Zone Diet - Scientific evidences

On important international scientific journals the results of much research on various aspects of a balanced food strategy with special reference to the glycemic index and the glycemic load, intake of proteins and omega-3 fatty acids, different pathologies (diabetes , cardiovascular) were published. Other studies have compared the effects of two different types of nutrition: the traditional (with 55-65% of calories from carbohydrates, 15-17% from protein and the remainder from fat) and similar to the Zone Diet (about 40% from carbohydrates, about 30% from protein and 30% from fat).
From these publications, research shows that the Zone diet reduces blood levels of triglycerides, C-reactive protein, homocysteine, systolic and diastolic blood pressure and, for diabetics, blood glucose and glycated hemoglobin. If the Zone diet is used to reduce overweight, it is very effective because, for the same calories, it felt to a lesser extent the appetite and it causes less lowering of basal metabolism.

1 - Ebbeling C.B., Swain J.F., Feldman H.A., Wong W.W., Hachey D.L., Garcia-Lago E., Ludwig D.S.
Effects of Dietary Composition on Energy Expenditure During Weight-Loss Maintenance
JAMA. 2012;307(24):2627-2634
According to the study published on JAMA by Cara Ebbeling and David Ludwig – Children's Hospital in Boston - diets that reduce the surge in blood sugar after a meal--either low-glycemic index or very-low carbohydrate–may be preferable to a low-fat diet for those trying to achieve lasting weight loss. Furthermore, the study finds that the low-glycemic index diet had similar metabolic benefits to the very low-carb diet without negative effects of stress and inflammation as seen by participants consuming the very low-carb diet.
The study suggests that a low-glycemic load diet is more effective than conventional approaches at burning calories (and keeping energy expenditure) at a higher rate after weight loss. Researchers have found that, contrary to nutritional dogma, all calories are not created equal, whatever the food used. In fact, some foods stimulate energetic metabolism more than others. Among these make a significant contribution not only foods rich in protein, but also rich in fiber (lots of vegetables, fruits, legumes and some grains such as oats, barley and rye) that among other things, increase the action of leptin, a hormone that helps control hunger and increase the basal metabolic rate.

2 - Gögebak Ö., Kohl A., Osterhoff M.A., van Baak M.A., Jebb S.A., Papadaki A., Martinez J.A., Handjieva-Darlenska T., Hlavaty P., Weickert M.O., Holst C., Saris W.H.M., Astrup A., Pfeiffer A.F.H.
Effects of Weight Loss and Long-Term Weight Maintenance With Diets Varying in Protein and Glycemic Index on Cardiovascular Risk Factors - The Diet, Obesity, and Genes (DiOGenes) Study: A Randomized, Controlled Trial
Circulation. 2011;124:2829-2838
DiOGenes is a pan-European (Maastrict, Copenhagen, Cambridge, Heraklion, Potsdam, Pamplona, Sofia, Prague)controlled dietary intervention study in 932 overweight adults who first lost body

weight on an 8-week low-calorie diet and were then randomized to 1 of 5 ad libitum diets for 26 weeks. This large-scale intervention study clearly separates weight loss from dietary composition–related effects. Low-glycemic-index carbohydrates and, to a lesser extent, low-protein intake may specifically reduce low-grade inflammation and associated comorbidities in overweight/obese adults.

3 - Navas-Carretero S., Abete I., Zulet M.A., Martínez J.A.

Chronologically scheduled snacking with high-protein products within the habitual diet in type-2 diabetes patients leads to a fat mass loss: a longitudinal study

Nutrition Journal 2011 10:74

Low glycemic load foods and diets and moderately high protein intake (carbohydrate, protein, fat caloric ratio 40-30-30) have been shown to reduce body weight and fat mass, exerting also beneficial effects on LDL-cholesterol, triglyceride concentrations, postprandial glucose curve and HDL-cholesterol levels.

