The Mediterranean diet is one the most healthy and well studied diets in the world.

Populations following this diet have been found to have lower rates of heart disease. More uniquely though, the Mediterranean diet has been proven in a randomized trial to be the cause of a reduction in death and heart attacks in patients that have had a prior heart attack.

And this is quite unusual. You might ask, "How many randomized dietary trials exist that show a significant reduction in total death rate?"

The answer: Only 4 exist, and 3 of these studies involve fish or fish oil intake. The only comprehensive dietary approach proven to reduce total death rate as well as decrease heart attacks is the Mediterranean diet which will be reviewed in this talk.

The information that supports the health benefits of a Mediterranean diet will be discussed first. This will be followed by a description of the foods that make up a Mediterranean diet.

The Mediterranean diet has been around for many years. This diet was first recognized as a healthy one by modern day researchers in a study called the Seven Countries Study which started in the late 1950s. This study followed over 11,000 men for 15 years in 15 separate populations. Five of these populations followed the Mediterranean diet. One of the major observations of the study was that the populations that followed the Mediterranean diet had lower rates of heart disease.

The people in Crete, which is a Greek island which is the cradle of Greek written language, follow a distinctive Mediterranean diet. The populations studied in Crete which followed this diet had the lowest rate of heart attack, cancer, and death of any of the 15 populations studied. This includes other locations that followed a somewhat different Mediterranean diet, as well as the two Japanese populations that were in the study.

Hence, the details of the Mediterranean diet followed by the people in Crete involved in this study are of particular interest, since the Cretan Mediterranean diet had the lowest rate of death and disease of all the diets studied, including the other variations of the Mediterranean diet.

There have since been multiple other studies showing health benefits associated with the Mediterranean diet. An observational study showed that
populations that move away from the Mediterranean diet, as time progresses, subsequently develop higher rates of heart disease and death\textsuperscript{16}.

However, observational studies don't prove that the dietary changes are the cause of the differences in health status. There are many different diets that have been analyzed using descriptive studies which compare populations with different dietary patterns. These studies can suggest a particular diet is beneficial, similar to the Seven Countries Study, but never actually prove that the differences in diet are truly the cause of the benefit.

The type of study that can prove that a diet is the cause of the benefit is study which randomizes the individual trial participant to a particular diet. The Mediterranean diet, as noted before, is supported by unique scientific evidence.

The Mediterranean diet is different in that a randomized trial has proven that the Mediterranean diet causes a reduction in total death rate and heart attack rate.

The Atkin's diet, South Beach diet, low fat diets and even the DASH diet are without this kind of data. No other comprehensive diet approach has proven this benefit. The Lyon Diet Heart Study is what proved that the Mediterranean diet was the cause of the benefit\textsuperscript{5,6}.

There were researchers (notably S. Renaud, M. de Logeril) at the time of this study that decided to focus on the Cretan Mediterranean diet because this diet is associated with very low rates of heart attack, death and cancer, even when compared to other Mediterranean diets.\textsuperscript{6} A randomized trial was devised to see if this diet could be shown to be the cause of the reduction in death and disease.

In this important randomized study, the researchers modeled changes in a Western diet after the dietary patterns found in the Cretan Mediterranean diet in the Seven Countries Study\textsuperscript{6}. A total of 605 patients having a recent heart attack were randomized to either a diet patterned after the Cretan Mediterranean diet or a diet similar to the typical prudent diet at the time. This randomized trial had a striking outcome. The degree of benefit in reduction in death and heart attacks with this Mediterranean diet was larger than what has been found in any other randomized diet trial\textsuperscript{5}. 
Here is a graph showing results from this study. The top line labeled the experimental diet represents the Mediterranean diet. The bottom line is the control diet. If there were no cardiac events or death occurring, there would be a perfectly straight line at the top representing 100% disease free survival with no cardiac death or heart attack occurring.

There was a major difference between the experimental diet which was the Mediterranean diet and the control diet. Death from all causes in this study was significantly reduced in the Mediterranean diet group by 60% and heart attacks were reduced by 70%.

Another important aspect of this landmark study is that it illustrates the value of a trial that affects the most important indicators of success—that is, a reduction in death rate and a reduction in serious illness such as heart attack. Though it is useful information when a trial shows that a particular diet results in improvement in cholesterol, blood pressure, or even imaging studies, this is not as reliable of information as when a randomized trial shows a difference in the death rate or major illness.

The trial we have just reviewed showed dramatic differences in the death rate and heart attack rates. But even though the Mediterranean diet reduced both death and heart attacks, there were not significant differences in cholesterol levels or blood pressure levels between the groups. And this included total cholesterol, as well as LDL and HDL cholesterol levels.

