Atrial fibrillation (AF) is associated with a high risk of cerebrovascular disease with normal neurologic examination performed by one of the authors were included. None were treated with anticoagulants or aspirin or had history of alcohol abuse. Cardiac history with respect to chest pain, hypertension, and heart failure graded by New York Heart Association (NYHA) criteria was obtained. Diagnostic criteria concerning etiologies in the AF patients have been described elsewhere. The studies comprised laboratory tests for thyrotoxicosis, chest x-ray, echocardiography for detecting left atrial thrombosis, and CT scan of the brain (using an EMI model 1010, Medical Hounslow, United Kingdom) without contrast injection.

The control group consisted of 30 healthy individuals who had previously participated in the Copenhagen City Heart Study, a population study in which nearly 20,000 persons were invited to have a cardiovascular examination during the years 1976–78 and 1981–83. Each control was selected to match a patient by age and sex and had normal sinus rhythm. None of the controls had history of cerebrovascular events or cardiovascular or endocrinologic disease, and all controls had normal physical and neurologic examinations before entering the study. The same studies were performed as in patients with AF. The study protocol was approved by the local ethical committee, and all participants gave informed consent.

All CT scans were evaluated blindly by 2 consultant neuroradiologists with special attention to the number of abnormal areas with apparent tissue loss. The lesions were mainly located in the cortex with no significant difference in lesion size between AF patients and controls. The abnormal areas probably reflected small, clinically silent infarcts. We conclude that these lesions are present in AF patients without history of cerebrovascular events and occur more frequently than in controls without atrial fibrillation. (Stroke 1987;18: 1098–1100)

**Subjects and Methods**

The study included 30 consecutive patients (17 women and 13 men, median age 73, range 57–87 years) with electrocardiographic (ECG)-confirmed AF of >1 year’s duration. The patients were prospectively and consecutively selected from patients referred to the out-patient clinic by their general practitioner for routine ECG.

Only patients without history of cerebrovascular
Results

Among the 30 patients with AF, 22 had atherosclerotic and/or hypertensive heart disease (73%), 5 AF alone (17%), 2 thyrotoxicosis (7%), and 1 rheumatic heart disease (3%). Four patients had experienced myocardial infarction previously, and 4 had exercise-induced angina. Seventeen patients (57%) had slight heart failure (NYHA Class I), 4 (13%) moderate heart failure (NYHA Class II), and the rest (30%) no heart failure. No patients had left atrial thromboses by echocardiography.

One CT scan each in the AF and sinus rhythm groups were excluded from analysis for technical reasons. Among 29 patients with AF, 14 (48%) had 1 or more low-density areas on CT scan compared with 8 of the 29 controls in sinus rhythm (28%) (Figures 1 and 2); this difference was not significant ($p > 0.10$) (Table 1). The total number of low-density areas was significantly greater in the AF group (39) compared with controls in sinus rhythm (16) ($p = 0.033$) (Table 1). Further CT analysis showed no difference in the size of low-density areas between AF patients and controls. The median volume of the areas was 944 mm$^3$ in both groups with a range of 148–4,486 mm$^3$ in AF patients and 370–2,544 mm$^3$ in controls. There was no correlation of the low-density lesions with age independent of rhythm disturbance.
high frequency among healthy individuals in sinus rhythm was not.

CT findings in elderly individuals are only sparsely studied and have mostly correlated degree of atrophy and psychological impairment without description of structural lesions.\(^8\) Other studies of normal elderly people have also focused on the degree of cerebral atrophy without further characterization of focal lesions.\(^11,12\) It is possible that no focal lesions were identified or that they were classified as localized atrophy.

In the present study some low-density areas could represent localized atrophy. However, we found more low-density areas in AF patients compared with controls, suggesting that AF in some patients leads to localized tissue loss. This finding stresses the need for randomized controlled studies of prophylaxis against thromboembolism in AF patients.

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References


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P Petersen, E B Madsen, B Brun, F Pedersen, C Gyldensted and G Boysen

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The online version of this article, along with updated information and services, is located on the World Wide Web at:
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