The study showed also the potential functionality of a series of low glycemic index products with moderately high protein content, as possible coadjuvants in the control of type-2 diabetes and weight management following a chronologically planned snacking offer (morning and afternoon).

4 – Lavecchia T., Petroni P., Rodio G., Pina R.

A Nutritional Strategy for Reducing Disease and Obesity Risks.

Adv Exp Med Biol. 698: 68-73 2011

Overweight and obesity are the most common nutritional disorders in our age and are becoming more and more common worldwide. The most harmful consequences of an incorrect diet leading to overweight or obesity are a series of cardio-vascular diseases often leading to disability and death. In recent years various studies have shown that a reduction in caloric intake is the main factor involved in reduction of pathology risk. In this article, a nutrition strategy, based on the Zone diet by US biochemist Dr. Barry Sears is proposed. It underlines the importance of choosing certain types of foods over others, their beneficial physiological effects on the human body and how they can reduce the risk of heart disease and cancer.

5 - Sears B., Ricordi C.

Anti-Inflammatory Nutrition as a Pharmacological Approach to Treat Obesity

Journal of Obesity Volume 2011, Article ID 431985

The ultimate treatment of obesity lies in re-establishing hormonal and genetic balance that generates satiety instead of constant hunger. This can be achieved by reducing silent inflammation induced by the diet. Anti-inflammatory nutrition should be considered as a form of gene silencing technology, in particular the silencing of the genes involved in the generation of silent inflammation. Such a proposed anti-inflammatory diet would consist of about 1,500 calories per day (about 50 grams of monounsaturated fat, 100 grams of low-fat protein, and 150 grams of low glycemic load carbohydrates per day). On a calorie basis, that is about 30% of the calories as fat, 30% as protein, and 40% as carbohydrates. These are the dietary recommendations made also by the Joslin Diabetes Research Center at Harvard Medical School for the treatment of obesity, metabolic syndrome, and diabetes. To this anti-inflammatory diet foundation should be added supplemental omega-3 fatty acids at the level of 2-3 grams of EPA and DHA per day either by an increased consumption of fatty fish or supplementation with fish oil supplements rich in EPA.

Finally, a diet rich in colorful, nonstarchy vegetables also would contribute adequate amounts of polyphenols to help not only to inhibit NF-κB (primary molecular target of inflammation), but also activate AMP kinase.

6 - Zulet M.A., Bondia-Pons I., Abete I., de la Iglesia R., López-Legarrea P., Forga L., Navas-Carretero S., Martínez J.A.

The reduction of the metabolyc syndrome in Navarra-Spain (RESMENA-S) study; a multidisciplinary strategy based on chrononutrition and nutritional education, together with dietetic and psychological control

Nutr Hosp. 2011;26:16-26

A study by the University of Navarra underlined the effectiveness of healthy lifestyle and balanced diet 40-30-30 to combat obesity, metabolic syndrome and associated complications. The study RESMENA-S aims to improve clinical criteria and biomarkers associated with MS though an integral therapy approach. The study is a randomized prospective parallel design in which is expected to participate a total of 100 individuals. The RESMENA-S group is a personalized weight loss (30% energy restriction) diet, with a macronutrient distribution (carbohydrate / fat / protein) of 40/30/30, high meal frequency (7 / day), low glycemic index/load and high antioxidant capacity as well as a high adherence to the Mediterranean diet. The control group is assigned to a diet with the same energy restriction and based on the American Heart Association pattern. Intervention trials to promote the adoption of dietary patterns and healthy lifestyle are of great importance to identify the outcomes and nutritional mechanisms that might explain the link between obesity, metabolic syndrome and associated complications.

7 - Larsen T.M., Dalskov S.M., van Baak M., Jebb S.A., Papadaki A., Pfeiffer A.F.H., Martinez J.A, Handjieva-Darlenska T., Kunešová M., Pihlsgård M., Stender S., Holst C., Saris W.H.M., Astrup A. for the **Diet, Obesity and Genes (Diogenes) Project**.

