Diabetes and the heart - role of CT in predicting outcomes

People suffering from adult type diabetes mellitus have an increased tendency to develop disease of large and small arteries. Disease of the coronary arteries of the heart may lead to chest pain on exercise (angina pectoris) or to acute heart attacks whereas disease of the very small arteries may lead to kidney and eye disease. High blood pressure, elevated blood cholesterol, smoking and persistently high blood sugar levels increase the risk of these complications. The current study aimed to examine if a non-invasive examination by CT scanning of the coronary arteries in diabetics aged between 55-74 years, without any known disease of the heart, could help to predict which individuals were at high risk to develop complications.

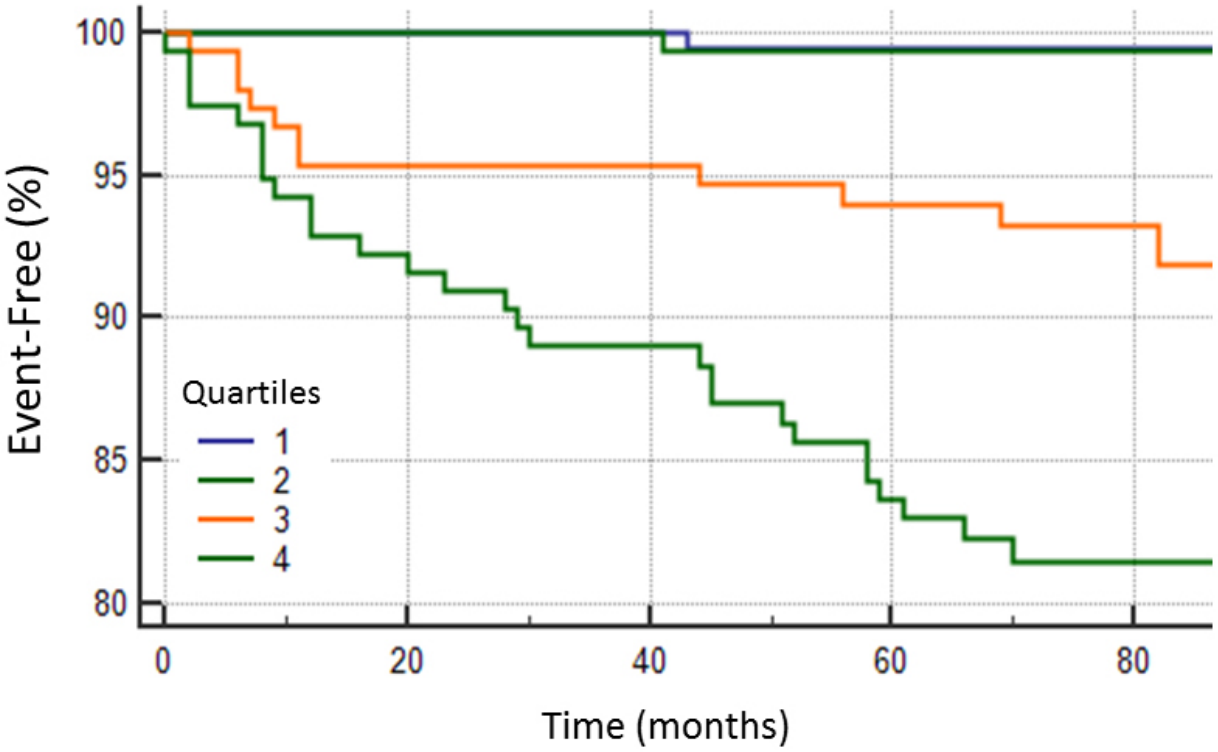

Fig. 1. Subjects in the 2 groups with more severe disease of the coronary arteries on CT (quartiles 3+4) have more adverse events over the period of follow-up.

In 21% of 630 diabetics who volunteered to undergo the study the coronary arteries had no disease at all and none of these individuals developed any signs of heart disease over an average period of follow-up of 6.5 years. All subjects were divided into 4 equally sized groups (quartiles) according to a scale measuring the extent of coronary artery disease. Figure 1 shows that for half the subjects (quartiles 1 and 2) in the lowest 2 grades of disease nearly 100% remained healthy having no events related to coronary heart disease. For those with more advanced disease (quartiles 3 and 4

in figure 1) an increasing number of subjects suffered from a coronary event over the 80 months of follow-up.

