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DEPARTMENT OF THE AIR FORCE
USAF SCHOOL OF AEROSPACE MEDICINE (AFSC)
BROOKS AIR FORCE BASE, TEXAS 78235

REPLY TO ATTN OF: NGI

15 JUL 1976

SUBJECT: Clinical Investigation Proposal #610: Thallium 201 Myocardial Imaging - Follow-up Status Report

TO: HQ USAF/SGPR
Wash DC 20314

1. As of 1 May 1976, exercise myocardial imaging was accomplished in 25 aircrewmembers prior to undergoing cardiac catheterization. The indications for the latter include: (a) Acquired bundle branch block, (b) Abnormal electrocardiographic responses to exercise stress testing, (c) Isolated episodes of atrial fibrillation, and (d) The serial development of Q waves on the annual electrocardiogram suggestive of myocardial damage. The procedures followed were as outlined in the protocol and the last status report. Fifteen aircrewmembers had normal coronary arteriograms. In this group 3 had normal myocardial scans and two had borderline abnormal scans. The latter were manifested by a questionable reduced uptake of the radionuclide near the apex in the inferior cardiac border. Ten aircrewmembers had abnormal coronary arteriograms. Three had abnormal myocardial scans, one had a borderline abnormal scan, and the remainder or six had completely normal scans. Five of the six with normal scans had at least a 50% lesion of one vessel; in fact three of these five had multiple vessel disease. The remaining aircrewmember with a normal scan had intimal roughening of his right coronary artery. The results are summarized on the attached copies of illustrations that were presented to the Aerospace Medical Association Meeting last May.

2. No complications have occurred. There have been no subjective symptoms or electrocardiographic changes as a result of the intravenous injection of this radionuclide.

3. These findings indicate that Thallium 201 myocardial imaging following exercise, as performed in this laboratory, is not a reliable method to detect the presence or progression of coronary artery disease in the aircrewmember. Similar results have been recently reported from other laboratories. High grade multiple vessel disease can result in a false negative scan because of generalized relative diminished uptake of the radionuclide by the myocardium rather than a localized area as required to detect a "cold spot." Furthermore, there must be greater than a 50 to 75% obstruction in a single vessel before there is a localized decreased uptake of the radionuclide.

4. As a result of this study, myocardial imaging using Thallium 201 has been temporarily suspended. It is felt that adding an additional 25 subjects to the study for a total of 50 as originally proposed is not indicated at this time. During the next several months, depending upon

the availability of the funds, animal studies will be conducted to evaluate measurements of radionuclide washout rather than uptake and image enhancement techniques. If these approaches appear to improve the sensitivity and specificity of myocardial imaging, then the human study will be extended in an additional 25 aircrewmembers who undergo cardiac catheterization. These procedures will not require modification of the existing approved protocol because the route of administration or amount of radionuclide administered will not change. The only difference is that a single dose of Thallium 201 will be administered at rest rather than during exercise and imaging will be accomplished before and after exercise to measure washout. A status report of the animal studies will be forwarded before applying these modifications to future human studies.

Robert Gen Iver

ROBERT G. MCIVER, Colonel, USAF, MC
Commander

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Illustrations (4 copies)

Cy to: AMD/RD
AFSC/SG

NORMAL CORONARY ARTERIOGRAPHY
VS
MYOCARDIAL SCANS

CASE NO.	REASON FOR SAM EVAL	REASON FOR CARDIAC CATH	CARDIAC CATH FINDINGS	MYOCARDIAL SCANS
1-4	RBBB	RBBB	NORMAL	NORMAL
5	LBBB	LBBB	NORMAL	NORMAL
6-10	STTWC's &/OR DM	ABN TM	NORMAL	NORMAL
11	ATRIAL FIBRILLATION	ATRIAL FIBRILLATION	NORMAL	NORMAL
12	QS V_1-V_2	ABN TM	NORMAL	NORMAL
13	OTHER	ABN TM	NORMAL	NORMAL
14	NSSTWC's - ABN DM	ABN TM	NORMAL	BORDERLINE: ? ↓ UPTAKE INFERIORLY RAO VIEW ONLY
15	↑ ANT. FORCES BORD: ABN. DM	ABN TM	NORMAL	BORDERLINE: ? ↓ UPTAKE INFERIORLY RAO VIEW ONLY

