

# BENEFITS OF THE WHOLE FOOD, PLANT BASED DIET (WFPBD)

## THE CHINA PROJECT

The **China Project** (which was conducted during the 1980s by Cornell University via lead investigator Campbell, the Chinese Academy of Preventative Medicine via lead investigator Chen, and the Oxford University) investigated and compared the healthful effects of the plant-based diet of the people indigenous to China and the Standard American Diet (SAD) (Root, 2015). The China Project found the average daily rural China diet - akin to **the whole-food, plant-based diet (WFPBD)** - consisted of 14% fat, 71% carbohydrate, 5% alcohol, 9% plant protein, and 1% was animal protein; while the

**Standard American Diet (SAD)** consisted of 36% fat, 42% carbohydrate, 7% alcohol, 5% plant protein, and 10% was animal protein; (Campbell et al, 1998). Refer to **Figure 1. WFPBD vs SAD - Macronutrient Composition**. It further found the average daily rural China diet, or the WFPBD, consisted of 2,630 calories (and 33 grams of fiber); while SAD consisted of 2,360 calories (and 11 grams of fiber). Refer to **Figure 2. WFPBD vs SAD - Caloric Intake**. Moreover, the body mass index (BMI) was 20.5 in rural China and 25.8 in the USA (Campbell et al, 1998). Refer to **Figure 3. WFPBD vs SAD - BMI**.

Figure 1. WFPBD vs SAD - Macronutrient Composition

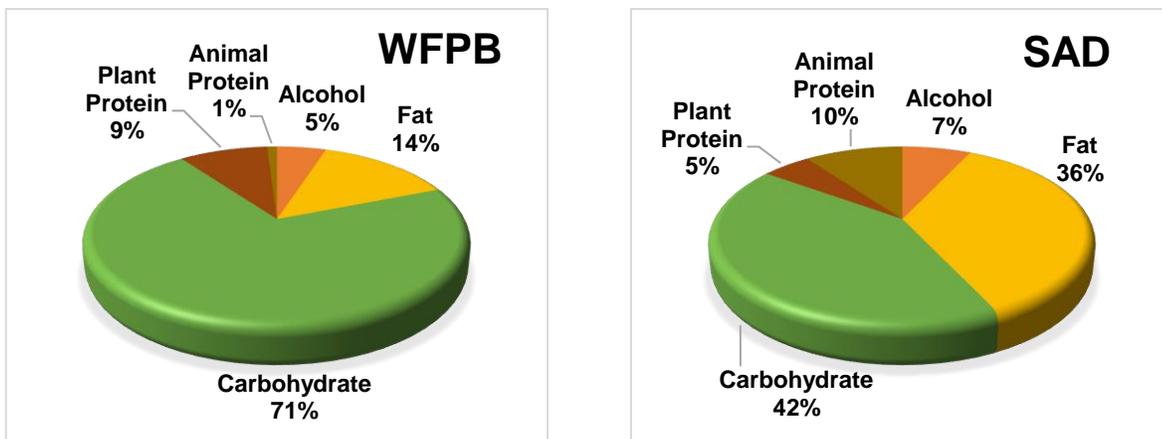
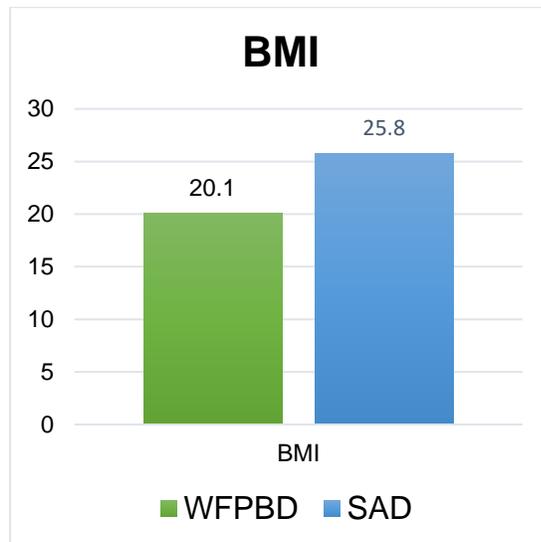


Figure 2. WFPBD vs SAD - Caloric Intake



Figure 3. WFPBD vs SAD - BMI



## THE CHINA PROJECT RESULTS:

The Standard American Diet (**SAD**) was associated with increased chronic diseases and mortality, while the rural China - or **whole-food, plant-based diet (WFPBD)** - was associated with better health and longevity (Campbell et al, 1998). For instance, the mean serum total cholesterol was 203 mg/dL on the SAD (specifically, adults aged 20-74 in the USA) and 127 mg/dL on the WFPBD (specifically, people living in rural China); coronary artery disease (CAD) was 16.7-fold greater for SAD men and 5.6-fold greater

for SAD women than their WFPBD counter-parts; and CAD mortality was inversely related with the frequency of consumption of green vegetables (Campbell et al, 1998). One broad conclusion of the study was the risk of CAD is positively related to animal-based foods and negatively correlated with consumption of plant-based foods (Campbell et al, 1998). Since the original China Project publications, copious trials have investigated the health benefits of the WFPBD.

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## ADDITIONAL RESEARCH ON THE BENEFITS OF THE WHOLE-FOOD, PLANT-BASED DIET (WFPBD)

### AGING SKIN AND THE WFPBD

Compared to eating the Standard American Diet (SAD), compliance to a whole-food, plant-based diet (WFPBD) reduces the dietary consumption of **advanced glycation end products (AGEs)** and maximizes anti-oxidation, thereby slows aging of the skin (Solway et al, 2020). AGEs contribute to inflammation and increased oxidant stress, which are linked to many chronic diseases and the aging in general (Uribarri et al, 2010). Animal-derived foods that are high in fat and protein are AGE-rich and prone

to additional AGE formation with dry heat (Uribarri et al, 2010). Foods highest in AGEs are meat, especially red meat, butter, mayonnaise, and fried foods (Brown, 2019). In contrast, carbohydrate rich foods and milk are low in AGEs, even after cooking (Uribarri et al, 2010). The most effective methods to limit AGEs is to avoid meat and when cooking foods use low heat and use moisture, e.g., poach rather than fry an egg, stew rather than fry (Uribarri et al, 2010).