A simple CT of the heart shows only calcium deposits in the arteries but with the injection of dye through a vein a complete picture of the arteries, the calcified and non-calcified regions of disease and any narrowing of the arteries can be seen. Figure 2 shows how subjects were divided into 3 risk groups according to the known risk factors mentioned above together with the extent of calcium in the arteries (in the left part of the figure) and how this assessment of risk changed with information from the full CT scan (on the right part of the figure). Each manikin represents one subject. The figure has 2 panels on top and 2 below. The panels on top represent the majority of subjects who stayed healthy and the lower panels the minority of subjects who became sick. Subjects in group 1 are at lower risk, group 2 at intermediate risk and group 3 at highest risk. In the upper 2 panels, those who remained healthy, more than a full line of patients at intermediate risk on the left (blue, Group 2) have moved correctly to a lower risk assessment category (group 1) on the right with the aid of the information from the full CT scan. A few subjects however have been moved incorrectly to a higher risk category (to Group 3). The lower 2 panels show subjects who suffered a coronary event during more than 6 years of follow-up. Half of those classified as intermediate risk (group 2, blue, lower left panel) following full CT were correctly reclassified to high risk (group 3, lower right panel).

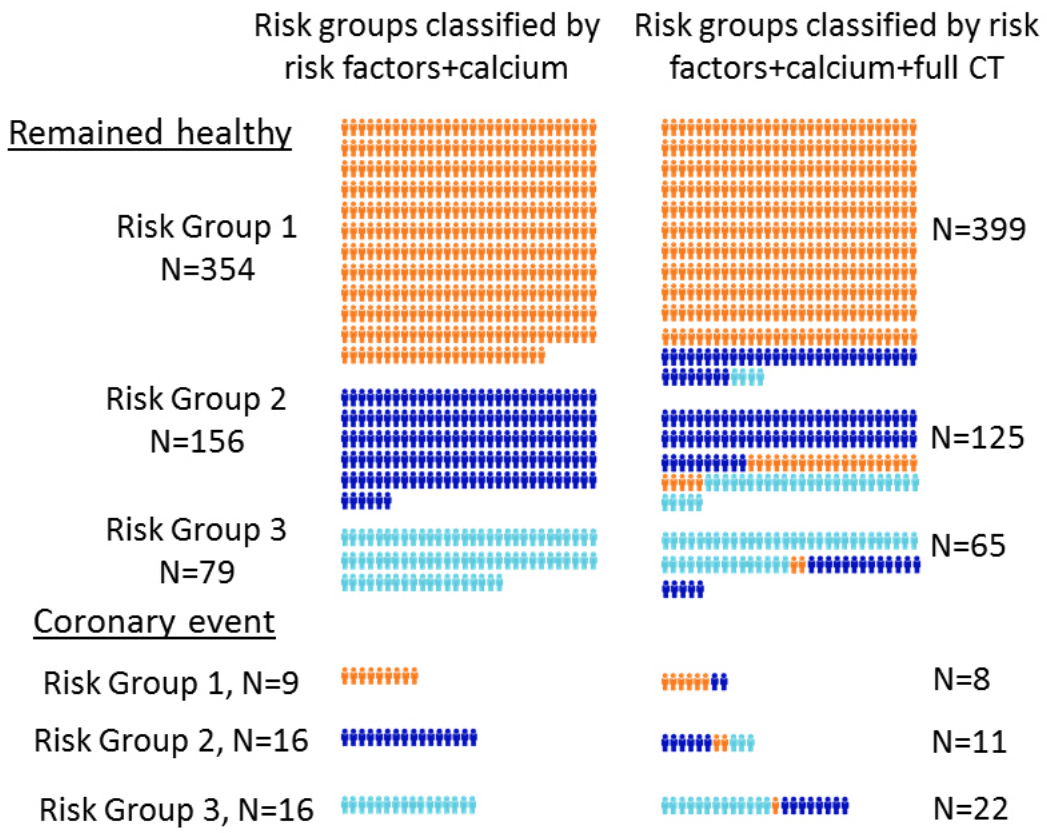

Fig. 2. Risk prediction for coronary event with and without full CT information.

In general subjects who had mild or moderate disease of the coronary arteries did not have an increased risk of eye or kidney disease but those who had more severe disease with significant narrowing of the coronary arteries also had more disease of the eyes and kidneys.

The routine use of a CT scan is not recommended for all diabetic subjects but in cases where there is some reason to suspect narrowing of the coronary arteries the finding of a normal CT scan can dismiss any concerns.

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Publication

Coronary Computed Tomography (CT) Angiography as a Predictor of Cardiac and Noncardiac Vascular Events in Asymptomatic Type 2 Diabetics: A 7-Year Population-Based Cohort Study.
Halon DA, Azencot M, Rubinshtein R, Zafrir B, Flugelman MY, Lewis BS
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