fat with a reputed name for causing health problems. As a common statement that it is essential to eat some healthy fats and avoid harmful fats. The fats provide the energy that it needs for the body to work properly, especially the body needs fat for brain development, controlling inflammation, and blood clotting. Fat also helps in the absorption of fat-soluble vitamins such as vitamins A, D, E, and K. Fats can be divided into two main groups: saturated and unsaturated fatty acids. Fatty acids are hydrocarbons, and their composition and structure are based on the number of carbon atoms and degree of saturation that would have been classified. For instance, they can be either short-chain (< 6 carbons), medium-chain (6-12 carbons), long-chain (14-20 carbons), or very long-chain fatty acids (more than 22 carbons).

The four-main saturated fatty acids (SFA) in the human diet are lauric acid (12 carbon atoms, abbreviated as C12:0) predominantly found in coconut oil, myristic acid (14 carbon atoms, C14:0) predominantly found in dairy products, palmitic acid (16 carbon atoms, C16:0) can be found from palm oil, and stearic acid (18 carbon atoms, C18:0) found in meat products. The unsaturated fatty acid (UNF) is further classified into monounsaturated (MUFA) and polyunsaturated (PUFA) fatty acids.

The most common MUFA present in the human diet is the Ω -9 (n-9) fatty acid, oleic acid (C18:1n9) present in olive oil, avocados, and most nuts. The Mediterranean diet emphasizing olive oil may contain > 70 percent monounsaturated fatty acids. The PUFA can be further subdivided into long-chain omega-3 (n-3) or omega-6 (n-6), depending upon the location of the carbon with the first double bond, counted from the methyl end of the molecule. The major dietary n-3 PUFA are α – linolenic acid (ALA or C18: 3n3), eicosapentaenoic acid (EPA or C20:5n3), and docosahexaenoic acid (DHA or C22:6n3). The major n-6 PUFA are linoleic acid (LA or C18:2n6) and arachidonic acid (AA or C20:4n6) (Sekar et al., 2016). Diet high in polyunsaturated fatty acids such as corn oil, sunflower oil, fish (salmon, mackerel, herring, trout) soybean oil, and nuts seeds (walnut, sunflower seeds) as pointed out by American Heart Association.

However, here we more focus on the topic of our discussion based on the strong relationship between dietary fats and osteoarthritis for the rest of this study from the research viewpoints of Sekar et al., “Dietary Fats and Osteoarthritis: Insight, Evidence, and New Horizon (2016) as well as other authors. Osteoarthritis (OA) is typically caused by the “breakdown of the articular cartilage” which causes various alterations around the joints usually by collective effects of both biological and biochemical factors.^{6,7} OA is the most common chronic musculoskeletal disease with higher frequency in obese individuals, females, and those aged over 60 years. There are an estimated 21.4 million older Americans living with OA in 2005 which is expected to increase to 41.1 million by 2030 (Nho SJ et al., 2013).

In addition, to loss of articular cartilage, there is remodeling of the subchondral bone, osteophyte formation, weakening of the periarticular muscles, and synovial inflammation⁸. It is important to note that osteoarthritis causes impaired joint motion, muscle weakness, pain, or choice for total knee replacement (TKR), if it is not treated may ultimately lead to disability. It would be very useful to prevent this TKR which is a very costly surgery with nutritional interventions for osteoarthritis that many million people suffers around the world. However, epidemiological studies have continued to suggest the link between high-fat diets and increased incidence of osteoarthritis, but it needs further research clarification for the understanding of what type of fat causes and how much fat of it induces osteoarthritis risk. Studies indicate the link between osteoarthritis and obesity has been long recognized, but it has been mainly credited to the increased loading forces on the joints, as weight gain is a major mediator of knee osteoarthritis (Felson et al., 1988; Messier et al., 2013; Christensen et al., 2015). Indeed, a key factor thought to link obesity and osteoarthritis is the increased intake of dietary saturated fatty acid (SFA). Let us explain first how saturated fatty acid (SFA) is associated with the health and disease of human beings and then processed with our topic of discussion osteoarthritis. **Role of Saturated Fatty Acid (SFA) and health problems:** Without a doubt, human plasma needs to have some balanced amount of SFAs which are the main form of lipids, because it helps and facilitates substrates for the production of energy, membrane fluidity, and storage of fatty acid in tissues. Studies have shown that the SFA plays a key role the in the pathogenesis of type 2 diabetes, obesity, and the metabolic syndrome itself. Also, the quantity and composition of dietary fats evidently affect insulin resistance⁹.