*Disclaimer: Image is a dramatization, and not an actual case.*

## ALZHEIMER'S DISEASE AND THE WFPBD

A lower fat diet, including the WFPBD, may help prevent **Alzheimer's disease (ALZ)** (Barnard et al, 2014). Although Diabetes mellitus and Hypertension increase the risk of ALZ by 31%, 40%, respectively (Lubitz et al, 2016), both can be managed, as we have discussed, with a WFPBD. Hypercholesterolemia, which increases the risk of ALZ by nearly 70% (Meng et al, 2014), can also be controlled with a WFPBD. Dietary consumption of advanced glycation end products (AGEs) is also closely linked to the worsening of ALZ lesions and cognition (Lubitz et al, 2016). Recent research has confirmed that “plant-based, low-fat, high-fiber, rich in antioxidants and

other lifestyle interventions may reduce the burden and disability” of ALZ (Ramirez-Salazar et al, 2021, p55).



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## CANCER AND THE WFPBD

The prevalence of carcinogens in our foods and our environment increases the risk of cancer (Epstein, 1990). Remarkably, a comprehensive meta-analysis concluded that a vegetarian diet decreases the incidence of cancer by 8% and WFPBD (vegan diet) reduces the **incidence of cancer** by 15% (Dinu et al, 2016). Plant-based phytochemicals found in herbs, spices, fruits, teas, and colorful vegetables have been linked with lower risks of cancer, particularly of the breast, pancreas, ovary, skin, prostate, bowel and esophagus (Thomas et al, 2014). Phytochemicals are naturally occurring compounds found in plants which purportedly combat disease. Other putative mechanisms for cancer reduction is the reduction of insulin like growth factors (IGFs) from dairy, of heavy metals and contaminants found in fish and chicken, and of heterocyclic amines (HCAs) (Newmark et al, 2010). Heterocyclic amines are compounds that form during the cooking of food, especially meat, over high heat; and can be aromatic or physically on the food with both forms increasing the risk for cancer (Abid et al, 2014). Purportedly, heavy metals such as lead bioaccumulate in the bones, organs, and meat of chickens and fish from feed and soil contaminated with lead. Bioaccumulation is the progressive build-

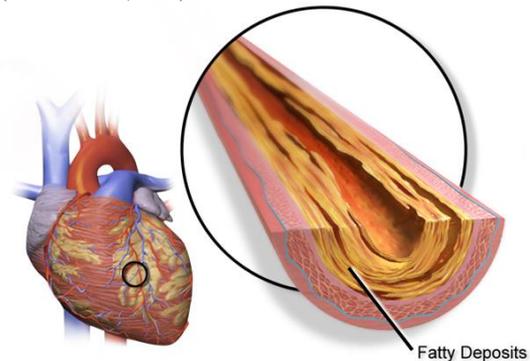
up of toxins moving up the food chain (e.g., from plant to smaller animal to larger animal to human) (Abid et al, 2014). Hormones, such as various growth factors in dairy are naturally occurring and are specific to bovine physiology - not human physiology. Whole-food, plant-based Diet during cancer treatment is still being examined. As for **cancer recurrence**, the American Cancer Society *and* the World Cancer Research Fund (WCRF) recommend patients adhere to a plant-based diet, limit alcohol consumption, maintain a healthy weight through-out life, and engage in regular physical activity (Mourouti et al, 2017).



## CARDIOVASCULAR DISEASES AND THE WFPBD

Excessive dietary fat consumption, as is found in the Standard American Diet (SAD), contributes to **cardiovascular diseases (CVDs)**, including hypercholesterolemia, atherosclerotic heart disease of coronary artery disease (CAD), angina, hypertension (HTN), and cerebral infarction (CVA) / stroke. In contrast, the whole-food, plant-based diet (WFPBD) decreases the risk of CVD (Kahleova et al, 2018; Patel et al, 2017; Tuso et al, 2013) and can lessen the severity of and even reverse or ‘cure’ certain CVDs (Esselstyn et al, 2014; Tuso et al, 2013). Research indicates that when the WFPBD is utilized by CVD-compromised individuals, it significantly decreases LDLs and total cholesterol (Jenkins et al, 2003c; Yokoyama et al, 2017). A specific type of WFPBD, the Portfolio diet (a diet that contains almonds or is low in saturated fat or is high in plant sterols, soy proteins or high in viscous fibers), improves the LDL: HDL cholesterol ratio and reduces LDL cholesterol to the extent that lovastatin, a ‘go-to’ antihypercholesterolemia medication, is no longer necessary (Jenkins et al, 2003s; Jenkins, 2005). Remarkably, the WFPBD has been found to actually **reverse CVD** (Esselstyn et al, 2014). The suggested mechanism may lie in the lower consumption of saturated fat, heme-iron, and trimethylamine N- oxide (TMAO), which is a compound produced by the and converted in the liver after high choline consumption of foods like red meat, eggs, and fish (Esselstyn et al, 2014). The ability of the WFPT diet to lower weight, reduce waist circumference, and lower total **cholesterol** results in improved cardiovascular health (Morin et al, 2018), **CAD** risk reduction by 40% (Kahleova et al, 2018; Patel et al, 2017), and reduced ischemic heart disease mortality (Crowe et al, 2013). The WFPBD also reduces the prevalence of **HTN** (Orlich & Fraser, 2014; Dinu et al, 2016), and better controls blood pressure in those with HTN (Lubitz et al, 2016; Pettersen et al, 2012) – even better than the DASH diet (Pettersen et al, 2012). In Pettersen’s (2012) study of participants with HTN, the WFPBD reduced mean systolic blood pressure by 6.9mm of Hg. Further, they had a lower odds ratio ( $or=0.37$ ) of HTN than that

of lacto-ovo vegetarians ( $or=0.57$ ), flexivevegetarians ( $or=0.97$ ), and omnivores ( $or=1.0$ ). Logically, the WFPBD as a treatment modality to prevent and help manage HTN reduces the risk of stroke. Afterall, HTN, CAD, obesity, and heavy alcohol use are some of the largest contributors to **stroke** risk – and each of these factors are closely related to proper nutrition and diet (Pettersen et al, 2012).



