Editorial

Getting to the heart of obesity

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This editorial refers to ‘Effects of insulin on left ventricular function during dynamic exercise in overweight and obese subjects’† by F.C. Sasso et al., on page 1205

The Queensland State government recently announced plans to extend the ban on tobacco smoking in public places to include licensed premises. Other states have followed suit, bringing most of Australia into line with the few jurisdictions in the world with the strictest anti-smoking laws. Probably as a result of such public health measures, some encouraging signs of a positive effect on smoking rates are beginning to be seen.

In contrast, the epidemic of being overweight and obese is gathering momentum and promises to fuel the prevalence of cardiovascular disease for some time to come.1 Being overweight and obese affects two-thirds of men and over half of women in the United States. Whilst there is considerable variation across Europe, similar rates are evident in the United Kingdom and Eastern Europe and the situation is no better in Australia. Globally, one trend is very clear: that these rates are increasing. In the United Kingdom, rates of obesity increased from 6 to 21% in men between 1980 and 2001. The role of obesity in the development of heart failure has been contentious. For some years obesity was considered only to be associated with other known risk factors for heart failure including diabetes, hypertension, and coronary atherosclerosis. Recently however, increased interest has been paid to the hypothesis that obesity is an independent risk factor for the development of heart failure. A number of prospective studies have supported this suggestion. In the Framingham population an increase in body mass index of 1 kg/m² increased the risk of heart failure by 5% in men and 7% in women, independently of other established risk factors.2

Both systolic and diastolic heart failure appear to be increased.

The mechanism underlying this observation remains unclear. Mechanistic research in this area is difficult because of the very tendency for obesity to cluster with other components of the metabolic syndrome. In this issue of the European Heart Journal, Sasso and co-workers3 present an elegant study of the relationship between obesity and subclinical cardiac dysfunction. The strength of their study lies in the lengths to which the investigators went to exclude other components of the metabolic syndrome, thereby studying a group that were purely obese and insulin-resistant and without evidence of pre-existing structural or ischaemic heart disease. Their primary finding was that obese subjects exhibit significantly impaired diastolic function at rest, which has been shown before, but these subjects also showed impaired contractile reserve with exercise.

The mechanism by which obesity might lead directly to cardiac dysfunction in the absence of ischaemia is not clear but a number of potential mechanisms have previously been implicated.

Obesity leads to adverse loading conditions on the heart due to endothelial dysfunction and increased peripheral vascular resistance leading to left ventricular hypertrophy.4 However, Sasso et al. have demonstrated these abnormalities despite excluding subjects with left ventricular hypertrophy assessed using echocardiography.

A tendency towards sleep-disordered breathing could lead to similar cardiac abnormalities and this is an area that requires further prospective evaluation but was not addressed by the current study.

Insulin resistance and hyperinsulinaemia are implicitly linked to obesity as found by Sasso et al. using insulin clamp-derived measures of insulin sensitivity. An association between insulin resistance and overt chronic heart failure has previously been demonstrated independently of obesity, diabetes, or the aetiology of heart failure, and appears to correlate with the severity of functional impairment.5 This, however, remains a classic ‘chicken and egg’ situation: does heart failure induce insulin resistance or are patients with insulin resistance...
more likely to develop heart failure? This new information suggests that the latter may be true, at least in obese individuals. Previous studies have demonstrated similar subclinical abnormalities of cardiac function in patients with type 2 diabetes mellitus. In most of these studies, other components of the metabolic syndrome have not been well controlled, probably because of the difficulty in recruiting non-obese subjects with type II diabetes in the absence of other metabolic abnormalities. Further clues may need to come from other populations. In Nigeria, type II diabetes, which is accompanied by insulin resistance, is increasing in prevalence but obesity remains very rare and most diabetics have a body mass index of <25 kg/m². Subclinical abnormalities of diastolic function are still observed in this population in the absence of obesity, hypertension, or ischaemic heart disease (D.B. Ojji, unpublished data). A direct association between insulin resistance and early cardiac failure is an attractive unifying hypothesis to explain these observations. Sasso et al. report a significant correlation between contractile reserve and insulin sensitivity that would further support this.

Why could insulin resistance lead to myocardial dysfunction? The answer is not clear and has been speculated upon for some time in relation to the concept of ‘diabetic’ cardiomyopathy, but preliminary studies suggest that insulin resistance may lead to abnormal myocardial substrate utilization and oxygen demand that may be exacerbated by mismatch of substrate utilization and myocardial blood flow.

A variety of pharmacological approaches to improving insulin sensitivity are available, including established agents such as angiotensin converting enzyme inhibitors and metformin, as well as relatively novel agents such as thiazolidinediones. Some of these are established therapy for chronic heart failure, diabetes, and the prevention of cardiovascular disease, but further studies of targeting prevention and treatment of chronic heart failure, specifically in obese patients, are clearly needed. Nevertheless, there is no doubt that only a strong and effective public health message will minimize the potentially explosive effect of being overweight and obese on the prevalence of chronic heart failure, which remains a disease characterized by a grim prognosis, high mortality, and enormous cost to health services.

References