The quantity of dietary fats is more important, as increased intake of fat (>37% of daily energy intake) worsens insulin resistance (Vessby et al., 2001). Increased plasma fatty acids increase insulin resistance in experimental animals and in individuals with and without diabetes. As such, the diet of a person has a huge influence on insulin resistance. For instance, a high-fat diet rich in SFA or n-6 PUFA stimulates insulin resistance, whereas a diet rich in n-3 PUFA improves insulin sensitivity (Storlien et al., 1991). In addition, it was also found that replacing saturated fat with monounsaturated fats in the diet drastically enhanced insulin sensitivity (Vessby et al., 2001). In numerous articles, it has been found that trans-fats are a strong risk factor for cardiovascular disease than PUFAs, MUFAs, and SFA (Willett, 2006). Indeed, many health benefits are associated with the intake of good dietary fatty acids and avoiding bad fatty acids. As mentioned earlier the aim of this study is to focus on the effects of fatty acids and osteoarthritis, it would be important to begin.

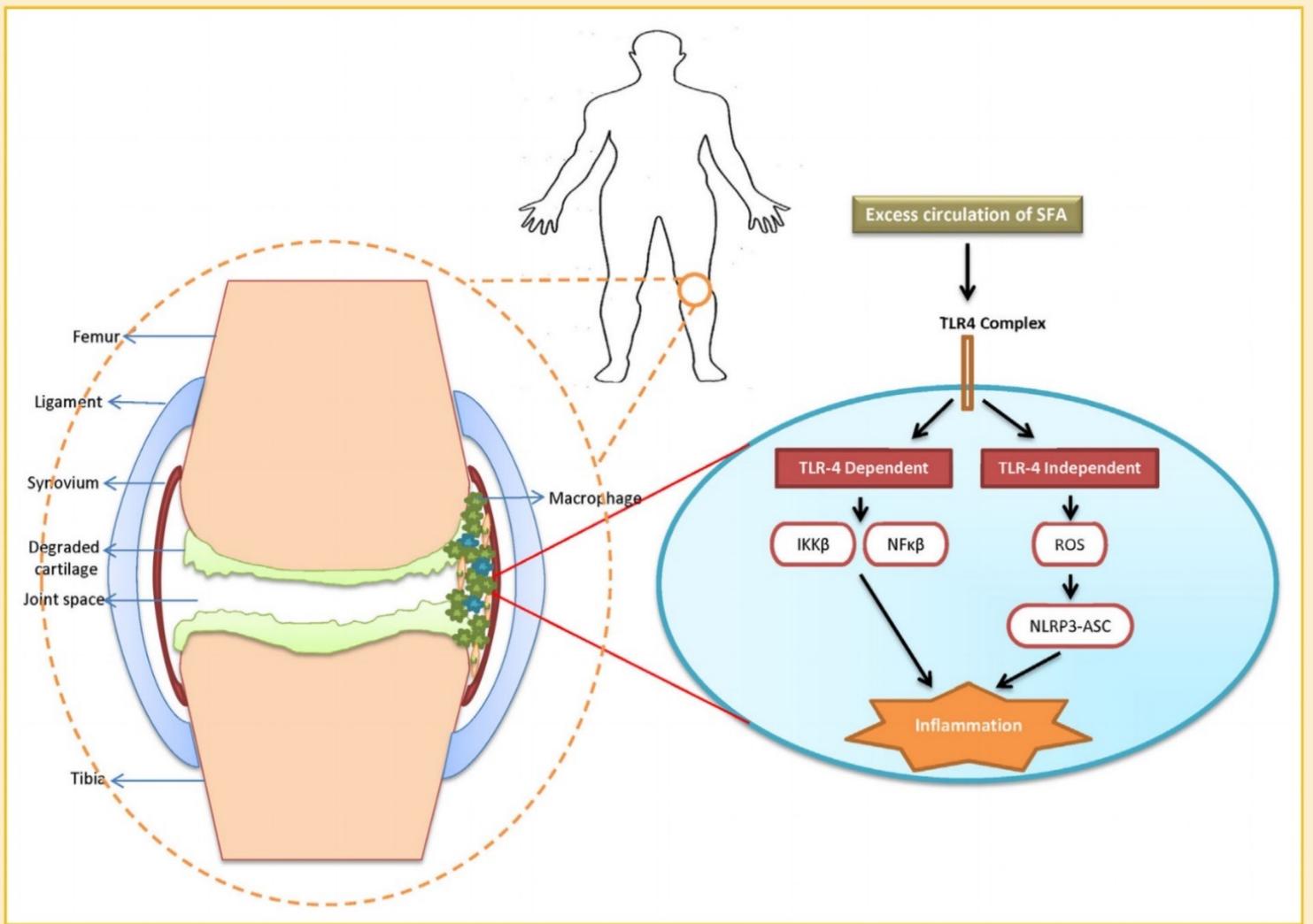
Role of fatty acids and osteoarthritis: Fatty acids and cholesterol are the most common lipids which have been found to be associated with cartilage physiopathology.¹⁰ Regarding the potential effectiveness of fish oil for osteoarthritis study published in the journal *Osteoarthritis and Cartilage* Researchers (2011) at the University of Bristol in the United Kingdom found that in guinea pigs which spontaneously develop osteoarthritis a diet rich in omega-3 fatty acids reduced the occurrence of osteoarthritis in half compared to standard guinea pig diet. Furthermore, scientists found that in guinea pigs fed a diet high in omega-3 fatty acids early signs of osteoarthritis such as the breakdown of cartilage and the loss of molecules that give cartilage its shock-absorbing properties were reduced. Another study published in the *Annals of the Rheumatic Diseases* in 2014 found that mice with knee osteoarthritis that ate a diet high in saturated fats or omega-6 fatty acids had significant worsening of their osteoarthritis, while mice given omega-3 supplements had healthier joints¹¹. This concludes that the wide range of researchers points out that in the case of the human diet, omega-3 fatty acids could potentially provide the added benefit of protecting joints from cartilage breakdown and preventing osteoarthritis severity.