A case study authored by Massera (et al, 2015) perfectly illustrates the power of the WFPB on CVDs. Massera reported on a 60-year-old man who presented to his physician with typical angina and had a positive stress test. The patient declined invasive testing and drug therapy, but agreed to replace his prior ‘healthy’ diet (which consisted of fish, skinless chicken, and low-fat dairy with some nuts, fruits, and vegetables) with a WFPBD consisting primarily of vegetables, whole grains, fruits, potatoes, legumes, beans, and nuts. Following four months on the WFPBD, the patient’s BMI dropped from 26 to 22  $kg/m^2$ , his LDL cholesterol dropped from 158 to 69  $mg/dL$ , his blood pressure normalized, and he could now ambulate one mile without angina. After two years on the WFPBD, the patient remained asymptomatic and was able to jog more than four miles without incident. Massera and his colleagues (2015) concluded that adoption of a WFPBD should be among the first recommendations given to patients with atherosclerosis.

## DIABETES MELLITUS TYPE 2 (DM-2) AND THE WFPBD

Two systemic reviews and many studies have concluded that, compared to omnivores, the prevalence and incidence of **diabetes mellitus type 2 (DM-2)** in vegetarians is less (Dinu et al, 2016; Hever & Cronise, 2017; McMacken & Shaw, 2017; Orlich & Fraser, 2014). Research also suggests the WFPBD can be used to effectively treat DM-2 (Lubitz et al, 2016; McMacken & Shaw, 2017). In one large retrospective study of 200,00 men and women, researchers at the Harvard School of Public Health compared (via a plant-based index) the effect of a ‘healthful’ versus an “unhealthful” plant-based diet on DM-2 (Satija et al, 2016). The study concluded plant-based diets, especially when rich in high-quality plant foods, are associated with significantly lower risk of developing DM-2, and stated their results support “current recommendations to shift to diets rich in healthy plant foods, with lower intake of less healthy plant and animal foods” (Satija et al, 2016, para4). However, because there is a lack of consensus as to the optimal macro-nutrient ratios, the focus of the plant-based diet should instead be on actual foods and eating patterns (McMacken & Shah, 2017). In other words, instead of counting the grams of carbohydrate, protein, and fat in a diet, the best prevention and treatment of DM-2 is to focus on unrefined (as opposed to refined) carbohydrates, monounsaturated

and polyunsaturated (as opposed to saturated and trans) fats, and plant (as opposed to animal) protein. One study of the effects of a WFPBD on participants with DM-2 found that in just three days it controlled the blood sugar levels of 84% of patients and partially controlled levels for 16% of patients (Chowdhury, 2017). A WFPBD has been shown to not only treat but also *prevent* DM-2 in WFPBD (Satija et al, 2016). The WFPBD can reduce blood sugar and cholesterol which also may translate into a lower rate of upper body musculoskeletal disorders in those with diabetes (Smith, 2003). Patients with diabetic **peripheral neuropathy** also see significant gains, noting a significant reduction in pain and numbness when following a WFPBD (Crane & Sample, 1994). A more recent randomized controlled trial found reduced pain and improved foot sensation in patients with diabetic peripheral neuropathy with a 20-week WFPBD (Bunner et al, 2015). Body Mass Index (BMI) reduction aside, a WFPBD may reduce Obesity and Diabetes type 2 through the reduced consumption of advanced glycation end products (AGEs). Due to the robust evidence in favor of the WFPBD for those with DM-2, the American Association of Clinical Endocrinologists endorse the WFPBD to lose weight and normalize blood sugars.

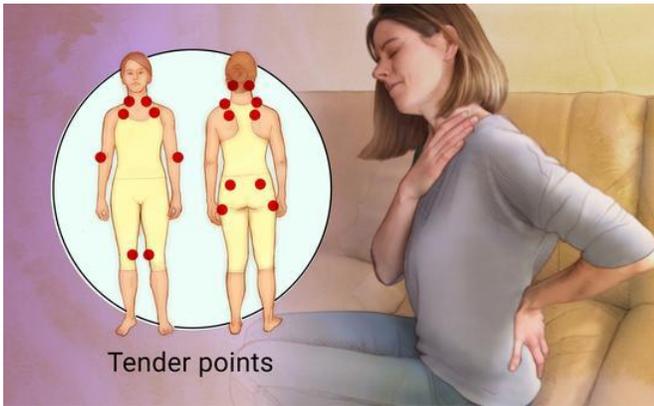
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## MORTALITY AND THE WHOLE-FOOD, PLANT-BASED DIET (WFPBD)

Numerous studies have found compliance to a plant-based diet, even a loosely defined vegetarian diet, significantly reduces **premature death** (e.g., Hever & Cronise, 2017; Kim et al, 2019; Kwok et al, 2014; Tuso et al, 2013). A recent publication, for instance, concluded adherence to the WFPBD caused an 18 to 20% reduction in all-cause mortality and a 32% reduction in cardiac deaths (Kim et al, 2019).



## FIBROMYALGIA AND THE WFPBD



Research suggests a plant-based diet benefits patients with Fibromyalgia. For example, one study found shifting patients with fibromyalgia from the Standard American Diet (SAD) to a WFPBD resulted in a significant decrease of their joint stiffness and pain, as well as an improvement of their self-experiences health (Hanninen, 2000). In another study, participants on a 3-month raw WFPBD reported significant improvements in the Visual Analog Scale (VAS) (3 points on the one to ten scale), joint stiffness, quality of sleep, the Health Assessment Questionnaire, and the General Health Questionnaire (Kaartinen et al, 2000).