Diets with High or Low Protein Content and Glycemic Index for Weight-Loss Maintenance

New England Journal of Medicine, published online – 25 nov. 2010

A study called as “Diogenes Project“ (from Diet, Obesity and Genes), made by University of Copenhagen together with eight research centers in Europe, involving almost a thousand families, has confirmed the effectiveness on a weight loss diet based on the assumption of vegetables, fruits, lean meats, fish and a reduced intake of carbohydrates.

Proper nutrition is based on lean meats, dairy products (of course, the choice goes to leaner products), eggs, fish, legumes, most fruits (attention only to bananas, grapes, figs and persimmons), plenty of vegetables (limit carrots, beets, pumpkins, corn) and dried fruit, like walnuts, almonds and hazelnuts. Great excluding refined carbohydrates instead of the whole versions.

As the researchers say, the positive result of the project lies in the ability of protein sources to give a greater sense of satiety, without forgetting the so-called "right feeling" essential to undertake physical activity.

8 - Jönsson T., Granfeldt Y., Erlanson-Albertsson C., Ahrén B., Lindberg S.

A paleolithic diet is more satiating per calorie than a mediterranean-like diet in individuals with ischemic heart disease

Nutrition & Metabolism 2010, 7:85

A study of a team of the University of Lund found marked improvement of glucose tolerance and lower dietary energy intake in ischemic heart disease (IHD) patients after advice to follow a Paleolithic diet, as compared to a Mediterranean-like diet. Twenty-nine male IHD patients with impaired glucose tolerance or diabetes type 2 were randomized to *ad libitum* consumption of a Paleolithic diet based on lean meat, fish, fruit, vegetables, root vegetables, eggs, and nuts, or a Mediterranean-like diet based on whole grains, low-fat dairy products, vegetables, fruit, fish, and oils and margarines during 12 weeks. In parallel with a four day weighed food record the participants recorded their subjective rating of satiety. The Paleolithic group were as satiated as the Mediterranean group but consumed less energy per day. The study also found that a lower energy intake did not affect the satiating power, that the Paleolithic diet is due to the presence of macro-nutrients, according to a proportion of calories from carbohydrates, protein and fat, respectively, close to 40%, 30% and 30 %, and fiber content.

9 - Abete I., Astrup A., Martínez J.A., Thorsdottir I, Zulet M.A

Obesity and the metabolic syndrome: role of different dietary macronutrient distribution patterns and specific nutritional components on weight loss and maintenance

Nutrition Reviews Vol. 68(4):214–231, 2010

The article reviews the scientific evidence for the effects of several dietary manipulations and sustainable strategies for weight loss and body weight stability as well as for treating specific features of the metabolic syndrome.

Thus, a currently available diet may be one that has a moderate protein content (30%), high monounsaturated and omega-3 FAs, low-GI carbohydrates (40%), and includes adequate quantities of fiber, isoflavones, calcium, and antioxidant minerals.

Since adherence to healthy dietary patterns can be difficult, meal replacement and dietary supplements should be considered as effective strategies for weight loss, weight maintenance, and treatment of Metabolic Syndrome. Several factors such as genetics, physical activity, psychopathological conditions, obesity type, gender, age, or yo-yo cycles may influence the outcome of any dietary intervention.

10 - Sears B.

The role of the adipose tissue in inflammation

Second Congress "Science in Nutrition" - Rome 2010 - Proceedings

There is only one organ in the body that can safely store excess fatty acids. This is the adipose tissue and this is why it holds a central role in the inflammatory process. As long as the fat cells of the adipose tissue are healthy, they can store any excess fatty acids (including arachidonic acid) in long-term storage. As the largest organ in the body, the adipose tissue is also the largest storage site for arachidonic acid. As long as the levels of arachidonic acid in the fat cells remain low the adipose tissue functions normally. However, as the levels of arachidonic acid begin to accumulate in the adipose tissue, the fat cells become compromised due to increasing inflammation. They are no longer able to sequester circulating fat (including arachidonic acid) as effectively and as result the lipotoxicity begins to develop in other organs such as the muscle, liver, and pancreas. Eventually, if the fat cells become too inflamed, they die causing massive macrophage infiltration

