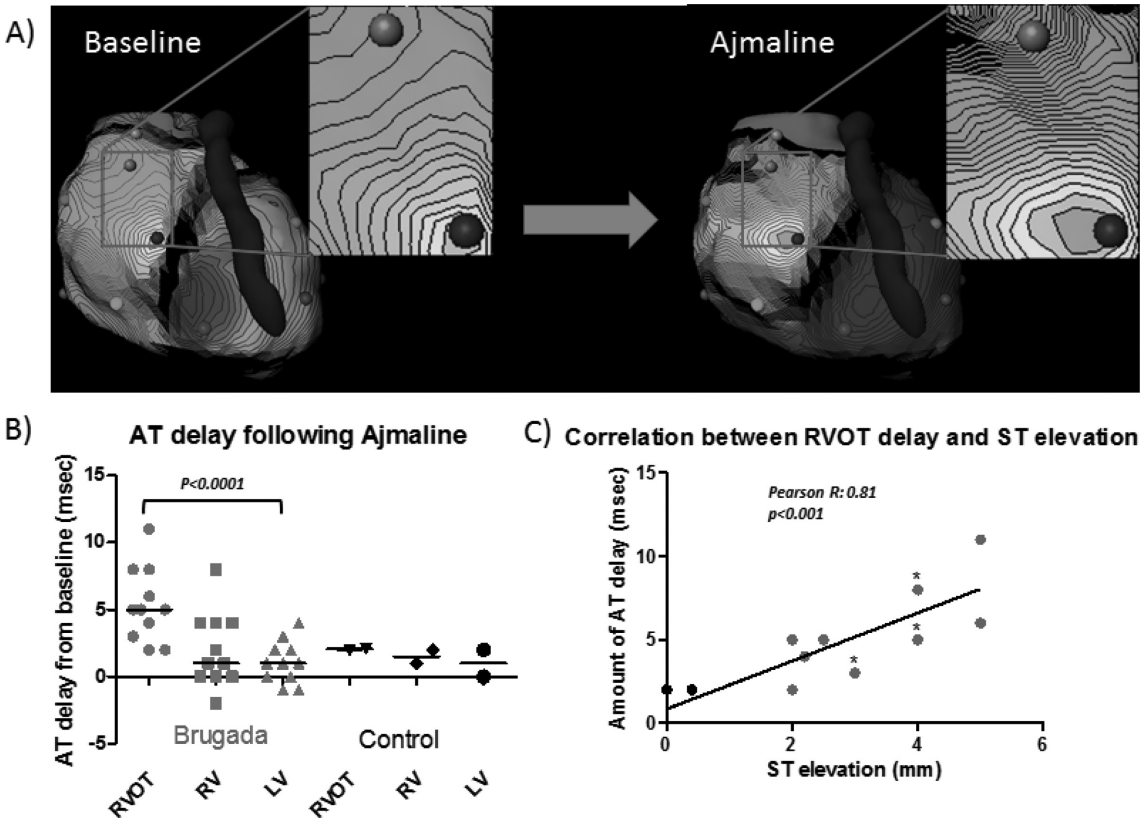


**Abstract 146 Figure 1** a) Isochronal crowding seen RVOT following ajmailne, and measurement of activation times across region b) Activation time (AT) delay across the different regions. c) Correlation of RVOT conduction delay with ST elevation on ECG. Black denotes control and red denotes Brugada participants

# Valve Disease/Pericardial Disease/ Cardiomyopathy

## 147 ELEVATED SERUM TROPONIN I IS ASSOCIATED WITH INCREASED RISK IN HCM

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The European Society of Cardiology recently recommended a new tool[1] to estimate 5 year risk of sudden cardiac death (SCD) in patients with hypertrophic cardiomyopathy (HCM). We investigated the relationship between serum cardiac troponin I (cTnI) levels and HCM-risk score in 100 consecutive patients referred to the West of Scotland Inherited Cardiac Conditions Clinic. The 20 most recent patients had a high sensitivity cTnI assay performed (limit of detection (LOD) 1.2 ng/L) and the remaining 80 had the traditional assay (LOD 10 ng/L). Demographic, clinical, genetic and imaging parameters were collected at first assessment. HCM-risk was calculated retrospectively.