A study was conducted regarding the efficacy and safety of fish oil in the treatment of knee osteoarthritis. 75 participants were divided into 3 groups of 25 people to study efficacy results after taking fish oil 1000mg and 2000mg once a day for 8 weeks. 1000 mg of fish oil contained long-chain omega-3 fatty acids of eicosapentaenoic acid (EPA) 400mg and docosahexaenoic acid (DHA) 200mg.

All participants had a complete visual analog scale to measure knee pain (OA). The Western Ontario and McMaster Universities Arthritis Index (*WOMAC*) functional subscale to assess knee function, measure 100 meters of walking velocity and 3 steps of walking time before taking fish oil, and re-measure all parameters at 8-12 weeks after taking fish oil to compare the result. Results indicate that all parameters had statistically significant better differences in the group of participants who had taken fish oil when compared to the control group. A study reports that the average score of patients was 9.06 from 10 and also to the verbal response of 50 participants everyone felt good and happy with fish oil. One participant had hematuria from silent CA bladder in the 10th week, but the other 49 participants were safe without any complications from fish oil. In conclusion fish oil 1000-2000mg daily supplementation had significant efficacy to improve the knee and also had safety in mild to moderate stages of knee osteoarthritis patients. However, 2000mg of fish oil the higher dose had not significantly higher efficacy than 1000mg of fish oil¹². However, this draws our attention to the dietary saturated fatty acid potential mechanisms in the activation of autophagy according to earlier authors Sekar et al., (2016). **Mechanisms and autophagy:** The term “autophagy” derived from the Greek meaning “eating of self”, was first coined by Christian Duve over 40 years ago and was largely based on the observed degradation of mitochondria and other intracellular structures within lysosomes of rat liver perfused with the pancreatic hormone, glucagon¹³.

