

Sudden Cardiac Death in NFL Players

NFL players are considered by many as a special group in American society. Their highly publicized lifestyle promotes an image of youthful energy and invulnerability. When catastrophic cardiovascular (CV) events occur in these players, uncommon as they are historically, the public is often troubled while considering the underlying cause of such events and pondering ways to prevent further tragic happenings.

In the past few years, there has been at least two documented cases of sudden cardiac death (SCD) in Arena league and NFL football. In the remote past, there were two other such known NFL related deaths in the 1970's. Since more than 1,500 NFL players compete annually, the impression that SCD is uncommon in active NFL players appears supported. However, the actual prevalence of SCD in retired NFL players is unknown. This and other health issues are presently being studied by the Living Heart Foundation (LHF), in cooperation with the NFL Players Association (NFLPA).

There is little publicized scientific data available concerning the causes associated with SCD in NFL players as determined by postmortem examinations. However, over the past 11 years there are a few reports that provide some insight into the nature of CV problems in NFL active and retired players.

In 1994, the National Institute for Occupational Safety Health (NIOSH) studied nearly 7,000 former NFL players' pension fund data and determined medium-term clinical outcomes by personal follow-up contact. NIOSH suggested that NFL linemen had a 52% increase in mortality compared to the general population and that cardiovascular disease was largely responsible. This study in medium-term mortality rates involving former players also suggested that non-whites had a 1.7 times greater risk of having cardiovascular disease than their white teammates. Large body size was also identified as an important factor to consider, when evaluating CV outcomes in former NFL players.

In 1998, the Georgia Institute of Technology studied 36 active NFL players and found that the % body fat and fat mass were increasing in linemen compared to earlier studies in the 1970's. In fact, the authors suggested that most of the increase in total body weight observed over the 20 year time span was due to increased fat mass.

In 2002 and 2003 two American College of Cardiology publications suggested that selected players might have increased CV risk. This was based on studies utilizing two common testing techniques to evaluate cardiac profiles. The data was collected several months before the young

football players actually signed contracts and entered the discipline of the active NFL teams. The electrocardiogram (1,282 players) revealed that more than 50% of these selected athletes had abnormal findings in spite of being asymptomatic and appearing fit. The prevailing opinion is that the electrocardiogram in young, asymptomatic, large-sized males is non-specific and sometimes misleading. The echocardiogram (156 players), a more sensitive testing method, showed that many of these football players showed hearts that were larger and thicker than accepted standards for people in the general population. The authors noted that these changes on echocardiogram were correlated with the players' body size. The significance of these findings requires further serial testing and correlations with future clinical outcomes, before conclusions may be made.

Barry Maron, MD, Director of the Minneapolis Heart Institute Foundation, has recently founded a registry that tracks young athletes (<age 35) for causes of SCD. This database includes information on athletes of both sexes who play many different sports. Although not specific to NFL players, the Minneapolis registry is the best available data for identifying causes of SCD in young athletes (table).

Causes Of sudden Death in 387 Young Athletes		
Cause	Number of Athletes	Percent
Hypertrophic cardiomyopathy	102	26.4
Commotio cordis (sharp blow to chest)	77	19.9
Coronary-artery anomalies	53	13.7
Left ventricular hypertrophy of indeterminate cause	29	7.5
Myocarditis	20	5.2
Ruptured aortic aneurysm (Marfan's syndrome)	12	3.1
Arrhythmogenic right ventricular cardiomyopathy	11	2.8
Tunneled (bridged) coronary artery anomaly	11	2.8
Aortic-valve stenosis	10	2.6
Atherosclerotic coronary artery disease	10	2.6
Dilated cardiomyopathy	9	2.3
Myxomatous mitral-valve degeneration	9	2.3
Asthma (or other pulmonary condition)	8	2.1
Heat stroke	6	2.1
Drug Abuse	4	1.6

Other cardiovascular cause	4	1.0
Long QT syndrome (seen on ECG)	3	.8
Cardiac sarcoidosis	3	.8
Trauma involving structural cardiac injury	3	.8
Ruptured cerebral (brain) artery	3	.8

In Dr. Maron’s SCD studies, published in the New England Journal of Medicine, only about 2% of young athletes who die of SCD have normal heart structure at autopsy. In addition, SCD victims are found most commonly among basketball and football players in the United States. It also appears that vigorous physical exercise can trigger lethal cardiac arrhythmias in individuals who have the presence of certain cardiovascular risk factors. Finally, up to 90% of such SCD events occur in relation to training or competition.

Over the past two years, the LHF has provided CV health services to active (5%) and retired (95%) NFL players. The LHF has identified the following list of CV risk factors involved in players CV health.

Retired NFL Players CV Risk Factors (Group Data)

1. Large body Size
2. High % body fat
3. inadequate regular exercise
4. sleep apnea
5. metabolic syndrome
6. persistent form of athletes heart
7. elevated serum cholesterol
8. systemic hypertension
9. diabetes

Findings involving group data utilize a relative index of risk for all retired players. For any individual player, all of the cited risk factors, some of the risk factors or none of these factors may be present.

At the present time, there is insufficient data to draw any conclusions related to correlations among CV testing, CV risk factor analysis and SCD in active NFL players. Similarly in retired NFL players the preliminary CV data will need to be expanded and tracked over many years time to begin

to determine risk factor correlations with SCD and other non-lethal outcomes like heart attack and stroke.

The LHF functions as the retired players' health advocate. Our first responsibility is to help individual NFL players to reduce existing CV risk factors. Our second task is to identify adverse group patterns or health trends that, if present, can be corrected. Such actions will help to lessen the impact of CV disease on future pain and suffering for players and, hopefully, greatly reduce future episodes of SCD. Unfortunately, due to the complexity of CV disease, there is currently no applicable health approach to guarantee the avoidance of SCD in any individual or group.

Over the past 2 years, because of concern for the health of former NFL players, LHF has offered voluntary health services to all NFL players. The NFLPA has supported this effort. The LHF has conducted 10 regional screenings in conjunction with its network of hospital partners, physician volunteers and national medical societies. Over 450 former players have been extensively tested, motivated and guided in ways to improve their health. The LHF communicates with the player and his doctor to affect change. If the player needs to find a doctor, the LHF is able to help. The LHF is helping retired NFL players now, neither the Foundation nor the NFLPA is waiting for the results of long-term studies to be obtained and scrutinized before acting. The time is now for encouraging health testing and subsequent changes that will influence retired NFL players and their families, so that they will enjoy an improved quality of life for years to come.