

Spaan JA, Cornelissen AJ, Chan C, Dankelman J, Yin FC. Dynamics of flow, resistance, and intramural vascular volume in canine coronary circu-


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What to 'eat and chew' in acute myocardial infarction?

We are very much impressed with the most interesting work of Espisito and Giugliano as well as the concerned editorial by Vogel in the same issue of the journal. Although both the groups are the best in the field, none has given any advice regarding the diet for acute myocardial infarction (AMI). Most cardiologists and dieticians continue to prescribe refined starchy bread, biscuits, butter, cakes to these patients without bothering about the adverse effects of such foods. There is no guideline for dietary intakes for AMI patients from any of the health agency, in both sides of the Atlantic. A recent study, among 54 patients of AMI, showed that the intake of large meals and large breakfast >1000 cal especially rich in trans fatty acids (TFA) was significantly associated with AMI when compared with control subjects. Those consuming large meals (fat and refined carbohydrates), showed significantly greater levels of tumour necrosis factor-alpha (TNF-α) and interleukin-6 (IL-6) when compared with subjects taking small breakfast. These proinflammatory markers are the risk factors of re-infarction and cardiac mortality among these patients. AMI is associated with endothelial dysfunction and tachycardia, characterized with hyperglycaemia, hyperinsulinaemia, hypertriglyceridaemia, free radical stress, rise in proinflammatory cytokines, and free fatty acids and which are predisposing factors for disruption of atheroma plaques, known to result in re-infarction and death. There appears to be an acute generation of a proinflammatory milieu, in patients with AMI, which in turn may become worst due to increased consumption of proinflammatory foods, resulting in endothelial dysfunction and greater incidence of complications and deaths.

Although consumption of fruits, vegetables, and nuts was protective against the risk of myocardial infarction, increased consumption of proinflammatory macronutrients such as w-6 fatty acids, TFA, saturated fatty acids (SFA), as well as refined carbohydrates may produce oxidative stress, free fatty acids, and proinflammatory substances such as TNF-α, IL-6, IL-18, and adhesion molecules like VCAM-1 (vascular cell adhesion molecule-1) and ICAM-1, which results in endothelial dysfunction. Glucose ingestion in normal subjects is associated with increased superoxide generation in leukocytes and mononuclear cells, as well as with raised amount and activity of nuclear factor-κB (NF-κB), a transcriptional factor regulating the activity of at least 125 genes, most of which are proinflammatory. Increased consumption of refined carbohydrates also causes an increase in two other proinflammatory transcription factor, activating protein-1 (AP-1) and Egr-1, the first regulating the transcription of matrix metallo-proteinases and the second modulating the transcription of tissue factor and plasminogen activator inhibitor-1. A high-fat meal may also increase the circulating levels of IL-18, a proinflammatory cytokine supposed to be involved in plaque destabilization associated with the simultaneous decrease of circulating adiponectin, an adipocyte-derived protein with insulin sensitizing, anti-inflammatory, and anti-atherogenic properties.

Further proof for the Columbus paradigm has been provided in more recent studies on the effect of meals on risk factors of atherothrombosis. Consumption of a high-fat meal together with vegetable foods rich in natural antioxidants largely prevent the negative effects on endothelial function. In particular, endothelial dysfunction acutely triggered by the consumption of a high-fat meal rich in SFA is reduced by the simultaneous consumption of a vegetable serving including pepper (100 g), tomatoes (100 g), and carrots (200 g). Intervention trials, using the whole diet approach so far produced are also in line with this epidemiological evidence. In the Lyon Diet Heart Study, 605 patients who had a myocardial infarction were randomly assigned to a 'Mediterranean-style' diet or a control low-fat diet. The intervention diet supplied 30% of energy from fats and <10% of energy from SFA, whereas the intake of 18:3 (n-3) (∆-linolenic acid) provided >0.6% of energy. After a mean follow-up of 27 months, the risk of new AMI and episodes of unstable angina as well as total mortality were reduced by ~70% by the Mediterranean diet. Singh et al. tested an 'Indo-Mediterranean diet' in 1000 patients in India, with existing coronary disease or at high risk for coronary disease. When compared with the control diet, the intervention diet characterized by increased intake of mustard or soyabean oil, nuts (walnuts, almonds), vegetables, fruits, and whole grains reduced the rate of fatal myocardial infarction by one-third and the rate of sudden death from cardiac causes by two-thirds. The aim of the Indian experiment was to determine the effects of a diet rich in w-3 fatty acids, vitamins, minerals, and antioxidants (fruits, vegetables, legumes, walnuts, almonds, fish, mustered, and soyabean oils) and low in refined...
carbohydrates, TFA, and SFA, in patients with AMI. All patients with a diagnosis of AMI, were assigned to an intervention diet ($n=204$) or a control diet ($n=202$) within 48 h of the onset of the symptoms of AMI.\textsuperscript{6,7} The intervention group was advised to consume 600 g/day of fruits, vegetables, legumes, almonds, and walnuts, in a soup or semisolids form and the control group a low-fat diet. Tomato soup, skim milk, and curd (yogurt) were commonly used to mix crushed almonds and walnuts and other foods, which were grilled with mustered oil, to prepare different types of soups.\textsuperscript{4,6,7} Compared with the control groups, patients allocated to the dietary intervention consumed significantly greater amounts of fruits, vegetables, pulses, almonds, walnuts, oils and fish, both during the first trial week, 6-week, and 1 year after AMI.\textsuperscript{7} The consumption of n-3 fatty acids was also significantly greater in the intervention group than in the control group (1.8 ± 0.66 vs. 0.65 ± 0.4 g/day, $P < 0.01$). The consumption of proinflammatory foods, such as butter, clarified butter, refined starches, and sugar were significantly greater in the control group than in the intervention group. Plasma lipid peroxide level decreased significantly in the intervention group when compared with the control group, indicating a decrease in oxidative stress, which is protective against proinflammatory IL-6 and TNF-α as well as endothelial dysfunction, although these data were not measured in our study.\textsuperscript{6,7} Lactate dehydrogenase (LDH) level increased less in the intervention group than in the control group, indicating that myocardial damage was prevented by the cardioprotective diet.