into the adipose tissue. With this macrophage infiltration comes increased production of inflammatory mediators that accelerate the spread of silent inflammation.
To overcome the silent inflammation induced by the Perfect Nutritional Storm requires an anti-inflammatory diet (with omega-3 and polyphenols). The most important aspect of such an anti-inflammatory diet is the stabilization of insulin and reduction of intake of omega-6 fatty acids.
Understanding the impact of an anti-inflammatory diet on silent inflammation begins to elevate diet from simply a source of calories to being on the cutting-edge of gene-silencing technology.

11 - Gardner C.D., Kim S., Bersamin A., Dopler-Nelson M., Otten J., Oelrich B.

Micronutrient quality of weight-loss diets that focus on macronutrients: results from the A TO Z study.

American Journal Clinical Nutrition – 23 giugno 2010.

The A TO Z study by professor Chistopher Gardner team of Stanford University to evaluate the micronutrients intake in weight-loss diets, compared 4 popular diets different in macronutrients distribution on obese and overweight women aged 25-50 years, randomly assigned to 4 groups : the Atkins (n = 73), Zone (n = 73), LEARN (Lifestyle, Exercise, Attitudes, Relationships, Nutrition) (n = 73), and Ornish (n = 72). After 8 weeks significant differences were observed between groups for all macronutrients and for many micronutrients. Energy intake decreased 500 kcal from baseline in all 4 groups. Weight-loss diets that focus on macronutrient composition should attend to the overall quality of the diet, including the adequacy of micronutrient intakes. Compared the other diets, the Zone diet, characterized by a moderate but not extreme reduction in carbohydrate - particularly through a reduction in refined carbohydrate - a low nutrient density and moderately increased protein intake provided the most optimal micronutrient levels during energy restriction.

12 – Sears B.

Anti-Inflammatory Diets for Obesity and Diabetes

J Am Coll Nutr. Vol. 28 n° 4 – 482S-491S 2009

Obesity and type 2 diabetes are strongly associated with increased inflammation. As the inflammation in adipose tissue increases, this becomes a strong driving force for the development of increased systemic inflammation that results in metabolic syndrome, eventually followed by the development of overt type 2 diabetes. The potential reversal of both conditions can be achieved by reducing the levels of inflammation through the use of an anti-inflammatory diet (based on a balanced intake of carbohydrates, proteins, fats and consequently on hormones, like insulin, which stimulate the increase of “bad” eicosanoids).

13 - Layman DK, Evans EM, Erickson D, Seyler J, Weber J, Bagshaw D, Griel A, Psota T, Kris-Etherton P

A Moderate-Protein Diet Produces Sustained Weight Loss and Long-Term Changes in Body Composition and Blood Lipids in Obese Adults

J. Nutr. 139: 514–521, 2009.

The study compared changes in body weight and composition and blood lipids after short-term weight loss (4 mo) followed by weight maintenance (8 mo) using moderate intake of protein diet (PRO), like Zone Diet or conventional high-carbohydrate diet (CHO), like USDA pyramid.
Participants (n 130) were randomized to 2 energy-restricted diets. At 12 mo, the PRO group had more participants complete the study with greater improvement in body composition. Using a

compliance criterion of participants attaining 10% weight loss, the PRO group had more participants lose more weight and FM than the CHO group. The CHO diet reduced serum cholesterol and LDL cholesterol compared with PRO (P,0.01) at 4 mo, but the effect did not remain at 12 mo. PRO had sustained favorable effects on serum triacylglycerol (TAG), HDL cholesterol (HDL-C), and TAG:HDL-C compared with CHO at 4 and 12 mo (P , 0.01). The PRO diet was more effective for FM loss and body composition improvement during initial weight loss and long-term maintenance and produced sustained reductions in TAG and increases in HDL-C compared with the CHO diet. The Zone Diet has proved once again the most effective against a diet low in fat and high intake of carbohydrates, which is not able to maintain over time the weight loss achieved during the initial phase.

