

## Editorial

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### CARDIO-VASCULAR ASSESSMENT OF PILOTS

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Atherosclerotic Coronary Artery disease (CAD) presents a spectrum of diagnostic difficulties. While, the diagnosis of symptomatic cases is not difficult, the diagnosis of silent CAD is not easy, especially, if any large scale screening is contemplated. The main problem in the diagnosis of asymptomatic CAD, is the cost factor, which increase as the studies become more and more sophisticated. Obviously, such screening of the general population, is not possible, as most of the countries can ill afford, to have such costly health programme. Yet, screening of category of personnel like aircrew is inescapable.

Sudden incapacitation in the air, leading to aircraft accidents and thus loss of life and property is a real danger. It is a problem, which is important equally in civil as well as military flying. Even though myocardial infarction has been implicated, in less than 0.5% of military aircraft accident fatalities<sup>1</sup>, in a recent US Air Force report, of sudden incapacitation, 5 out of the 146 cases were due to myocardial infarction<sup>2</sup>. Reports from member countries of International Civil Aviation Organisation (ICAO) also mention, that every year one or two pilots do suffer from sudden in-flight incapacitation due to CAD, though not resulting in accidents. Some aviation medicine authorities, however, have worked out that the "crash" rate now being achieved in commercial operations, in respect of pilot incapacitation, is at least 10 times better than is required by airworthiness criteria for comparably vital aircraft systems (Chapman)<sup>3</sup>.

The relative importance of the cardio-vascular problems in aircrew, can be gauged from the fact, that nearly 38% of all loss of flying category among civil pilots are due to Cardiovascular diseases<sup>4</sup>. It is in this context, that medical evaluation of aircrew assumes considerable importance. Assessment of cardiovascular function of aircrew forms an important part of this medical evaluation.

The problem of adopting uniform medical certification standards for pilots, throughout the world, is an extremely difficult one. Yet ICAO which is the forum for International Civil Aviation Safety has laid down the various standards and continually draws upon the scientific and professional expertise, to review them periodically<sup>5</sup>.

The Bethesda report<sup>6</sup> lays down extensive and valuable criteria for cardiovascular assessment, relating to aviation safety. The working party of the Cardiology Committee convened by the Royal College of London<sup>7</sup> to examine the standards of cardiovascular fitness of airline pilots with specific reference to electrocardiographic testing, was another landmark in the medical evaluation of aircrew. A submaximal exercise test is recommended at initial examination, as it provides a base-line for future reference (Doyle and Kinch)<sup>8</sup>. It may also unmask, a silent CAD in a few cases.

The most recent, significant achievement relating to aviation medicine programme, has been in 1982, when the ICAO Council adopted a standard, providing mandatory training for aviation medical examiners world wide<sup>9</sup>.

Normal cardiovascular function is a dynamic, stress adoptive process and is an important requirement of all personnel engaged in aviation duties. In its evaluation as on today, electrocardiography is an important and generally available technique. Screening with ECG of all asymptomatic individuals, is done initially and at periodic intervals.

In this process, many abnormalities of ECG may be seen. While, they may not be diagnostic of a specific disease like CAD, they may not be normal. Thus the omnibus term "ECG Abnormality" is often used, to include the various deviations from the strictly normal pattern of ECG. The term "Non specific ECG Abnormality" is also used, after excluding all possible known causes. Unfortunately, there is no uniformity in defining these non specific abnormalities or their significance. The finding, that non specific ST/T changes, have been associated with increased mortality in people with angiographic CAD<sup>10</sup> and overt CAD is reported to develop in larger number of persons with these abnormalities<sup>4</sup> need further consideration. That people with non diagnostic ST/T abnormalities have 3 to 10 times the risk of developing CAD than others<sup>11,12</sup> is again significant.

Recently, however, there has been many reports on the limitations of stress testing in the detection of Ischaemic heart disease in asymptomatic individuals<sup>13, 14, 15, 16, 17</sup>. The predictive value of a positive test in asymptomatic individuals unlike hospital population is only 35-40%<sup>13</sup>.

Thus, all the findings, obtained from various studies, assume significance in present day context of aviation fitness. In this issue of the journal, there are two articles wherein, the authors have tried to highlight some aspects, from a retrospective study of ECGs of flying personnel. The conclusion drawn from one of these studies about ST/T abnormalities, being statistically related to an increased risk of developing IHD is in conformity with the findings of other workers. It further confirms the need for a longer follow up of such cases. Similarly Mani et al in their follow up study of non specific repolarisation ECG Abnormalities (in this issue of the journal) found 24.1% progressing eventually to a diagnosis of CAD. This again highlights the necessity for long term follow up of such cases of ECG Abnormality.

On one hand, various studies have shown the limitations of stress ECG in asymptomatic individuals, while at the same time, they indicate that not all cases of non specific ECG abnormalities are innocuous. Thus, the problem in evaluating trained pilots showing ECG abnormality becomes difficult at times. An over cautious approach may lead to grounding of highly trained flying personnel causing considerable loss to the individual and state. Too liberal a view, might at the other end, compromise flight safety. It is hence of paramount importance that a balanced approach is needed in these cases. It is in such cases that techniques like echocardiography, ambulatory monitoring, stress testing under hypoxia, gated blood pool studies. Thallium scan and even Coronary Angiography have a place in the cardiovascular assessment.

A review of such studies, retrospective and prospective, from more centres, would provide us with sufficient information for proper evaluation. It might also help the aviation medical authorities to implement an intervention programme designed to modify the life style of pilots showing certain ECG abnormalities.

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