Therefore, an ideal balance between rate of synthesis and degradation constitutes a normal extracellular matrix which in turn maintains cartilage homeostasis. Strong defense mechanisms play an important role in the protection of cells against oxidants for the vitality of homeostasis. Usually in tissues with a “high rate of cell turnover” the cells get constantly renewed, but it is not so the case in the cartilage tissue. It is because cartilage is a “postmitotic tissue” which hardly undergoes cell replication due its low cell numbers (Lotz, 2012). The cells in such tissues, in order to survive depend solely on a mechanism called “autophagy” to “remove the damaged organelles and macromolecules” (Lotz, 2012). Autophagy is a highly organized mechanism by which intra-cellular organelles and macromolecules get rearranged to maintain the survivability of the tissue (Mizushima, 2007). To understand better, studies have suggested that Autophagy is known to be initiated because of lipotoxicity (a [metabolic syndrome](#) that results from the accumulation of [lipid](#) intermediates in non-[adipose tissue](#), leading to cellular dysfunction and [death](#).) from the increased levels of circulating serum-free fatty acid (FFA) levels. Circulation of FFA usually is known to be one of the causative agents of diseases associated with increased lipid content in the body, such as obesity. The increased levels of intercellular free fatty acid usually occur due to the imbalance of free fatty acid synthesis and utilization. Indeed, the excess free fatty acid is in the form of “esterified” and stored as “lipid droplets” which then get broken down by the “cellular lipases”

Therefore, due to this excess accumulation of free fatty acid, the tissue undergoes an overload, thereby causing dysfunction of cells leading to apoptosis (the death of cells that occurs as a normal and controlled part of an organism’s growth or development) as reported by the studies. It is important to note that there is a link between obesity and autophagy activation that can be accredited to the increased endoplasmic reticulum (ER) activity caused by the excess lipid storage in the adipocytes. As a result, that leads to misfolding of the proteins and causes ER stress, the release of fatty acid, and increased expression of inflammatory cytokines, which impinges the mammalian target of rapamycin (mTOR) and induces autophagy (Zha & Zhou, 2012) as shown in the figure below.



Schematic representation of inflammation of the knee joint stimulated by SFA through two distinct pathways; TLR-4 dependent and TLR-4 independent pathways.

Source: https://www.researchgate.net/profile/Sunderajhan_Sekar/publication/309146322_Dietary_Fats_and_Osteoarthritis_Insights_Evidences_and_New_Horizons/links/58293ca108ae5c0137f15534.pdf **Dietary fat linked to knee osteoarthritis**

(OA) progression: As mentioned earlier about osteoarthritis here we are emphasizing according to MedPage Today article “Dietary Fat-Including Type-Matter in Knee OA progression” that high intakes of total fat and particularly saturated fatty acids (SFA) increased the rate of structural progression of knee osteoarthritis, whereas high intakes of unsaturated fatty acids appeared to slow the rate of radiographic progression in a prospective observational study.

According to a study conducted and data from more than 2,000 patients with knee osteoarthritis who participated in the osteoarthritis initiative, researchers led by Dr. Big Lu of Brigham and Women's Hospital in Boston found more severe joint space narrowing with increasing intake of total fat and SFA, even after adjusting for BMI and other potential cofounders. However, in contrast, higher intake of monounsaturated fatty acids (MUFA) and polyunsaturated fatty acids (PUFA) were associated with less loss of joint space width. As the report describes, "although the potential mechanisms linking dietary PUFA and OA are unknown, there is consistent evidence that PUFAs are directly linked to inflammation via their role as precursors for a family of compounds known as eicosanoids."