ABNORMAL CORONARY ARTERIOGRAPHY
VS
MYOCARDIAL SCANS

CASE NO.	REASON FOR SAM EVAL	REASON FOR CARDIAC CATH	CARDIAC CATH FINDINGS	MYOCARDIAL SCANS
1	NSTWC's BORD, ABN, DM	ABN TM	• TWO >90% LESIONS PROX. RCA • DISTAL FILLING OF RCA FROM LCA • RD	ABNORMAL: ↓ UPTAKE INFERIORLY
2	RBBB	RBBB	• INTIMAL ROUGHENING PROX. RCA • 20% ECCENTRIC LESION MID LAD • RD	ABNORMAL: ↓ UPTAKE ANTERIORLY
3	SERIAL Q's (NO SX)	SERIAL Q's ABN TM	• > 90% LESION PROX. RCA • COMPLETE OCCLUSION RCA AT CRUX • > 90% LESION ORIGIN OBTUSE MARGINAL ARTERY • POST DESCENDING RCA FILLED FROM O.M.A. • RD	ABNORMAL: ↓ UPTAKE INFERIORLY
4	ATRIAL FIBRILLATION	ATRIAL FIB. NORMAL TM	• TWO 20% LESIONS PROX. RCA • 20% LESION PROX. CIRCUMFLEX ARTERY • 50%-60% LESION PROX. LAD • BALANCED	BORDERLINE: ? ↓ UPTAKE OF THE APEX IN MULTIPLE VIEWS

ABNORMAL CORONARY ARTERIOGRAPHY
VS
MYOCARDIAL SCANS

CASE NO.	REASON FOR SAM EVAL	REASON FOR CARDIAC CATH	CARDIAC CATH FINDINGS	MYOCARDIAL SCANS
5	NSSTWC's ABN TM	ABN TM	•INTIMAL ROUGHENING PROX. RCA •40% ECCENTRIC LESION LMCA •70-80% PROX. LESION IN A DIAGONAL BRANCH •RD	NORMAL
6	AP NORMAL ECG	AP ABN TM	•MULTIPLE>50-90% LESIONS RCA •20% LESION LMCA •50% LESION PROX. OBTUSE MARGINAL •20-30% LESION TRUE CIRCUMFLEX •MULTIPLE 50% LESIONS LAD •DISTAL RCA FILLED FROM CIRCUMFLEX SYSTEM •RD	NORMAL
7	RBBB	RBBB	•INTIMAL ROUGHENING PROX. RCA •40-50% LESION MID LAD •RD	NORMAL

ABNORMAL CORONARY ARTERIOGRAPHY
VS
MYOCARDIAL SCANS

CASE NO.	REASON FOR SAM EVAL	REASON FOR CARDIAC CATH	CARDIAC CATH FINDINGS	MYOCARDIAL SCANS
8	CHEST PAIN SERIAL Q'S	SERIAL Q'S NORMAL TM	•DIFFUSE 50-90% LESIONS RCA •DYSKINESIS INF. WALL •RD	NORMAL
9	NSSTWC's	ABN TM	•20% LESION MID LAD •60% LESION PROX. CIRCUMFLEX •70-90% LESION OF OBTUSE MARGINAL BRANCH •60% LESION MID RCA •GENERALIZED HYPOKINESIS ON LV ANGIO •RD	NORMAL
10	NSTWC's ABN DM	ABN TM	•INTIMAL ROUGHENING PROX. RCA •RD	NORMAL