Cardiac TnI was elevated in 27% of the population (n = 100, 60% male, mean age 56 ± 14, left ventricular outflow tract (LVOT) obstruction (i.e. resting gradient ≥30 mmHg) in 20%) and they had significantly higher overall HCM-risk score (3.7% v 2.2%, $p < 0.01$). Of the risk tool's component variables, an elevated cTnI was associated with increased left atrial diameter (50 ± 8 v 42 ± 8 mm, $p < 0.01$) and raised maximum LVOT gradient (33 ± 38 v 19 ± 24 mmHg, $p < 0.03$), but not with maximal wall thickness, family history of SCD, the presence of non-sustained ventricular tachycardia, history of syncope, or age at clinical evaluation. Of non-tool variables, an elevated cTnI was associated with history of atrial fibrillation (37% v 14%, $p < 0.01$) and heart failure (22% v 3%, $p < 0.01$). Finally, in a sub-group (n = 49) of patients who underwent cardiac magnetic resonance imaging, patients with an elevated cTnI were more likely to have late gadolinium enhancement (92% v 38%, $p < 0.01$).

In conclusion, serum cTnI is elevated in a significant proportion of patients with HCM and is associated with clinical markers of disease severity. Biomarkers may be useful as an adjunct to current risk models in identifying patients with adverse cardiac remodelling and underlying atrial fibrillation.

### REFERENCE

1 O'Mahony C *et al*. A novel clinical risk prediction model for sudden cardiac death in hypertrophic cardiomyopathy (HCM risk-SCD). *Eur Heart J*. 2014;**35**(30):2010—20

## 148 THE COST EFFECTIVENESS OF SCREENING YOUNG ATHLETES WITH ECG IN THE UK

Harshil Dhutia*, Aneil Malhotra, Rajay Narain, Ahmed Merghani, Jon Senior, Saeed Azizi, Gherardo Finnochiaro, Michael Papadakis, Maite Tome, Sanjay Sharma. *St. George's University of London*; **Presenting Author*

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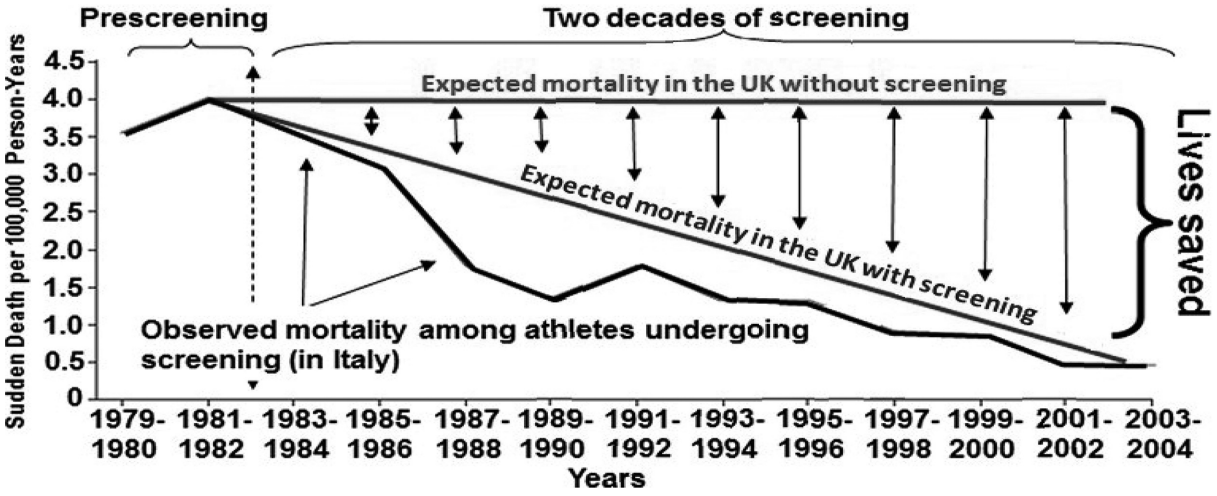
**Introduction** High false positive rates and subsequent costs of additional investigations provide major obstacles to state-sponsored screening of young athletes for cardiac disease with

