Letters

Physical Inactivity Is a Risk Factor for Primary Ventricular Fibrillation

The new Physical Activity Guidelines for Americans (1) indicate that only one-half of adults meet the key guidelines for aerobic physical activity (PA). Significant reductions in risk of all-cause and cardiovascular mortality occur at activity levels equivalent to 150 min weekly of moderate-intensity physical activity. Notably, the Guidelines indicate that some physical activity is better than none: benefits begin already with significantly <150 min/week.

We assessed whether even low levels of PA might be associated with a lower risk of primary ventricular fibrillation (VF) during a first myocardial infarction (MI) by analyzing data from the PREDESTINATION (PRimary vEntricular fibrillation and suDden dEath during a firST myocardIal iNfArcTION) trial. This is a case-control, prospective, multicenter study enrolling patients aged 18 to 80 years with a first MI associated (cases) or not (controls, paired by sex and age) with VF within 24 h of symptoms, before reperfusion.

The study enrolled 375 case and 595 control subjects with mean age 59 years; 85% were male. Data collection included family history of sudden death in first-degree relatives age <80 years and physical inactivity, defined as absence of any regular vigorous or moderate-intensity PA lasting for ≥10 consecutive min for a total of ≥30 min weekly. The adjusted odds ratio (OR) was obtained by multivariable logistic regression.

Case and control subjects had the same prevalence of hypertension, diabetes, smoking, and family history of coronary artery disease, and had a higher prevalence of family history of sudden death.

Data on the level of physical activity were available in 936 patients, of whom 98 (10.5%) were physically inactive. Table 1 shows the comparison of subjects with and without physical inactivity. Inactive subjects were more frequently obese; dyslipidemic; and taking antihypertensive agents, statins, and aspirin. Familiarity for MI or sudden death was similar.

Physical inactivity was present in 55 of 366 case subjects (15.0%) and 43 of 568 control subjects (7.6%; p = 0.0004); the OR was 2.16 (95% confidence interval: 1.41 to 3.30). The OR for primary VF associated with physical inactivity, adjusted for the multivariable significant predictors (systolic blood pressure, K^+ <3.5 mEq/l, anterior MI, family history of sudden death) was 1.74 (95% confidence interval: 1.07 to 2.81; p = 0.02).

PA has favorable effects on type 2 diabetes, obesity, hypertension, and lipid profile, leading to reduced cardiovascular and all-cause mortality (1). The assessment of individual PA level should include every activity performed during the day, not just leisure time (LT) PA. Notably, when compared with inactivity, performing even less than the recommended weekly minimum was associated with a significant 20% lower all-cause mortality (2).

The relationship between PA and sudden death is less defined and was assessed by few population studies between the 1970s and the early 2000s; all but 1 evaluated solely LTPA rather than all daily PA. Overall, these studies suggested a protective effect on sudden death or primary cardiac arrest, even with an LTPA as light as walking for 60 min/week (3).

PREDESTINATION is the first study specifically reporting the deleterious effects of physical inactivity on the risk of primary VF, a completely novel finding. We decided to strictly define physical inactivity as <30 min/week of vigorous or moderate intensity, because this was the first analysis of this type and we expected MI patients to have a relatively low average level of PA. A more complete questionnaire would have allowed assessment of dose-response relationship. Also, a larger study would allow sufficient power for the study of different subgroups.

Importantly, the increased risk of sudden death associated with physical inactivity found in previous studies could be simply due to the increased risk of MI among physically inactive subjects. The present finding greatly extends this concept, indicating that within subjects experiencing a first MI, physical inactivity almost doubles the risk of VF. In addition to the proposed effect of PA on MI risk and on development of collateral blood flow, we suggest that other mechanisms play a causative role. Namely, that PA,