14 - Pina R.

Anti-inflammatory diet : the Zone and PUFA omega-3 in sport

International Zone Pre-Conference Proceedings – Cancun 2008

Nutrition in sports plays an essential role. Diets must be balanced, proportional to athletes' caloric requirements and provide the appropriate amount of energy and of supplements (vitamins, minerals and omega-3). Athletic performance can be affected by several neuro-psychological factors (study by Department of Physiology of University of Siena). Among them special importance is attached to ability to stay focused, ability to maintain and diversify attention, control of execution of motor gestures, reactivity, speed of movement. These functions are in turn affected by mood and the ability to control emotion. These factors are associated with the activation of specific areas of the central nervous system and complex interaction between them.

15 - Ebbeling CB

Role of the Glycemic Index in Anti-inflammatory Diets

Second International Zone Conference Proceedings – Cancun – nov. 2008

Traditionally, carbohydrates have been classified as simple or complex based on chemical structure. The glycemic index is an alternative system for classifying carbohydrate-containing foods according to postprandial glycemia in response to food portions containing a standard amount (50 grams) of available carbohydrate. Thus, glycemic index provides a measure of carbohydrate quality. Values for glycemic load (i.e., product of glycemic index and carbohydrate amount) are used to describe how food portions differing in not only quality but also quantity of carbohydrate affect postprandial blood glucose responses. Plausible physiological mechanisms have been proposed to link dietary glycemic index and glycemic load with inflammation, as depicted in the slide presentation. Based on available data, choosing carbohydrate source and amount to reduce glycemic index and glycemic load is a promising strategy for controlling body weight and inflammation.

16 - Halton TL, Liu S, Manson JE, HuFB

Low-carbohydrate-diet score and risk of type 2 diabetes in women

American Journal Clinical Nutrition 2008; 87: 339-346

The research by Halton, Liu and Manson has a major scientific validity, as carried out on a huge number of people, more than 85,000, who were part of the Nurses' Health Study.

The purpose of the study was to examine the association between low-carbohydrate-diet score (based on percentage of energy as carbohydrate, fat, and protein) and risk of type 2 diabetes.
These data suggest that diets lower in carbohydrate and higher in fat and protein do not increase the risk of type2 diabetes. In fact, diets rich in vegetable sources of fat and protein may modestly reduce the risk of diabetes. Research data confirm the potential benefit in reducing the glycemic load, replacing refined high glycemic index carbohydrates with vegetables, fruits, whole grains (which have a low glycemic index) and sources of favorable fats and proteins.

17 - Johnston CS, Tjonn SJ, Swan PD, White A, Hutchins H, Sears B

Ketogenic low-carbohydrate diets have no metabolic advantage over nonketogenic low-carbohydrate diets

American J Clinical Nutrition 2006;83:1055– 61

Both dietary strategies effectively reduce body weight and insulin resistance, while the non-ketogenic low-carbohydrate diet was associated with favorable feelings of energy and an optimal mood profile.

18 - Gannon MC and Nuttall FQ.

Control of blood glucose in type 2 diabetes without weight loss by modification of diet composition.

Nutr Metab (Lond) 2006 3: 16

This study demonstrated without any weight loss a Zone Diet was better able to control blood sugar levels in type 2 diabetics than the recommended diabetic diet.. The researchers tested the efficacy of diets with various protein:carbohydrate:fat ratios for 5 weeks on blood glucose control in people with untreated type 2 diabetes. The results were compared to those obtained in the same subjects after 5 weeks on a control diet with a protein:carbohydrate:fat ratio of 15:55:30. A 30:40:30 ratio diet resulted in a moderate but significant decrease in 24-hour integrated glucose area and % total glycohemoglobin (%tGHb).

