

## SCIENTIFIC LETTER

## Lower myocardial infarction mortality in French men the day France won the 1998 World Cup of football

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Events that induce stress in a large number of people in a defined area, such as earthquakes and war, have been reported to increase the incidence of myocardial infarction. In contrast, the effect of major sporting events, such as a major football (soccer) match, on cardiovascular mortality is still controversial.<sup>1–3</sup> On one hand the emotional and mental stress, and alcohol and tobacco consumption, could increase myocardial infarction mortality, but on the other hand the immense fervour and the collective euphoria observed at the time of a victory could decrease this mortality. We hypothesise that in an exceptional positive sporting event, the total effect could be a decrease in cardiovascular mortality. The final of the World Cup of football held in France on Sunday 12 July 1998 gave us the opportunity to assess this hypothesis.

## METHODS

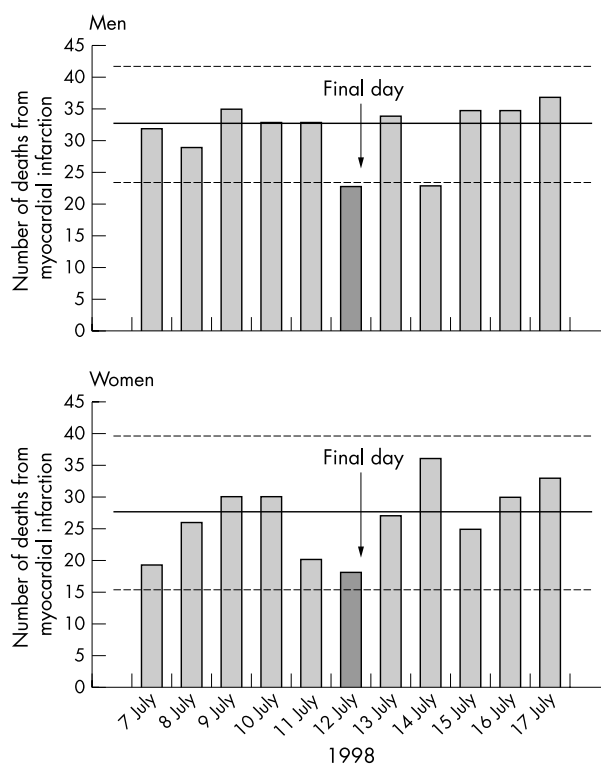
We analysed data on mortality using the French cause of deaths statistics system for June–July 1997 and 1998. The data comprised sex specific numbers of deaths from all causes (*International classification of diseases*, ninth revision (ICD-9): codes 001.0–999.9) and myocardial infarction (ICD-9: code 410). Additional data were available for six other causes of death: asthma (ICD-9 codes 493.0, 493.1, 493.9), cardiac dysrhythmias (ICD-9 codes from 427.0 to 427.9), heart failure (ICD-9 codes 428.0, 428.1, 428.9), malignant neoplasm of female breast (ICD-9 codes from 174.0 to 174.9), malignant neoplasm of trachea, bronchus, and lung (ICD-9 codes from 162.0 to 162.9), and sudden death of unknown cause (ICD-9 codes 798.0, 798.1, 798.2, 798.9).

As done previously,<sup>1,2</sup> the number of deaths on the day of the final was compared with the mean number of deaths on the preceding and following five days, for men and women separately. In addition, we compared the data with those from corresponding periods in 1997. Relative risks (RR) with 95% confidence intervals (95% CI) were calculated.

## RESULTS

All cause mortality was not different on the day of the final compared with the five days on either side in men (718 cases *v* average 695.2 cases; RR 1.03, 95% CI 0.92 to 1.18) and women (630 *v* average 628.3 cases; RR 1.00, 95% CI 0.85 to 1.22).

As fig 1 shows, mortality from myocardial infarction in men was significantly lower on the day of the final compared with the five days on either side (23 cases *v* average 32.6 cases; RR 0.71, 95% CI 0.55 to 0.98). In women, there was a non-significant decrease in the number of deaths from myocardial infarction (18 *v* 27.6 cases; RR 0.65, 95% CI 0.45 to 1.16). Mortality from myocardial infarction was also significantly lower in men on 14 July, the French national holiday (23 cases). Analyses of the same period in 1997 showed no significant decrease in myocardial infarction mortality on 12 and 14 July. Analyses of six other causes of death showed no significant variation on the same 11 days of 1997 and 1998.



**Figure 1** Number of deaths from myocardial infarction, in French men and women, from 7 July 1998 to 17 July 1998. France played Brazil in the final of the World Cup of football on 12 July 1998. Horizontal lines represent the mean and 95% confidence intervals for the five days preceding and the five days after the final match.

## DISCUSSION

In Witte's study<sup>1</sup> mortality from acute myocardial infarction and stroke was increased in Dutch men the day the Dutch football team played France and was eliminated from the 1996 European football championship. Replicating the same study Toubiana and colleagues<sup>2</sup> did not find a similar trend in the French data. Furthermore his table shows a trend to decreased cardiovascular mortality (RR 0.74, 95% CI 0.58 to 1.02).

The 1998 World Cup of football was the biggest sporting event ever held in France. Mounting expectations for final victory had a powerful impact on the general population as France won game after game. The final, watched by 23.6 million television viewers (40% of the French population), began at 9 pm and ended at 11 pm on Sunday 12 July. Consequently the decreased mortality from myocardial infarction in French men on 12 July basically occurred during the hours preceding the final. Hourly timing of deaths would have been helpful for interpreting results.

Such a positive effect of a major sporting event on national mortality data has never been reported. The exact mechanism

behind this difference is still unclear. Decreased activities and/or euphoria before and after the final could result in less stress. The combined effect of a day off work, a national holiday, and the euphoria of victory might also explain the fall in mortality from myocardial infarction two days later on 14 July.

It is noteworthy that a decreased workload in accident and emergency departments was also reported when England hosted the 1996 European football championship.<sup>4</sup> Moreover a reduction in the number of emergency psychiatric presentations occurred in Scotland during World Cup final competitions and was attributed to enhancement of national identity and cohesion.<sup>5</sup>

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## IMAGES IN CARDIOLOGY

### Acute anterior myocardial infarction obscured by diaphragmatic eventration

**A** 61 year old man presented with a three hour history of chest pain consistent with myocardial ischaemia. Initial ECG (below) demonstrated ST elevation/high take-off in lead V1 with ST depression in leads V2-V6, I, II, and tall R waves in leads V2-V3. These changes were not felt to meet criteria for thrombolytic treatment and this was withheld.

The patient was transferred to the coronary care unit (CCU) with a diagnosis of unstable angina. A portable chest x-ray (right, upper panel) showed that there was left diaphragmatic eventration with displacement of the heart to the right side of the mediastinum. Subsequent right sided and posterior lead ECGs (right, lower panel) were performed which showed ST elevation of 2 mm in leads V2-V3 consistent with anterior infarction. Thrombolytic treatment was not given because of the time which had elapsed from symptom onset.

Displacement of the heart within the thorax may obscure the classic 12 lead ECG changes of acute myocardial infarction and lead to misdiagnosis and inappropriate withholding of thrombolytic treatment. In such cases, the initial use of non-standard ECG lead positions is recommended for accurate diagnosis and treatment.

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