The pathophysiology of OA is now recognized to involve "a complex interplay between articular pro-versus anti-inflammatory mediator." The study included 2,092 individuals with medial radiographic knee OA with a Kellgren-Lawrence grade of 2 or 3 in at least one knee and excluded knees with severe radiographic OA. A study included that their dietary intake of fatty acids was assessed using the Block Brief Food Frequency Questionnaire. The joint space width measured between the medial femur and tibia of the knee on plain posterior-anterior radiographs was used to evaluate radiographic progression. At baseline, those in the highest quartile of dietary fat intake were more likely to be younger, non-Hispanic black, less educated, depressed, and smokers; have higher body mass index, and have higher intakes of calcium, protein, and total calories compared with the participants in the bottom quartile of total fat intake. However, researchers showed a positive association of dietary saturated fat with knee OA progression and potential protective effects of dietary PUFA and MUFA against knee OA progression¹⁴.

Preventive care for osteoarthritis: First and foremost, the important preventive care step begins with the type of dietary fatty acids intake of a person, here in the case of obesity that affects the knee cartilage which induces osteoarthritis. These lifestyle changes may help and prevent osteoarthritis as follows:

- Consume healthy dietary fatty acids such as olive or vegetables oils and nuts
- Eliminate trans-fatty acids, such as commercially baked goods, cookies, crackers, cakes, French fries, onion rings, donuts, processed foods, and margarine.
- Losing extra weight helps relieve pressure on a person's joints and may slow down the loss of cartilage, as well as relieve pain. Especially for osteoarthritis, being overweight is a big problem, and losing weight is one of the best strategies to improve the condition
- Exercise regularly helps to lose weight and improve symptoms of osteoarthritis. Exercise strengthens the muscles, that will support the joints.
- Research suggests the benefits of exercise for people with osteoarthritis in reducing pain and disability because improves strength, range of motion, balance and coordination, endurance, and posture.
- Eat more fruits and vegetables and whole grains
- Drink 6 to 8 glasses of filtered water daily.¹⁵

Conclusion: The right choice for intake of dietary fats is crucially important in the health and longevity of a person. The human body runs by the biochemical response through the type of diet we consume, and reaction that cells or tissues either turn on genes that assist in the burning of fats or turn off that helps with fat accumulation throughout the body which causes obesity, which is coupled with multiple health problems, especially in the knee that leads to osteoarthritis. It would be much easier and cost-effective if we constantly monitor our daily diet and lifestyle, rather than later go through knee surgery or other adverse related health issues with multiple problems and consequences. Studies have shown that dietary and saturated fats have a huge impact on the increasing severity of osteoarthritis, but dietary PUFA and MUFA particularly olive oil prevent and protect against the potential accumulation of fat which will lead to osteoarthritis. It is important to note that in junk foods, the bad fats normally are digested and absorbed as fats in our body's cells easily but to burn out those junk fats from the body's cells it will take a long time and hard work daily 30-minute to one-hour rigorous exercise.

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Mission: BioNatural Healing College is a non-profit public benefit institution that has tax-exempt status under the Internal Revenue Service, Section 501(c)(3) of the United States of America. Our goal is to offer a high-quality education a diploma program as well as holistic health and nutrition conferences, seminars, workshop, and continuing education. The focus of these educational programs is to offer healing and holistic nutrition science through online distance learning. These dynamic online education programs will provide diverse adult learners throughout the world the experience of enhancing their quality of life, their health, and their happiness.

Vision: The faculty, staff and management team of BioNatural Healing College are passionately committed to providing the best teaching possible in this field. We seek to encourage, motivate and explain the importance of this field to prospective students so that they may make an informed decision regarding enrollment. We seek an ultimate goal of satisfaction for the student based on responsibility, commitment, respect, awareness and sustainable education for society.

Accreditation and Recognition: BioNatural Healing College is based in California. It is an institution that has the goal to deliver on- demand online distance learning around the globe. This education is of high quality and vocational in nature. BioNatural Healing College is a legal business entity that has been approved to operate by the State of California's Bureau for Private Postsecondary Education that set forth in the educational code. BioNatural Healing College is not accredited by the United States Department of Education. BioNatural Healing College is a member of the American Holistic Health Association (AHHA).