TABLE 1	Baseline Characteristics of the Study Population		
	Physically Inactive (n = 98)	Physically Active (n = 836)	p Value
Body mass index, kg/m^2	29.1 ± 4.3	26.6 ± 3.8	<0.001
Primary VF	55 (56.1)	311 (37.2)	<0.001
FH of CAD	42 (42.9)	309 (37.0)	0.28
FH of SD	14 (14.3)	99 (11.8)	0.70
Diabetes	15 (15.3)	100 (12.0)	0.33
Hypertension	60 (61.2)	420 (50.2)	0.04
Smoker	59 (60.2)	431 (51.6)	0.10
Dyslipidemia	60 (61.2)	313 (37.4)	<0.001
Obesity	38 (39.8)	122 (14.6)	<0.001
Medication before MI			
Diuretic	14 (14.3)	58 (6.9)	0.02
Calcium-antagonist	10 (10.2)	82 (9.8)	0.76
BB	20 (20.4)	78 (9.3)	0.002
ACE inhibitor	19 (19.4)	124 (14.8)	0.38
ARB	13 (23.6)	34 (10.9)	0.03
Aspirin	16 (16.3)	55 (6.6)	0.002
Statin	16 (16.3)	50 (6.0)	0.001
Antidiabetic agent	5 (5.1)	29 (3.5)	0.05
First HR, beats/min	78 ± 20	78 ± 20	0.97
First SBP, mm Hg	138 ± 30	140 ± 29	0.59
First DBP, mm Hg	83 ± 16	85 ± 17	0.48
First K$^+$, mEq/l	3.82 ± 0.52	3.80 ± 0.50	0.71
CK-MB Peak, mU/l	143 (57, 351)	182 (86, 345)	0.17

Values are mean ± SD, n (%), or median (25th, 75th percentile). Categorical data are expressed as n (%); continuous data as mean ± SD, and compared with Student's t-test, with the exception of CK-MB peak, expressed as median (25th, 75th percentile) and compared with Mann Whitney U test.

ACE = angiotensin-converting enzyme; ARB = angiotensin II receptor blocker; BB = beta-blocker; CAD = coronary artery disease; CK-MB = creatine kinase-myocardial band; DBP = diastolic blood pressure; FH = family history; HR = heart rate; K$^+$ = serum potassium; MI = myocardial infarction; SBP = systolic blood pressure; SD = sudden death; VF = ventricular fibrillation.

by decreasing sympathetic activity and increasing vagal tone and reflexes, markedly reduces the probability of VF during acute myocardial ischemia [4].

In conclusion, physical inactivity almost doubles the risk of ventricular fibrillation in case of MI. Even modest PA reduces this risk, possibly through an improved sympatho-vagal balance. Independent of the potential mechanisms, physical inactivity is a preventable risk factor for cardiac arrest which should be avoided in all subjects and particularly in those at higher risk.

*Gaetano M. De Ferrari, MD
Veronica Dusi, MD
Marta Ruffinazzi, MD
Vincenzo Gionti, MD
Luisa Cacciavillani, MD
Patrizia Noussan, MD
Valerio Zacà, MD
Tommaso Sanna, MD
Lia Crotti, MD, PhD
Peter J. Schwartz, MD

*Department of Molecular Medicine
Section of Cardiology
University of Pavia
Pavia
Italy
E-mail: g.deferrari@smatteo.pv.it
Twitter: @ESCAPE_NET

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Burden of Coronary Artery Disease as a Cause of Sudden Cardiac Arrest in the Young

Coronary artery disease (CAD) accounts for 80% of sudden cardiac arrest (SCA) overall [1], but non-ischemic structural heart diseases and electrical disorders are considered more prevalent in young patients [2]. Considering recent shifts in CAD epidemiology [3], we hypothesized that CAD may be the main cause of SCA among young adults at present. We therefore systematically assessed SCA etiology in patients <40 years of age using a large population-based registry.

The Paris Sudden Death Expertise Center (Paris-SDEC) initiated, in May 2011, a prospective population-based registry in the greater Paris area [4,5]. Every case of out-of-hospital SCA in those ≥18 years of age is captured and systematic information is gathered. Causes of SCA were centrally adjudicated.