Total cardiac events, including fatal and non-fatal myocardial infarctions and sudden cardiac deaths, were significantly lower in the intervention group when compared with the control group, both after 6 weeks\textsuperscript{7} as well as after 1 year. These intervention trials indicate that further studies should be conducted with Columbus diet and Columbus oil (olive oil + lin seed oil) in patients with AMI, to demonstrate cyto- kine and endothelial function-mediated mechanisms, in the pathophysiology of complications and deaths, among these patients. Similar dietary intakes are being advised in the Columbus paradigm (www.Columbus-concept.com).

It is therefore suggested that a western diet should be avoided in patients with AMI, and a diet, which is beneficial to vascular endothelium and myocardium is administered. There is no precise and proven guideline for dietary advice, in patients with AMI, which may be protective against recurrent cardiac events. A Columbus soup (tomatoes, grapes, vegetables, walnuts, almonds + lin seed, and olive oil) or a Columbus yogurt containing, walnuts, almonds, black raisins could be prepared for ready use, for non-pharmacological intervention, among patients of AMI. Such recipes have been commonly used by us in our studies and clinical practice.\textsuperscript{4,6,7} We would appreciate the opinion of the authors of the above work.

References


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What to 'eat and chew' in acute myocardial infarction?: reply

We thank Dr Singh and his colleagues for putting in perspective an interesting topic: what should a patient with acute myocardial infarction (AMI) eat? Obviously, this question is charged with important practical implications. Starting from the premise that a patient with AMI or acute coronary syndrome is likely to be an "inflamed" patient, it should be wise to prescribe a diet that is associated with reduced inflammatory markers. In other words, cooling down inflammation may be a sound dietetic strategy. Unfortunately, some foods currently given to these patients, such as refined starches or cakes, may cause a rapid rise in plasma glucose concentrations, which in turn may further deteriorate glucose homeostasis. Moreover, rapid glycaemic swings may activate the innate immune system, most likely by an excessive production of proinflammatory cytokines associated with a reduced production of anti-inflammatory cytokines.\textsuperscript{1} So, dietary patterns high in refined starches, sugar, and saturated and trans-fatty acids, and poor in natural antioxidants and fibre from fruits, vegetables, and whole grains should be avoided in patients with AMI or acute coronary syndrome. However, no trial has specifically addressed this topic.

We are sorry for not being aware of the Columbus paradigm, but we note that the phrase "endothelial dysfunction acutely triggered by the consumption of a high-fat meal rich in saturated fatty acids is reduced by the simultaneous consumption of a vegetable serving including pepper (100 g), tomatoes (100 g), and carrots (200 g)" refers to our data.\textsuperscript{4} As cardiovascular diseases, various forms of cancer, and diabetes combine to make up nearly 70% of all deaths in the US,\textsuperscript{2,3} adoption of a healthy lifestyle is paramount to reducing chronic disease risk. So, the choice of healthy sources of carbohydrates, fat, and proteins associated with regular physical activity, and avoidance of smoking is critical to fighting the war against chronic disease.

Long-term dietary intervention studies are scanty. However, they demonstrate that a whole diet approach, such as the Mediterranean-style diet, reduced the risk of...