## KIDNEY DISEASE AND THE WFPBD

One critical function of the kidneys is to remove wastes and excess fluid from the body. The glomerular filtration rate (**GFR**) ( $\text{mL}/\text{min}/1.73 \text{ m}^2$ ) indicates the health of the kidneys and, in those under age 40, is normally 100-130 in men and 90-120 in women. It is normal for the GFR to gradually decline with age, but it does so at a steeper rate for those with CKD, Hypertension (HTN), Diabetes mellitus (DM), and Hyperlipidemia (Wetzels et al, 2007). There are five stages of **chronic kidney disease (CKD)**. In **stage 1**, the GFR is  $\geq 90$ , kidney function is technically within normal limits (WNL), and the patient is asymptomatic. Often, this patient has a genetic history of kidney disease. In **Stage 2**, the GFR is 60 to 89 and kidney function is mildly reduced. In **Stage 3**, the GFR is 30 to 59 and kidney function is moderately reduced. In **Stage 4**, the GFR is 15 to 29 and kidney function is severely reduced. In **Stage 5**, the patient will still have a GFR, but as it decreases towards zero and the kidneys fail, hemodialysis will be necessary to sustain life.



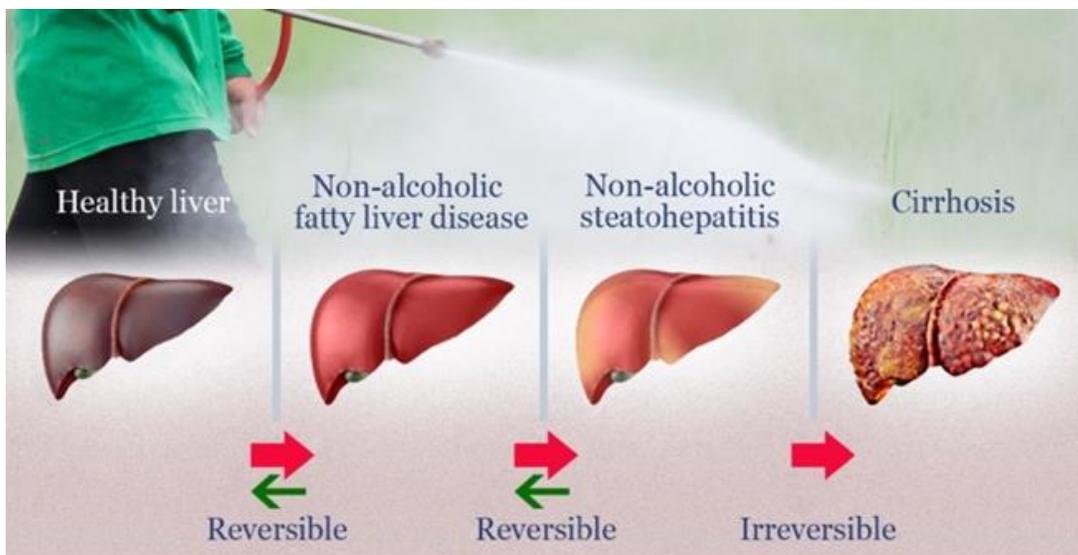
Signs and symptoms of CKD, which progress with the disease severity, include change in urination (e.g., difficulty with urination, foamy urine, blood in the urine), kidney pain, ammonia breath, metallic taste, nausea and vomiting, der-mal rash and itching, feeling cold, shortness of breath (SOB), extreme fatigue, trouble concentrating, and vertigo. Historically, the treatment for CKD has been to attempt to slow the progression of the disease by preventing or managing HTN, DM, and hyperlipidemia, and DM; and, when necessary, prescription of an anti-angiotensin II medication. However, despite these interventions, the GFR and CKD invariably continue to progress towards **acute kidney failure** and death (Goraya & Wesson, 2015). Because research has demonstrated a poor diet is a causative factor in CKD-related death (Goraya & Wesson, 2015), increased attention is on a dietary intervention to slow the progression of CKD. Small scale studies have shown that obtaining protein from plant rather than animal sources reduces dietary acid and improves metabolic acidosis, and, as a result, slow the reduction in GFR and the progression of CKD (Goraya & Wesson, 2015). With a longitudinal, retrospective study (median follow-up 24-yrs) the effects of a plant-based diet on GFR and the incidence of CKD was assessed and it was concluded adherence to a healthy plant-based diet is favorably correlated with a reduced risk, but not necessarily the progression of CKD (Kim et al, 2019).

## NON-ALCOHOLIC FATTY LIVER DISEASE AND THE WFPBD

**Non-alcoholic fatty liver disease (NAFLD)** is caused by excessive fat consumption, especially saturated fat and cholesterol from animal products, and sugar consumption (Zelber-Sagi et al, 2007). Left untreated, NAFLD can progress into Non-alcoholic steatohepatitis and eventually Cirrhosis of the liver, which is non-reversible. Refer to **Figure 4. Progression of NAFLD**. In a recent open observational pilot study, providing vegan [WFPB] diet

advice to patients presenting with NAFLD resulted in their liver enzymes normalizing within six months (Chiarioni et al, 2021). This dramatic change was due to improved antioxidant intake and gut microbiota courtesy of the plant-based diet (PCRM, 2021). Chiarioni's research attests to the efficacy of the vegan [WFPD] diet in the prevention and treatment of NAFLD – as well as the prevention of hepatocellular carcinoma and cirrhosis (PCRM, 2021).

**Figure 4. Progression of NAFLD**



## OBESITY AND THE WFPBD

Research using a methodology including linear and logistic regression analyses ‘proves’ there is a positive association between meat consumption and **obesity** (Wang & Beydoun; Salter, 2018). Meat consumption is also linked to ‘**central**’ obesity, which is excess visceral fat in the abdominal region, as measured by the **waist to hip ratio (WHR)** (Wang, 2009).