This is an example that shows the most reliable information on the health effects of a dietary intervention is the result of a randomized trial showing significant
differences in total death rate and disease rates. It is not that cholesterol information is not important, but rather that it does not always tell the full story.

Now, let's review what foods make up the Mediterranean diet. At this point, if you haven't already printed what is labeled as "Mediterranean Diet Handout", please pause this video and print this now. Having this sheet available while the talk proceeds will help considerably in being able to remember and use this information.

The Cretan Mediterranean diet as described in the 7 Countries Study had an abundance of fresh fruit and vegetables. There was a high intake of legumes which include beans, peas, and lentils. There was a very high intake of olive oil with 31% of the total calories coming from olive oil\textsuperscript{17}. The olive oil was cold pressed, virgin olive oil.

There was no intake of corn oil or similar oils\textsuperscript{16}. There was a high intake of whole grain bread which was often made from a combination of wheat and barley\textsuperscript{17}. Potatoes were a part of the Cretan diet, averaging 1 medium potato daily\textsuperscript{18,19}, but potatoes with butter, sour cream, or bacon bits are not part of the Cretan Mediterranean diet.

Carbohydrates comprised 49\% of the total calories and primarily complex carbohydrates\textsuperscript{16,17}. There was no significant intake of white bread, pastries, or deserts other than fruit\textsuperscript{16,17}. In the Cretan diet there was also a modest intake of red wine with an average intake of slightly more than 1 glass daily. Some men drank more, but a 1/5th of the men did not drink at all\textsuperscript{16}.

Plain yogurt was eaten in modest quantities at somewhat less than one cup per day\textsuperscript{17-18}. (235g of “a milk category”\textsuperscript{18} daily, but Cretan adults rarely drink plain milk, but rather eat yogurt instead\textsuperscript{17}. Hence: there was ingestion of approximately 235g of yogurt daily- approximately 1 cup.) Nuts, often as a snack, were popular throughout the year, but in small quantities, with 6-8 nuts being eaten at time\textsuperscript{17}. Animal products were not eaten in large quantities. The intake of fish averaged approximately ½ oz a day\textsuperscript{17}. Cheese intake also averaged 1/2 ounce per day\textsuperscript{17}. Meat intake totaled only an average of 1 oz. daily and approximately 3 eggs were eaten weekly\textsuperscript{16,17}. There was no significant intake of butter, cream, milk, or corn oil\textsuperscript{16}.

Most calories were from plant based sources. Approximately 90\% of the calories in the Cretan Mediterranean diet were from plant sources and 10\% were from animal sources.\textsuperscript{16}
The protein intake consisted of 11% of the total calories and primarily came from plant based sources of protein. (The people of Crete were a vigorous and active group, with no evidence of protein deficiency.) Compared to other Mediterranean diets, the Cretan Mediterranean diet consisted of more fruits and legumes meaning beans, peas and lentils, and considerably more olive oil than the other populations. On the other hand they took in less meat and animal products.

The researchers, when creating the Lyon Diet Heart Study, were aware of the very low rates of disease associated with the Cretan Mediterranean diet. They wanted to test a diet modeled after the Cretan Mediterranean diet in a randomized controlled trial.

The Cretan Mediterranean diet used in the trial was adjusted to make it more palatable to the study subjects who had all recently experienced a heart attack. In trying to duplicate the Cretan diet though, the researchers confronted a problem. It was impossible to impose olive oil in sufficient quantities as the only edible fat in populations unfamiliar with its taste. Populations not growing up with very high olive oil intake will simply not respond to being told to increase their olive oil intake to where it is nearly a third of their calories.

In order to increase the intake of the type of fat found in olive oil, canola oil, which is similar to olive oil in being high in monounsaturated fats, was used to create a canola oil margarine. In addition, canola oil also has a significant amount of plant based omega 3 fat. This allowed the study participants to duplicate the high blood levels of plant based omega 3 fat which have been found in the people of Crete. Hence, in the study, both olive oil and canola oil were used by patients in the Mediterranean diet group which increased the overall monounsaturated fat intake of the participants and provided a source of plant based omega 3 fats to the study participants as well.

Also, to increase palatability, study participants rather than simply being requested to decrease meat intake, were instructed that they could eat poultry. The goal of the researchers was to make changes in the diet of the participants in a fashion that they would adhere to as well as find palatable. To increase the use of monounsaturated fat, canola oil and olive oil were encouraged. And to increase compliance and satisfaction with the diet, poultry was allowed without restriction.

Now, in the mid portion of the sheet labeled Mediterranean Diet Handout you will see the heading labeled “the details of the diet modeled after the Cretan Mediterranean diet”. This describes the Mediterranean diet used in the Lyon Diet Heart Study which resulted in fewer deaths and heart attacks.
So how did the Lyon Diet Heart Study follow the dietary pattern of the Cretan Mediterranean diet? First, the group with the diet patterned after the Cretan Mediterranean diet was advised to eat more fruits and vegetables. More legumes, which include beans, peas, and lentils were recommended. The study participants actually ate 100% more legumes than the control group. More whole grain bread was advised as well.

