# Differential impact of adiposity on risk of atrial fibrillation in men and women in UK Biobank

C.J.F. Camm[1], B. Lacey[1], B. Casadei[2], J.C. Hopewell[1]

*[1]University of Oxford, Nuffield Department of Population Health, Oxford, United Kingdom; [2]University of Oxford, Radcliffe Department of Medicine, Oxford, United Kingdom*

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**Background:** Atrial fibrillation (AF) and obesity are common conditions with important health implications. Greater adiposity has been associated with higher risk of AF. However, body fat distribution differs between sexes, and the independent effects of different adiposity measures on AF risk remain unclear.

**Purpose:** To establish the independent effects of general and central adiposity on risk of incident AF in men and women.

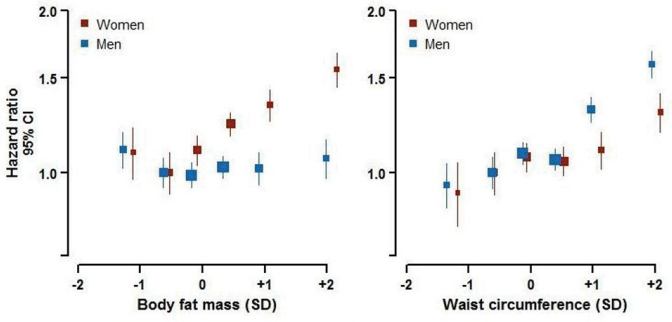
**Methods:** UK Biobank is a prospective study involving 502,536 adults (aged 40–69). Participants underwent an extensive baseline interview and physical assessment (including bio-impedance measurements). Incident AF cases were identified by linkage to national hospital statistics and death registry data. Cox regression models adjusted for age, sex, ethnicity, deprivation, smoking and alcohol, were used to estimate effects of general adiposity (body mass index [BMI] and body fat mass), central adiposity (waist circumference [WC]), and lean mass, on risk of incident AF (per sex-specific standard deviation [SD]).

**Results:** Among 477,918 participants (mean age 56.4 years, SD 8.1; 45% men) with no history of AF, mean BMI was similar in women (27.0kg/m$^2$, SD 5.0) and men (27.8kg/m$^2$, SD 4.1). Conversely, mean WC was lower in women (84.5cm, SD 12.3) than men (96.8cm, SD 11.0), while mean body fat mass was higher in women (26.9kg, SD 9.8) than men (22.2kg, SD 8.0). A total of 14,362 incident AF events were identified (5,254 in women, 9,108 in men) over 8.1 years median follow-up. AF was positively associated with adiposity. A 1-SD higher BMI, equivalent to 4.6kg/m$^2$, and a 1-SD higher WC, equivalent to 11.7cm, were each associated with >30% higher risks of AF (hazard ratio [HR] BMI 1.32 [95% CI 1.30–1.34]; WC 1.37 [1.35–1.39]), and showed no sex differences. Lean mass was also strongly associated with AF (1.41 [1.39–1.43]), and similar between sexes. In contrast, a 1-SD higher body fat mass, equivalent to 9.0kg, was associated with a 34% higher risk of AF overall (1.34 [1.32–1.36]), but had a stronger effect in women (1.41 [1.38–1.45]) than men (1.30 [1.28–1.33]), p-interaction 1x10–6; albeit effects were comparable per kg).

After adjustment for body fat mass and lean mass, WC remained positively associated with AF overall (1.19 [1.15–1.23]) and in both sexes (1.14 [1.09–1.20] in women, 1.21 [1.17–1.26] in men). However, following adjustment for lean mass and WC, body fat mass remained positively associated with AF (1.09 [1.06–1.12]) overall, and in women (1.19 [1.14–1.26]) but was almost completely attenuated in men (1.04 [1.01–1.08]), p-interaction 0.004 (Figure). Associations were not materially changed by further adjustment for height, or by excluding those with prior vascular disease.

**Conclusions:** Central adiposity is strongly and independently associated with AF in both sexes. Conversely, general adiposity is independently associated with risk of AF in women but not men. Suggesting the impact fat distribution on AF risk differs by sex.

**Independent association of body fat mass and waist circumference with atrial fibrillation**




Hazard ratios (HR) were adjusted for age, sex, ethnicity, deprivation, smoking, alcohol, and lean mass. Left panel additionally adjusted for waist circumference. Right panel additionally adjusted for body fat mass. Anthropometric measures were categorised into six groups: the lowest four represent 20% of participants each and the highest two representing 10% each. In each category, the area of the square is inversely proportional to the variance of the category-specific log risk, which also determines the 95% CI (represented by error bars).

Fat mass, waist circumference & AF risk