An anecdotal case (Nixon, n.d.t): The photos on the right depict the before and after waist to hip ratio (and body weight) of Tara, a woman who switched from the Standard American Diet (SAD) to the Whole-Food, Plant-Based Diet (WFPBD). Tara's story available at:



<https://happyherbivore.com/2014/11/how-tara-depression-pms-gi-issues-cholesterol/>

Two systematic reviews concluded that compared to vegetarians, omnivores have a higher **Body Mass Index (BMI)** (Orlich & Fraser, 2014; Dinu et al, 2016). Further, compared to ‘anything except meat’ vegetarian and omnivorous diets, **obesity**, can be significantly *prevented* and *cured* with a WFPBD (Le & Sabaté, 2014; Turner-McGrievy et al, 2004). But this has been known for quite some time now. In 2006, Berkow and Barnard reviewed 87 published studies and concluded that the vegetarian diet is highly effective for weight loss. Their review suggested the weight loss in vegetarians is not dependent upon exercise and occurs at a rate of approximately one pound per week.

Hever and Cronise (2017) concluded that due to the reduction and severity of obesity for those following a plant-based diet in their research, they recommended healthcare professionals utilize the plant-based diet as a primary modality in the prevention and treatment of obesity and obesity-related inflammatory markers.

An anecdotal case (Nixon, n.d.a): The photos below depict the before and after bodies of Adam and wife who switched from the SAD to the WFPBD. Adam’s story available at: <https://happyherbivore.com/2015/08/how-adam-high-blood-pressure-dieting-weight-loss/>



## OSTEOARTHRITIS (OA) AND THE WFPBD



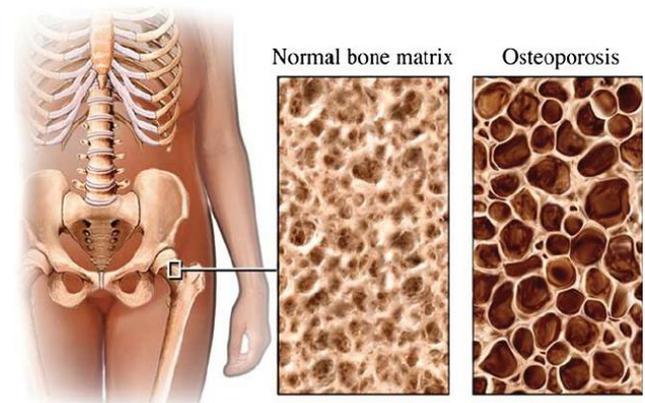
Patients with musculoskeletal disorders can also benefit from the WFPBD. Take, for example, **osteoarthritis (OA)**, **chronic pain syndrome** (also referred to as musculoskeletal pain or simply chronic pain), and **chronic inflammation**. Longitudinal research has found diets rich in plant-sourced fiber, such as the WFPBD, consistently show less symptomatic OA, including less pain and a higher level of function (Dai et al, 2017). Symptom reduction in OA may be related to, among other factors, reduced inflammation, a lower body mass index (BMI), and

a lower dietary intake of AGEs. In a small randomized trial of subjects with OA, a 6-week WFPBD intervention produced a significant reduction in chronic pain as measured by the Visual Analog Scale (VAS) (2.4 points reduction), and a significant improvement in function, as measured by the Short-form Health Survey (SF-36) (Clinton et al, 2015). Another small study also found the WFPBD produced a significant reduction in chronic pain as measured by the VAS (pain reduced 3.14 points) and an improvement in function as measured by the SF-36 (function improved 24 points) (Towery et al, 2018). A 2017 meta-analysis concluded the overall markers of chronic inflammation, as measured by C-reactive protein (CRP), are significantly lower in those who have been adherent to the vegetarian diet for at least two years (Haghighatdoost et al, 2017). The take-away point is the WFPBD might very well help physical therapy patients who present with OA, chronic pain, and chronic inflammation.

## OSTEOPOROSIS AND THE WFPBD

A common misconception is the WFPBD is contraindicated for a person with **osteoporosis (OP)**. A study comparing vegetarian and omnivore post-menopausal women, however, found no significant differences in the spine and femoral neck **bone mineral density (BMD)** and the mean daily intakes of energy, protein, and calcium (Kim et al, 2007). In fact, a systematic review and meta-analysis by the National Osteoporosis Foundation found there are no differences in total body BMD, total hip BMD, lumbar spine BMD, or femoral neck BMD, total body bone mineral content between peri-menopausal and post-menopausal women who consume animal protein diets versus soy protein diets (Shams-White et al, 2018). Naturally, if the plant-based diet does not include soy, the individual must be conscientious to obtain adequate calcium and vitamin D from the plant-foods they do ingest. Interestingly, individuals consuming high protein diets promote acidosis,

which requires buffering from calcium and phosphorus from bones, which might actually contribute to OP (Benetou et al, 2012). The bottom line is a dietary pattern rich in fruits, vegetables, whole grains, nuts and legumes can be ideal for bone health (Movassagh & Vatanparast, 2017).



## PARKINSON'S DISEASE AND THE WFPBD

A diet high in berries and foods rich in flavonoids, such as tea, and may reduce the **risk of Parkinson's disease (PD)** by nearly 25% (Hagan et al, 2016). Another protective mechanism for PD is nicotinic compounds, ideally sourced from nightshade vegetables, such as peppers, eggplants, potatoes, and tomatoes (Nielsen et al, 2013). In contrast to the protective effects of certain plant-based foods, a meta-analysis published in *Lancet Neurology* concluded dairy and high fat diets significantly increase the risk of PD (Ascherio & Schwarzschild, 2016). In fact, Jiang and Zhang (2014) found the risk of PD increases 17% for every 200g (~3/4 cup) increment of milk and 13% for every 10g (~1/3 oz) increment of cheese daily intake. Compared to non-organic foods, organic foods may reduce the risk of PD because they are low in pesticides, which especially combined with a high fat consumption, is purportedly associated with PD (Kamel et al, 2014).