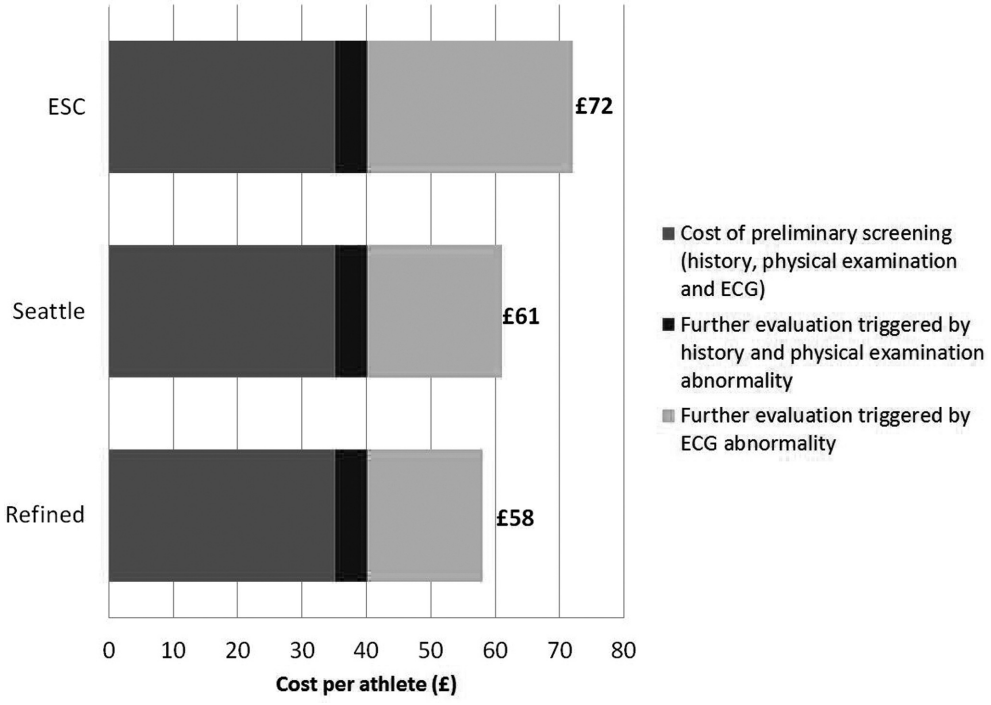



**Abstract 148 Figure 1** Assumption of expected lives saved in screened athletes over 20 years based on the experience of screening athletes in Italy

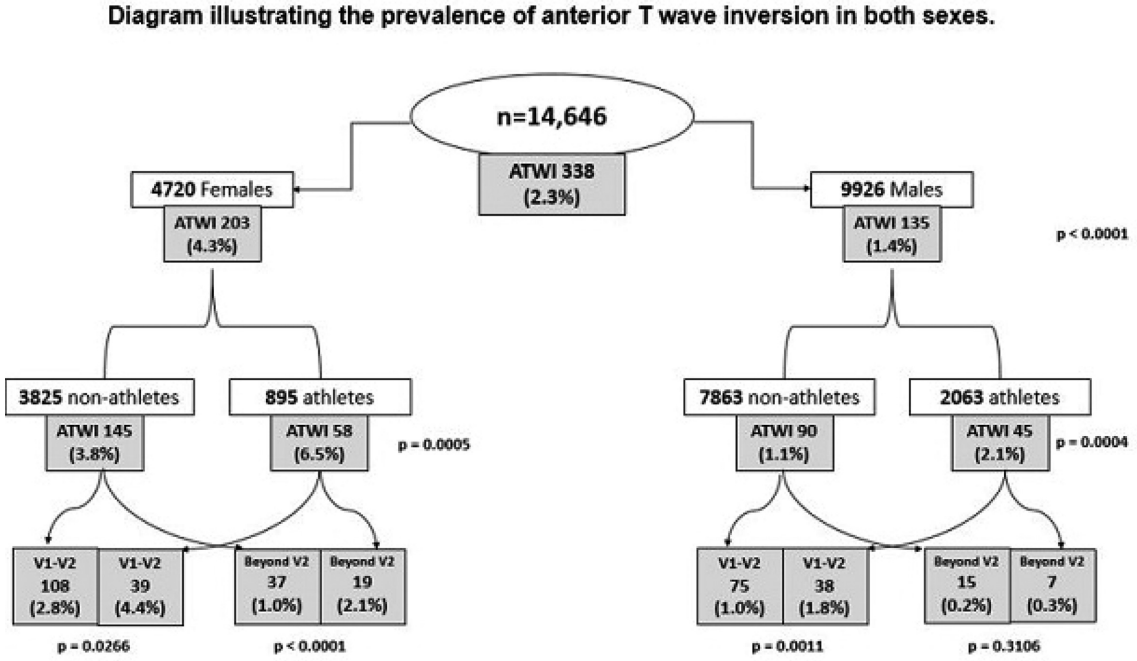
ECG. However, the actual cost of ECG screening in large cohorts of athletes has never been assessed systematically. We investigated the financial implications of ECG screening in young athletes in the UK, and evaluated the impact of modification of ECG interpretation criteria on cost.

**Methods** Between 2011–14, 4,925 athletes (14–35 years) were consecutively assessed through a charity screening programme with history, physical examination and an ECG interpreted with the ESC criteria by a cardiologist at a cost of £35 per athlete. Athletes with abnormal results underwent additional tests at hospitals in their geographic vicinity at the discretion of the hospital cardiologist. The cost of additional tests were based on the UK National Health Service tariffs. A cost-projection model to evaluate cost-effectiveness was conducted based on (1) our costs, (2) UK sports participation statistics and (3) data from an Italian study which reported a 3.6/100,000/years reduction in incidence of sudden cardiac death in athletes screened with ECG over 20 years (Figure 1). The Seattle and refined criteria for ECG interpretation were applied to the cohort retrospectively.

