An Update on the Epidemiology of Atrial Fibrillation

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In the last 2 decades, there has been a significant increase in the incidence, prevalence, and overall burden of atrial fibrillation (AF), with an estimated 33.5 million individuals affected worldwide in 2010 [Chugh SS et al. *Circulation.* 2014]. In a session at Heart Rhythm 2015, experts discussed the current understanding of the risk factors, predictors, and factors associated with AF.

Although there are many known risk factors for AF, the identification of new risk factors and targets for therapies designed to prevent or delay AF remains important. Sumeet S. Chugh, MD, Cedars-Sinai Medical Center, Los Angeles, California, USA, reviewed some of the emerging predictors of AF.

Elevated circulating troponin levels have been reported in ambulatory older adults with incident AF [Hussein AA et al. *Heart Rhythm.* 2015], while decreased levels of testosterone were associated with incident AF in men aged 55 to 69 years, especially those aged ≥ 80 years [Magnani JW et al. *Circ Arrhythm Electrophysiol.* 2014]. Inflammation as indicated by increased white blood cell count [Rienstra M et al. *Am J Cardiol.* 2012], elevated serum levels of uric acid [Chao TF et al. *Int J Cardiol.* 2013], and active inflammatory bowel disease [Kristensen SL et al. *Europace.* 2014] are significant risk indicators for the incidence AF in both men and women.

The risk of AF is increased with obesity and extreme changes in weight. Among obese men (but not women), physical activity can attenuate this risk; that is, the risk for AF is increased 156%, 129%, and 37% among obese men with poor, intermediate, and ideal levels of activity, respectively [Huxley RR et al. *Circ Arrhythm Electrophysiol.* 2014]. Thyroid-stimulating hormone levels can indicate AF risk, with a low risk associated with overt hypothyroidism and a high risk with hyperthyroidism [Selmer C et al. *BMJ.* 2012]. The use of specific nonsteroidal anti-inflammatory drugs other than aspirin [Liu G et al. *Am J Cardiol.* 2014] and opioids [Qureshi W et al. *Circulation.* 2015] also were associated with an increased risk of incident AF.

An analysis of 50 years of data from the Framingham Heart Study showed that the incidence and prevalence of AF appears to be increasing, which the investigators suggest may be partly due to enhanced surveillance [Schnabel RB et al. *Lancet.* 2015]. Lower rates of morbidity and mortality may be possible through the early detection of AF by increased awareness, targeted screening programs, and the recognition of new emerging risk factors.

Stroke is the third-leading cause of death in women, who account for about 61% of all stroke-related deaths, according to Christine M. Albert, MD, Brigham and Women's Hospital, Boston, Massachusetts, USA, who discussed the risk factors for AF and stroke in women. The high burden of stroke among women is directly related to their longer life expectancy, their higher exposure to sex-specific risk factors (pregnancy, oral contraceptive use), and the fact that certain risk factors for stroke are stronger or more prevalent in women (migraine with aura, diabetes, AF).

Among a group of healthy women, new-onset AF was independently associated with all-cause, cardiovascular (stroke, heart failure [HF], myocardial infarction [MI]), and noncardiovascular mortality [Conen D et al. *JAMA.* 2011]. Both the US guidelines for stroke in women [Bushnell C et al. *Stroke.* 2014] and the European AF guidelines [Camm AJ et al. *Eur Heart J.* 2012] recommend the use of risk stratification tools that account for sex-specific differences in the incidence of stroke, such as the CHA_2DS_2-VASc score.

Other studies in women have reported that baseline blood pressure (systolic more than diastolic) [Conen D et al. *Circulation.* 2009], obesity [Wang TJ et al. *JAMA.* 2004], and increasing weight [Tedrow UB et al. *J Am Coll Cardiol.* 2010] are good predictors of AF. Increasing body mass index is associated with the early development of nonparoxysmal AF more than paroxysmal AF [Sandhu RK et al. *J Am Heart Assoc.* 2014].

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Table 1. Predictors for Atrial Fibrillation

Factor	Study
Developing end-stage renal disease in adults with chronic kidney disease	Bansal N et al. *Circulation.* 2013
Venous thromboembolism	Enga KF et al. *J Thromb Haemost.* 2015
Myocardial infarction (especially in women and blacks)	Soliman EZ et al. *JAMA Intern Med.* 2014
SCD and coronary heart disease not meeting SCD criteria	Chen LY et al. *JAMA Intern Med.* 2013
Heart failure	Schnabel RB et al. *Eur J Heart Fail.* 2013

SCD, sudden cardiac death.

In one study, women who achieved the US government's recommendation for physical activity were at reduced risk of AF compared with those who did not (RR, 0.86; 95% CI, 0.75 to 0.98; $P = .03$) [Everett BM et al. *Circ Cardiovasc Qual Outcomes.* 2011]. Moderate alcohol consumption (2 drinks a day) was not associated with an increased risk of incident AF; however, alcohol consumption above that was associated with a small but statistically significant increased AF risk [Conen D et al. *JAMA.* 2008].

The primary prevention strategy for AF is to identify those at high risk using the known risk predictors, as well as genetic markers, and then apply prevention approaches, said Dr Albert. These might include blood pressure control, weight loss, moderate physical activity, smoking avoidance, and minimizing alcohol intake.

Emelia J. Benjamin, MD, National Heart, Lung, and Blood Institute's Framingham Heart Study, Framingham, Massachusetts, USA, reported that AF is associated with an increased risk of end-stage renal disease, venous thromboembolism, MI, HF, sudden cardiac death, and all-cause death. Secondary AF is not benign and can lead to HF if left untreated. Prevention of adverse events associated with AF can best be achieved with anticoagulation, changes in lifestyle, and optimal control of risk factors.

Evidence suggests that AF is associated with a higher risk of cognitive impairment and dementia, with or without a history of clinical stroke [Kalantarian S et al. *Ann Intern Med.* 2013]; other predictors are listed in Table 1. Medicare data show that 5 years after a diagnosis of AF, 13.7% of patients were hospitalized for HF, 7.1% developed new-onset stroke, and 5.7% had gastrointestinal hemorrhage; MI was less frequent (3.9%) [Piccini JP et al. *Eur Heart J.* 2014].

AF diagnosed during secondary precipitants, such as surgery, acute alcohol consumption, or pulmonary embolisms, is associated with future AF episodes. The most common long-term outcomes following secondary AF were cardiothoracic surgery, infection, noncardiothoracic surgery, and acute MI. The risk of HF was reduced in patients with AF (HR, 0.74; 95% CI, 0.56 to 0.97) [Lubitz SA et al. *Circulation.* 2015].

Prevention of AF can be achieved with weight reduction and intensive risk factor management [Abed HS et al. *JAMA.* 2013]. Future approaches may include personalized prediction of the risk of AF and the use of preventive therapies designed to affect the clinical and subclinical risk factors. Furthermore, the use of multidisciplinary protocols designed for primary and secondary prevention of AF may be of benefit in reducing the morbidity and mortality associated with AF.