As noted previously, less meat in regards to beef, lamb, and pork was suggested and replacing this with poultry was recommended. It was recommended that no delicatessen meat be eaten. Cheese was recommended as the only dairy product, with no butter, cream, or milk being recommended. The study participants ate 1 oz. of cheese daily.

In regards to fat intake for the Mediterranean diet group, olive oil and canola oil were to be used exclusively for cooking and salads, and a canola oil margarine was provided for other purposes. Fish intake was encouraged, but the average fish intake of approximately two ounces per day was not significantly different between the study and control groups. Alcohol intake in the study was the same for both the Mediterranean diet group and the control group averaging one glass of wine daily.

Though the total fat intake for the intervention Mediterranean diet was similar to the control diet, there were differences in the types of fat, which are listed at the bottom of your handout. Compared to the control group, the Mediterranean diet group ate less saturated fat - 30% less. Monounsaturated fat which comes from sources such as olive and canola oil was increased by 24%.

The ingestion of plant based omega-3 fat which is found in foods such as canola oil and walnuts in the study group and foods such as the salad green, purslane in Crete, was increased by 300% compared to the control group. And though the percentage increase in plant based omega-3 ingestion is high, the entire daily intake of plant based omega 3 fats taken in by the study group can be achieved by eating less than 1 ounce of walnuts daily.

The intake of n-6 polyunsaturated fat which is found in oils such as corn oil was decreased by 33% in the study group diet. There was a similar total fat, wine, and fish intake compared to the control group. Because the Lyon Diet Heart Study was a randomized controlled trial, the difference in the diet can be said to be the cause of the improved outcomes. This means the 60% reduction in death rate and the 70% reduction in heart attack rate were caused by the differences in diet.

It is not possible though, to say what parts of the Mediterranean diet led to the improved outcome. The Mediterranean diet consists of a set of multiple foods and dietary changes.
A single isolated dietary component of this diet might have substantially different effects. The Mediterranean diet has been proven as a comprehensive diet approach to reduce death and heart attacks.

To summarize, the Cretan Mediterranean diet consists of:

1. Very high intake of fruits and vegetables.
2. Regular and frequent intake of legumes: beans, peas, lentils.
3. High intake of virgin, cold pressed olive oil, a monounsaturated fat. Canola oil was encouraged in the randomized trial to increase monounsaturated fat intake and achieve plant based omega 3 blood levels similar to what has been found in Crete.
4. Whole grain breads.
5. Very low intake of white bread, pastries, and deserts other than fruit.
6. Low intake of meat of beef, pork, and lamb. No delicatessen meat. Poultry intake was without restriction in the randomized trial.
7. Low intake of saturated fat.
8. Cheese intake of ½-1 oz per day and plain yogurt up to 1 cup/day. Otherwise, no dairy products including: no cream, no butter and no plain milk. No corn oil.
9. Fish intake was encouraged in the randomized trial.
10. Red wine, averaging 1 glass daily.
11. Nuts- with an intake of 6-8 nuts per serving
12. Low overall intake of animal products.

And the Mediterranean diet is the only comprehensive diet proven by a randomized trial to decrease death and heart attacks, making it particularly pertinent for those at risk for heart disease.

Of note, there is a link on this web site which provides the scientific references for this talk on the Mediterranean diet if you have an interest. There is also a link providing more formal nomenclature for dietary fats as well as other information related to the Mediterranean diet.
And, in regards to making any major changes in your diet, particularly with respect to alcohol intake, it is strongly recommended that this be discussed with your personal physician prior to making any change.

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NutritionHeart.com        E. Roehm, M.D.       2011

References for Mediterranean diet talk:


19. USDA SR22 p1583
P1583 defines as a common measure: 1 medium potato: 213g; (p1397 -same definition)


21. Plant based alpha linolenic acid in Lyon Heart study6 vs. 1 oz of walnuts:
Lyon Diet Heart Study: 1941 average calories per day with 0.83% from alpha linolenic acid (which is plant based omega-3 fat) .......... \[1941 \times .0083 = 16.1\] calories. Given that there are 9 calories in a gram of fat, 16.1 calories is equivalent to 1.8g of alpha linolenic acid.

Walnuts 1oz = 185 calories contains 2.5g of alpha linolenic acid. If 1 oz of walnuts has 2.5g, then it only takes less than an ounce to equal the 1.8g of alpha linolenic acid intake of the Lyon Diet Heart Study. Or more precisely: \[1.8/2.5 = 0.72\] oz which is about \(\frac{3}{4}\) of an ounce.