For patients who **already have PD**, it is well-established that a diet low in protein (less than 0.6/kg of body weight/day) significantly increases levodopa absorption motor responses and longer "on" time (Virmani et al, 2016). Compared to a diet high in protein, a diet high in fiber-rich plant-based foods and adequate fluids will promote gastrointestinal (GI) motility, which is advantageous because Parkinsonian patients are prone to constipation (with a prevalence rate of 24.6-63%) (Stocchi & Torti, 2017). Compared to an omnivorous diet, a four-week plant-based diet intervention was associated with significant improvements in the Unified Parkinson's Disease Rating Scale (UPDRS) (change from 74.46 to 47.67) and the Modified Hoehn and Yahr Staging Scale (MHYSS) (change from 3.15 to 1.96) (Baroni et al, 2011). Recent research has confirmed that "plant-based, low-fat, high-fiber, rich in antioxidants and other lifestyle interventions may reduce the burden and disability" of PD (Ramirez-Salazar et al, 2021, p55).

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## RHEUMATOID ARTHRITIS (RA) AND THE WFPBD

Research suggests a plant-based diet benefits patients with **rheumatoid arthritis (RA)**. For example, one systemic review concluded that a fast followed by an adoption of the vegetarian diet provided a long-term decrease in pain and an increase in function in patients with RA (Müller et al, 2001). Compared to the standard American diet (SAD), a diet emphasizing an abundance of vegetables, legumes, fruits, and whole grains are associated with decreased inflammation (e.g., a reduction in anti-inflammatory markers such as high-sensitivity C-reactive protein, interleukin-6, and tumor necrosis factor alpha) (Galland, 2010). In the obese, a diet with a high vegetable and fiber content reduces anti-inflammatory markers better than any amount of exercise (Sutcliffe et al, 2015). Compared to vegetarians

and omnivores, plant-based dieters with probiotic supplements enjoy reduced pain and stiffness, and an increase in activities (Hanninen, 2000).



## THE WHOLE-FOOD, PLANT-BASED DIET (WFPBD) PLATE

An infographic ‘plate’ that can be used as a guide for the whole-food, plant-based diet was

created by the Physicians’ Committee for Responsible Medicine (PCRM).



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## THE GUIDELINES FOR THE WFPBD

The ten guidelines of a ‘generic’ Whole-food, plant-based (WFPB) diet will now be provided. In a nutshell, adhering to a WFPBD means **eating only**

**healthy plant sourced foods** – not unhealthy ones such as deep-fried onion rings!

**1. WHOLE-FOOD PLANTS ONLY – NO ANIMAL SOURCES:** Consume *only* plant foods that are *not* refined (i.e., not stripped of its original nutrient content, such as what occurs with the conversion of whole grain flour to white flour) and *not* processed (i.e., no added sugar, salt, or oil in the packaging, such as what occurs when potatoes are ‘processed’ into French fries).

**2. FLUIDS:** The daily fluid intake, including water but not limited to water, should be at least 2.7 L (11.4 cups) for women and at least 3.2 L (13.5 cups) for men. Fluid intake should be increased as needed for profound sweating due to extreme physical activity and heat index.

**3. CALORIC INTAKE:** Caloric intake should be sufficient to maintain health and be in balance with caloric output so the body weight is stable with no appreciable increase in body fat. The exception is if there is a goal to lose body fat mass and/or gain lean body mass.

**4. FOOD GROUPS:** The four ‘food groups’ are **Fruits, Vegetables, Legumes, and Whole Grains**. Refer to **Figure 5. WFPB Food Groups**.