19 – Noakes M, Keogh JB, Foster PR, Clifton PM

Effect of an energy-restricted, high-protein, low-fat diet relative to a conventional high-carbohydrate, low-fat diet on weight loss, body composition, nutritional status, and markers of cardiovascular health in obese women

Am J Clin Nutr 2005;81:1298 –306.

Weight loss is similar for the two diets, but the results of the analysis and loss of body fat is more evident in the low-carbohydrate diet.

20 - Fontani G, Corradeschi F, Felici A, Alfatti F, Bagarini R, Fiaschi AI, Cerretani D, Montorfano G, Rizzo AM e Berra B.

Blood profile, body fat and mood state in healthy subjects on different diets supplemented with omega-3 plyunsaturated fatty acids.

European Journal of Clinical Investigation, 2005 n. 35, pagg. 499-507

The Zone Diet, in relation to that similar to the Mediterranean diet (55% of calories as carbohydrate, 15% as protein and 30% as fat), has a more slimming effect. It also reduces the rates of blood triglycerides, homocysteine and fasting insulin.

21 – Pereira MA, Swain J, Goldfine AB, Rifai N, Ludwig DS

Effects of a low-glycemic load diet on resting energy expenditure and heart disease risk factors during weight loss.

JAMA, 2004 vol. 292, n. 20, 24 novembre

In people who follow the diet similar to the Zone, insulin resistance is lower, the values of blood triglycerides and C-reactive protein are lower, as well as systolic and diastolic pressure. The slimming effect: it is known that diets usually after a period of time since their beginning, manifest two effects that hinder the further loss of body fat: a side effect of increasing appetite (which tends to increase "input"), on the other hand, the significant reduction of "basal metabolism" (which tends to reduce "output"). The diet similar to the Zone, with a low glycemic load, proved to be more favorable from both points of view, than with equal calories but derived from carbohydrates for 65%, from protein for 17% and from fat for 18%.

22 - Gannon MC, Nuttal FQ, Saeed A, Jordan K, Hoover H

An increase in dietary protein improves the blood glucose response in persons with type 2 diabetes.

American Journal of Clinical Nutrition, 2003 n. 78, pagg. 734-741

With the zone diet blood sugar levels are significantly lower glycated hemoglobin was significantly lower and the same happens with triglycerides.

23 - Nuttal FQ, Gannon MC, Saeed A, Jordan K, Hoover H

The metabolic response of subjects with type 2 diabetes to a high-protein, weight-maintenance diet.

Journal of Clinical Endocrinology & Metabolism, 2003 n. 88 (8), pagg. 3577-3583

The research, and to demonstrate that the 40-30-30 diet does not cause changes in calcium excretion in the urine, also shows that there is an increase in fasting blood levels of GH and IGF-1, hormones that have an anabolic effect in athletes and may help increase their muscle mass at equal strength training.

JOSLIN DIABETES CENTER OF HARVARD MEDICAL SCHOOL – BOSTON
NUTRITION GUIDELINE FOR PEOPLE WITH TYPE 2 DIABETES

The "Joslin Diabetes Center Clinical Nutrition Guideline for Overweight and Obese People with Type 2 Diabetes, Prediabetes or at High Risk for Developing Type 2 Diabetes" is consistent with Joslin's care strategy, which emphasizes a personalized approach to diabetes management.
This Joslin guideline, which evolved from a review of the scientific literature, details the following for the major nutrients that provide calories:

Carbohydrate: approximately 40 percent of a person's daily calories should come from carbohydrate; the total should not be less than 130 gm daily. This is a significant change from previous recommendations that promoted a higher carbohydrate intake. Scientific data show that reducing one's carbohydrate intake while simultaneously increasing healthier protein and fat choices may be a better approach to weight control. It may also help decrease cardiovascular disease in overweight people with type 2 diabetes.