**Results** The majority of athletes were male (83%) and Caucasian (85%). 26 sports were represented. 1.6% had an abnormal history or physical examination. 21.8% had an abnormal ECG according to the ESC criteria. 11.2% athletes required echocardiography, 1.9% exercise testing, 1.4% holter, 1.2% cardiac MRI and 0.2% required other tests after 30 month follow-up. The Seattle and refined criteria reduced the abnormal ECG rate to 6% and 4.3% respectively. 15 athletes (0.3%) were identified with potentially sinister cardiac disease by all 3 criteria. Following further tests, the cost of screening with the ESC criteria amounted to £72 per athlete screened and £23,750 per condition detected. The Seattle and refined criteria reduced costs to £61 and £58 per athlete respectively, and £20,160 and £18,976 per condition detected (Figure 2).




**Abstract 148 Figure 2** The impact of ECG interpretation criteria on cost per athlete screened




**Abstract 149 Figure 1** Diagram illustrating the prevalence of anterior T wave inversion in both sexes

20 years of annual screening would save 1,667 lives at a cost of £3.5 million per life saved with the ESC criteria; the Seattle and refined criteria reduced the cost to £3 million and £2.8 million per life saved respectively.

**Conclusions** The impressive 20% cost saving associated with ECG modification will be welcomed by organizations that mandate screening for their athletes. However, ECG screening is expensive considering the large number of young athletes that would require screening and the low event rate in such populations. Further ECG modification and physician education is required for such practices to be achievable or sustainable at a state-level.

## 149 THE PREVALENCE AND SIGNIFICANCE OF ANTERIOR T WAVE INVERSION IN A LARGE WHITE POPULATION OF YOUNG ATHLETES AND NON-ATHLETES

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10.1136/heartjnl-2016-309890.149

**Introduction** Anterior T wave inversion (ATWI) on an electrocardiogram (ECG) of an adult white individual raises the possibility of an underlying cardiomyopathy. While European consensus guidelines recommend that ATWI beyond V1 warrants further investigation, the prevalence and significance of ATWI has never been reported in a large white asymptomatic population.

**Objective** This study investigated the prevalence and significance of ATWI in a large cohort of young, white adults including athletes. This was an observational study with a mean follow-up period of 18.1 months.

**Setting** Several UK elite sporting organizations conduct ECG based pre-participation screening of athletes through the charitable organization, Cardiac Risk in the Young (CRY) for young and apparently healthy individuals. Follow-up of individuals with abnormalities at preliminary assessment is provided at a tertiary centre for inherited heart conditions and sports cardiology.

**Participants** 14,646 subjects aged 16–35 years were evaluated including 4,720 (32%) females and 2,958 (20%) athletes. All individuals underwent health questionnaire, physical examination and 12-lead ECG.

**Main Measures** ATWI was defined as T wave inversion in 2 or more contiguous anterior leads (V1-V4) and investigated comprehensively to elucidate underlying cardiac pathology. ATWI >-0.1 mV or in 2 or more contiguous leads was considered abnoraml except in V1/III.

**Results** 338 individuals (2.3%) exhibited ATWI. Those with ATWI were of similar age compared with subjects without ATWI (21.2 (± 5.4) years vs. 21.7 (± 5.3) years). Both groups had a similar mean body surface area. ATWI was more common in females compared with males (n = 203; 4.3% vs n = 135; 1.4%: $p < 0.0001$) and was more common in athletes than non-athletes in both sexes (females: n = 58; 6.5% vs. n = 145; 3.8%; $p = 0.0005$, and males: n = 45; 2.1% vs. n = 90; 1.1%; $p = 0.0004$; see Figure 1). Among athletes, ATWI was more prevalent in those competing in endurance sports than strength sports (n = 82; 5.6% vs. n = 41; 2.8%: $p < 0.0001$). Noone with ATWI was diagnosed with ARVC after further evaluation.

Univariate predictors of ATWI were female gender and athletic status. Stepwise multiple linear regression identified female gender (hazard ratio 3.1, 95% CI 1.96–4.90, $p < 0.001$) and athletic status (HR 3.3, 95% CI 1.91–5.63, $p = 0.001$) as independent predictors irrespective of age.

**Conclusions and implications** Anterior T wave inversion confined to V1/ V2 may be a normal variant or physiological