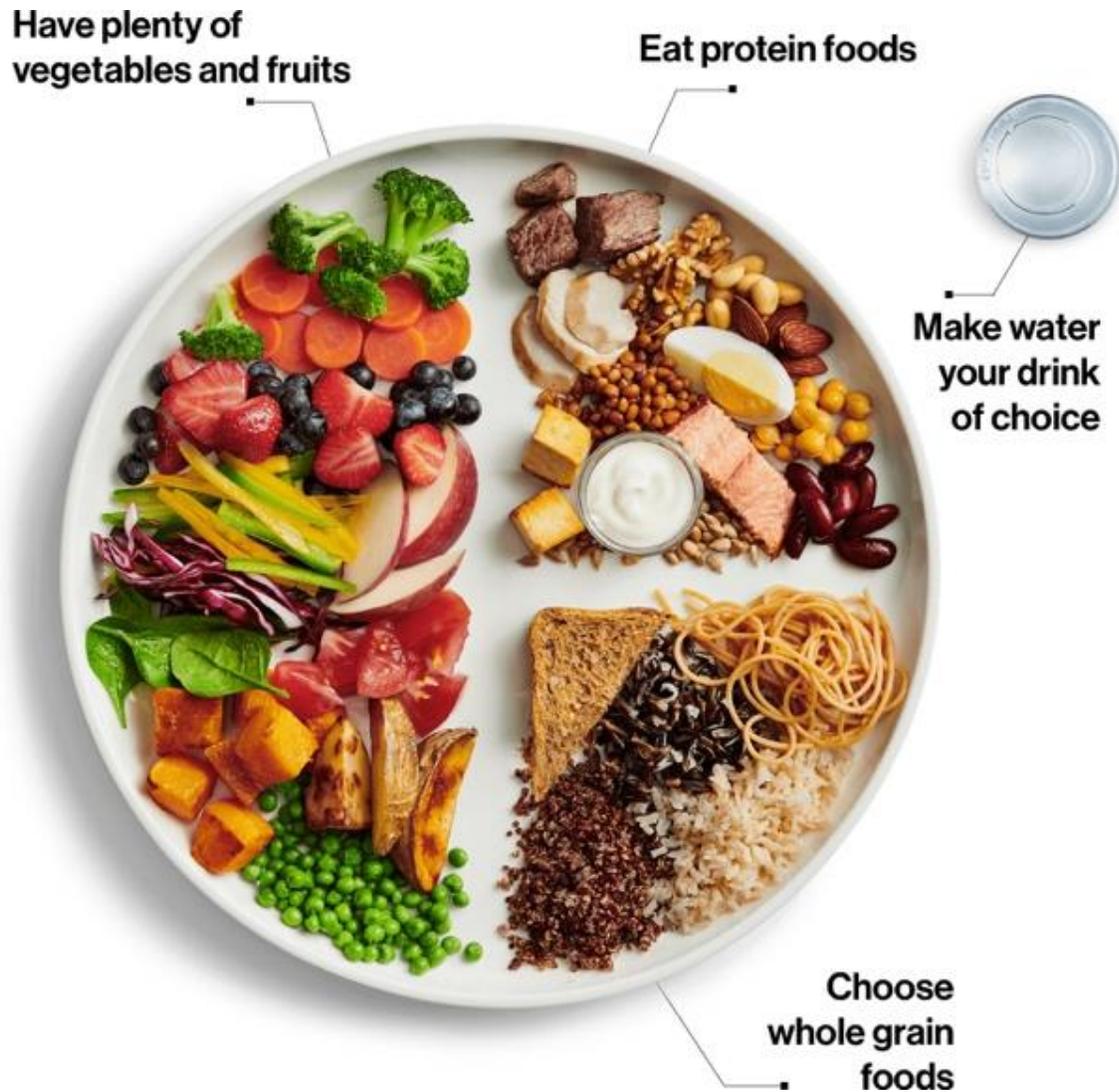
**Figure 5. WFPB Food Groups**



**5: THE PLATE:** Each of the four food groups should comprise one-quarter of the plate. Refer back to **Figure 6. WFPB Plate**. Not all meals will comprise exactly 25% of each of the four food groups, but at least over the course of a day, or at least every few days, the guidelines should be met. For an example of a WFPBD plate, refer to **Figure 5-3.6. Sample WFPBD Plate**. To estimate the quantity of food that is equivalent to one-quarter of the plate, the four food groups can be *approximated* as described below.

- **FRUITS:**  $\geq 2$  cups
- **VEGETABLES:**  $\geq 2.5$  cups, including at least 1.5 cups of ‘dark’ vegetables and 1 cup of leafy vegetables
- **LEGUMES:**  $\geq 2$  cups
- **WHOLE GRAINS:**  $\geq 1.5$  oz

**Figure 6. Sample WFPBD Plate**



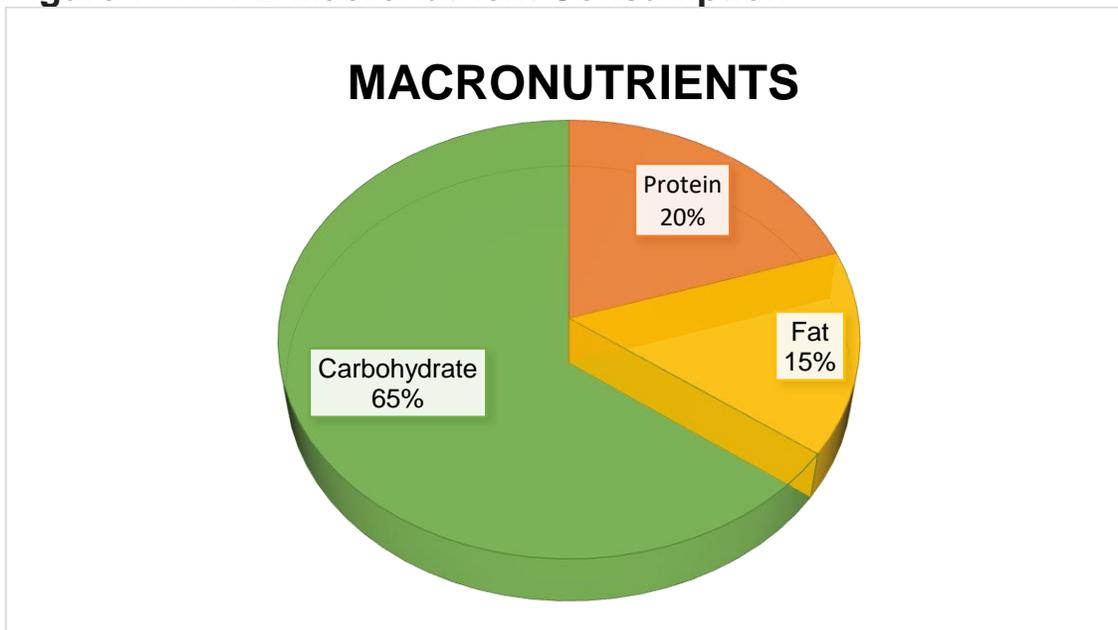
**6: VARIETY:** The choice of fruits, vegetables, and legumes should vary widely to obtain all essential micronutrients. A simple way to ensure variety is to choose a variety of colors! The whole grains may also vary amongst the darker colors.

- **FRUITS:** citrus (e.g., oranges), berries (e.g., blueberries and raspberries), stone (e.g., apricots and peaches), melons (e.g., cantaloupe and watermelon), tropical (e.g., bananas and mangos), and cores (e.g., apples and pears).
- **VEGETABLES:** dark vegetables (e.g., asparagus, beans, broccoli, Brussel sprouts, carrots, kale, collard greens, peppers, spinach, and sweet potatoes) and 'non-dark' vegetables
- **LEGUMES:** beans (e.g., chick, kidney, navy, pinto, and soy), lentils (e.g., brown, green, red and yellow), and peas
- **WHOLE GRAINS:** whole grain bread, cereal, pasta, rice, etc.

**7. MACRONUTRIENTS:** When the ‘plate’ guidelines are met, the composition of macronutrients will typically range 60% to 70% carbohydrate, 10% to 15% fat, and 15% to 20% protein – but this will vary. Refer back to **Figure 7. WFPB Macronutrient Consumption.**

- **CARBOHYDRATE:** Of the carbs, the fiber intake should be  $\geq 25$ grams for a 2000 kcal/day intake and 30 grams for a 3000 kcal/day intake. The legumes will provide much of the fiber, but some will also be obtained from the vegetables, whole grains, and fruits. Small amounts of fiber can also be obtained from a ‘treat’ such as dark chocolate. With a variety of high-fiber food choices, the diet will consist of both soluble and insoluble fibers.
- **PROTEIN:** At a minimum, 0.8 grams per kg of body weight is generally required. The exact amount is influenced by age, gender, body composition, and medical status.
- **FAT:** Dietary fats should be low in saturated fats and high in essential fatty-acids and polyunsaturated oils (e.g., olive oil).

