that we encounter in primary care. It is associated with increased morbidity and mortality.

The association between exercise and AF is somewhat dichotomous and there may be a U-shaped relationship between the intensity of exercise and AF risk, see p19. In men, long-term regular intense sporting activity particularly of the endurance variety can increase the risk of developing AF. However, in older men moderate physical activity seems to decrease the risk.

This study addressed an area that is relatively light on evidence at present; the association between AF and exercise in middle-aged and elderly women.

This was a large prospective study with complete follow up. However, the authors acknowledge that it relied on self-reporting of physical activity and the intensity of exercise was not measured.

The authors concluded that moderate physical activity was sufficient to reduce risk of AF in middle-aged and older women significantly.

These findings provide further support for encouraging regular exercise in our patients.

DR PETER SAVILL

● **Drca N, Wolk A, Jensen-Urstad M et al. Physical activity is associated with a reduced risk of atrial fibrillation in middle-aged and elderly women. *Heart* 2015;101:1627-1630 doi:10.1136/heartjnl-2014-307145**

See also Playing it safe:exercise and cardiovascular health, p15

Diabetes

Is high intensity intermittent exercise beneficial in type 2 diabetes?

Recent research from Newcastle University suggests that high intensity intermittent exercise is associated with improved cardiac structure and reduced liver fat in type 2 diabetes patients.

In this prospective randomised controlled trial, 28 patients with type 2 diabetes were allocated randomly to high intensity intermittent training (HIIT) or standard care. Baseline investigations included cardiac structure, glycaemic control, liver and visceral fat and blood parameters. The two groups were well matched in terms of their baseline characteristics. Eleven patients in the control group, mean age 59 ± 9 years, and 12 from the intervention arm, mean age 61 ± 9 years, completed the study.

The HIIT group performed 36 cycle ergometry sessions over 12 weeks i.e. three sessions per week at a gym on non-consecutive days. Patients had to perform at least 32 (89%) of the sessions to be included in the final analysis. The exercise intensity was measured between 6 and 20 on the Borg Rating of Perceived Exertion. After a five-minute warm up in which the participants progressed from RPE of 9 to 13 ('very light' to 'somewhat hard'), there were five intervals reaching RPE 16/17 ('very hard'), before a three-minute recovery period.

The length of the intensive intervals was initially two minutes, and this was extended by ten seconds every week, so that week 12 consisted of 3 min 50s intervals. Initially supervised, the sessions were then self-administered using an iPod, and adherence checked with an exercise diary and phone calls.

Cardiac MRI, cardiac spectroscopy and liver and visceral fat MRIs were undertaken, in addition to measurement of blood parameters. The results of the scans were interpreted by doctors unaware of which arm the patient had been allocated to.

Compared with controls the HIIT group showed improved cardiac structure, systolic function, early diastolic filling rates and peak torsion. The HIIT group also showed a significant 39% reduction in liver fat ($P < 0.05$).

HIIT had no effect on fasting glucose or fasting insulin levels. The intervention group showed a modest reduction in HbA_{1c} (7.1% ± 1.0% to 6.8% ± 0.9%) compared with the control group (7.2% ± 0.5% to 7.4% ± 0.7%). The reduction in liver fat correlated with the HbA_{1c} changes.

Changes in left ventricular structure are identifiable in diabetes patients before the development of overt cardiac disease. HIIT has been shown to elicit a strong cardiovascular response, and the authors set out to investigate whether this translated into measurable changes in patients.

The authors say that HIIT should be considered to reduce cardiometabolic risk in patients with type 2 diabetes. I would support this but sound a note of caution about the paper.

The study was small, and the effects on glycaemic control did not achieve statistical significance. There was no intervention arm for continuous moderate exercise, so it is unclear whether this would have any benefits compared with the control group.

The study was recruited from volunteers responding to advertisements in local newspapers and from diabetes community groups and a large number of patients failed the selection criteria (201 out of 256 originally assessed for eligibility).

The HIIT would need to be continued, and adherence to the regimen over the longer term would also be important for benefits to be sustained.

Although there are questions to be answered, any increase in activity will benefit patients, and HIIT is a popular exercise regimen at the moment.

DR MATTHEW LOCKYER

● **Cassidy S, Thoma C, Hallsworth K et al (2015). High intensity intermittent exercise improves cardiac structure and function and reduces liver fat in patients with type 2 diabetes: a randomised controlled trial. *Diabetologia.* doi:10.1007/s00125-015-3741-2**

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