- In terms of carbohydrate intake, eating fresh vegetables, fruits, beans, and whole grain foods is preferable to eating pasta, white bread, white potatoes and low fiber cereal.
- Fiber intake should be approximately 50 grams daily if that amount can be tolerated; a minimum of 20-35 grams per day is recommended. High-fiber foods include fruits, vegetables, whole grain cereals, breads, nuts and seeds.

Protein: approximately 20 to 30 percent of a person's total calories should come from protein. This is a higher percentage than recommended in the past. Scientific data reveal that eating more protein helps people feel "full" and thus causes people to eat less calories overall. Protein also helps to maintain lean body mass during weight loss. Examples of protein include fish, skinless chicken or turkey, nonfat or lowfat dairy products and legumes such as kidney beans, black beans, chick peas and lentils.

- Anyone with signs of kidney disease should consult their provider before increasing the daily amount of protein.

Fat: approximately 30 to 35 percent of a person's daily calories should come from fat.

- Mono- and polyunsaturated fats, such as olive oil, canola oil, nuts, seeds and fish (especially those high in omega-3 fatty acids, such as salmon, mackerel, lake trout, herring and sardines)
- Foods that are high in saturated fat, such as beef, pork, lamb and high-fat dairy products (cream cheese, whole milk) should be eaten in small amounts.
- Foods that are high in trans fats such as fast foods, commercially baked goods, crackers, cookies and some margarines should be avoided.

- Cholesterol intake should be less than 300 mg daily; or less than 200 mg in people with an LDL ("bad") cholesterol that is more than 100 mg/dL.

Guidelines for Physical Activity: physical activity is extremely important to a weight loss plan. A minimum of 150 to 175 minutes of moderate intensity physical activity is recommended. Examples of this include walking, biking, swimming and dancing. A target of 60 to 90 minutes most days of the week is encouraged. Physical activity should be a mix of cardiovascular, stretching and resistance activities to maintain or increase lean body mass.

RELATED REFERENCES

Campbell A.
Tackling "diabesity" head-on. Joslin Diabetes Center's new nutrition guideline.
Diabetes Self Manag. 2005 Nov-Dec;22(6):40, 42-4.

Gannon MC and Nuttall FQ.
Control of blood glucose in type 2 diabetes without weight loss by modification of diet composition.
Nutr Metab (Lond) 2006 3: 16

Gannon MC, Nuttall FQ, Saeed A, Jordan K, and Hoover H.
An increase in dietary protein improves the blood glucose response in persons with type 2 diabetes.
Am J Clin Nutr 2003 78: 734-741

Giusti J., Rizzotto J.A.
Interpreting the Joslin Diabetes Center and Joslin Clinic Clinical Nutrition Guideline for Overweight and Obese Adults With Type 2 Diabetes.
Curr Diab Rep. 2006 Nov;6(5):405-8.

Hamdy O and Carver C.
The Why WAIT program: improving clinical outcomes through weight management in type 2 diabetes.
Curr Diab Rep 2008 8: 413-420

Layman DK, Shiue H, Sather C, Erickson DJ, and Baum J.
Increased dietary protein modifies glucose and insulin homeostasis in adult women during weight loss.
J Nutr 2003 133: 405-410

Markovic TP, Campbell LV, Balasubramanian S, Jenkins AB, Fleury AC, Simons LA, and Chisholm DJ.
Beneficial effect on average lipid levels from energy restriction and fat loss in obese individuals with or without type 2 diabetes.
Diabetes Care 1998 21: 695-700

Nuttall FQ, Gannon MC, Saeed A, Jordan K, and Hoover H.
The metabolic response of subjects with type 2 diabetes to a high-protein, weight-maintenance diet.
J Clin Endocrinol Metab 2003 88: 3577-3583

Russell KG, Rosenzweig J.
Improving outcomes for patients with diabetes using Joslin Diabetes Center's Registry and Risk Stratification system.
J Healthc Inf Manag. 2007 Spring;21(2):26-33