**Figure 7. WFPB Macronutrient Consumption**

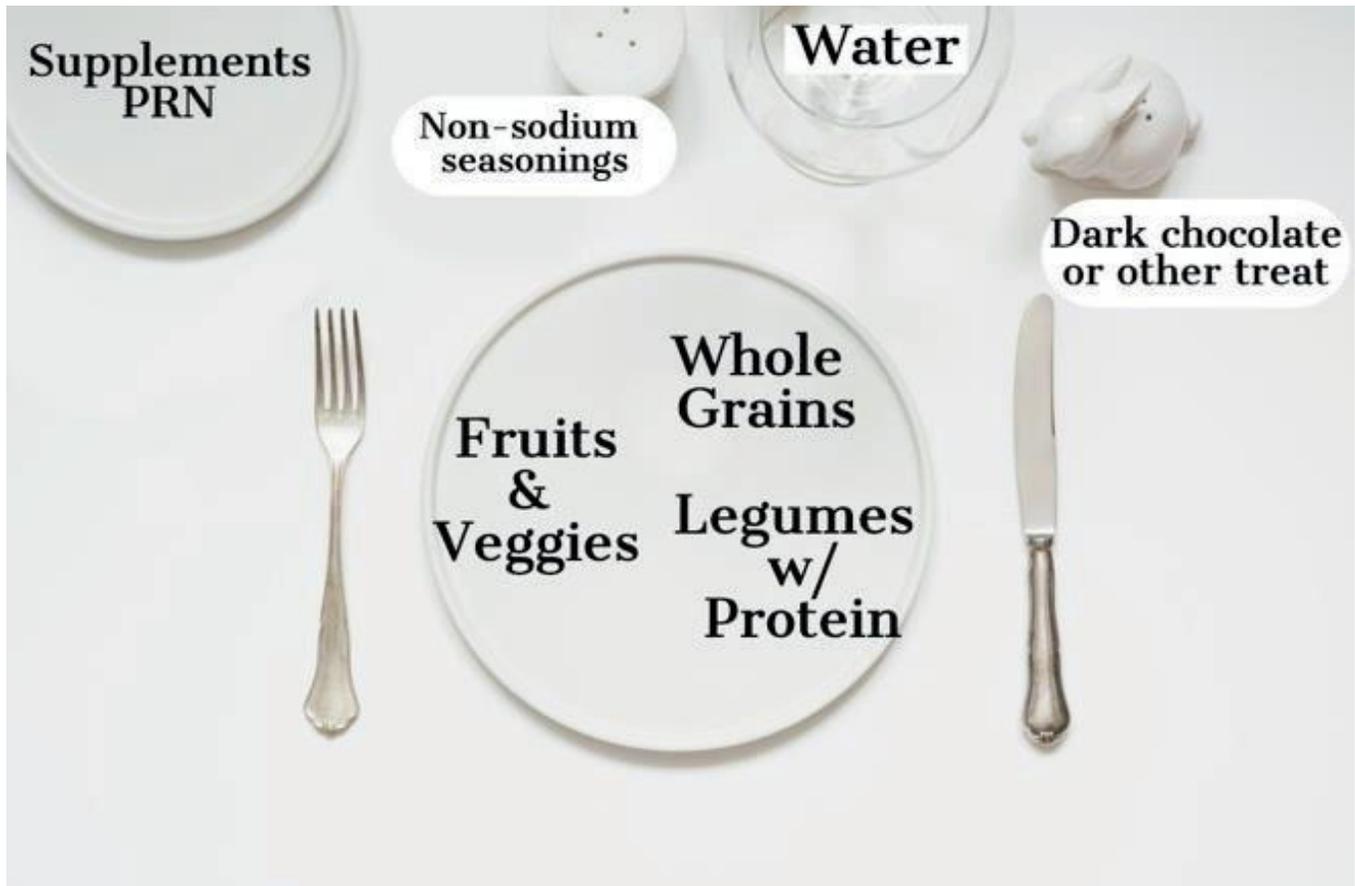


**8. HIGH-NUTRIENT DENSITY AND LOW-CALORIED DENSITY FOODS:** If the other guidelines are followed, the majority of foods consumed will be high-nutrient density and low-calorie density. To enhance nutrient density and minimize toxins, organic foods are recommended. In theory, little to no processed foods (e.g., movie style popcorn) or refined foods (e.g., white pasta) will be consumed. However, a low percentage of people are willing to restrict themselves to a 100% WFPBD and this is recognized. For example, many people want to indulge on cake and ice cream on their birthday! (But, if a diabetic, only diabetic friendly cake and ice cream!)

**9. FORTIFIED FOODS AND/OR SUPPLEMENTS:** To ensure adequate intake of calcium, iron, vitamin B12, and vitamin D, it is required to incorporate fortified ‘substitute milks,’ such as fortified soy or almond milk, and/or supplements.

**10. WFPBD DERIVATIVES:** For a derivative of the WFPBD that is designed for fat loss, refer to ‘Chapter 6: Obesity, Section 6: Weight/Fat Loss Diets.’ Although not condoned by vegans, there are also WFPB derivatives that include animal foods: (1) Lacto-WFPBD, (2) Ovo-WFPBD, (3) Lacto-ovo-WFPBD, (4) Pesco-WFPBD, etc. The emphasis of these diets is the whole-food, plant-based foundation, but they permit foods that add key nutrients, such as calcium, iron, vitamin B12, and vitamin D. To follow one of these derivatives, care and expense should be taken so the animals supplying the foods are treated humanely. For example, consuming cow’s milk only from pasture-raised cows and eggs only from free-range chickens.

A WFPBD plate setting provides a simple visualization of the guidelines discussed.



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*Disclaimer: Before starting any nutritional diet, a person - particularly if s/he has a chronic disease – is advised to consult with his or her physician.*

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