New Systems For Preservation And Assessment Of Cardiac Graft Viability Before Transplantation

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By

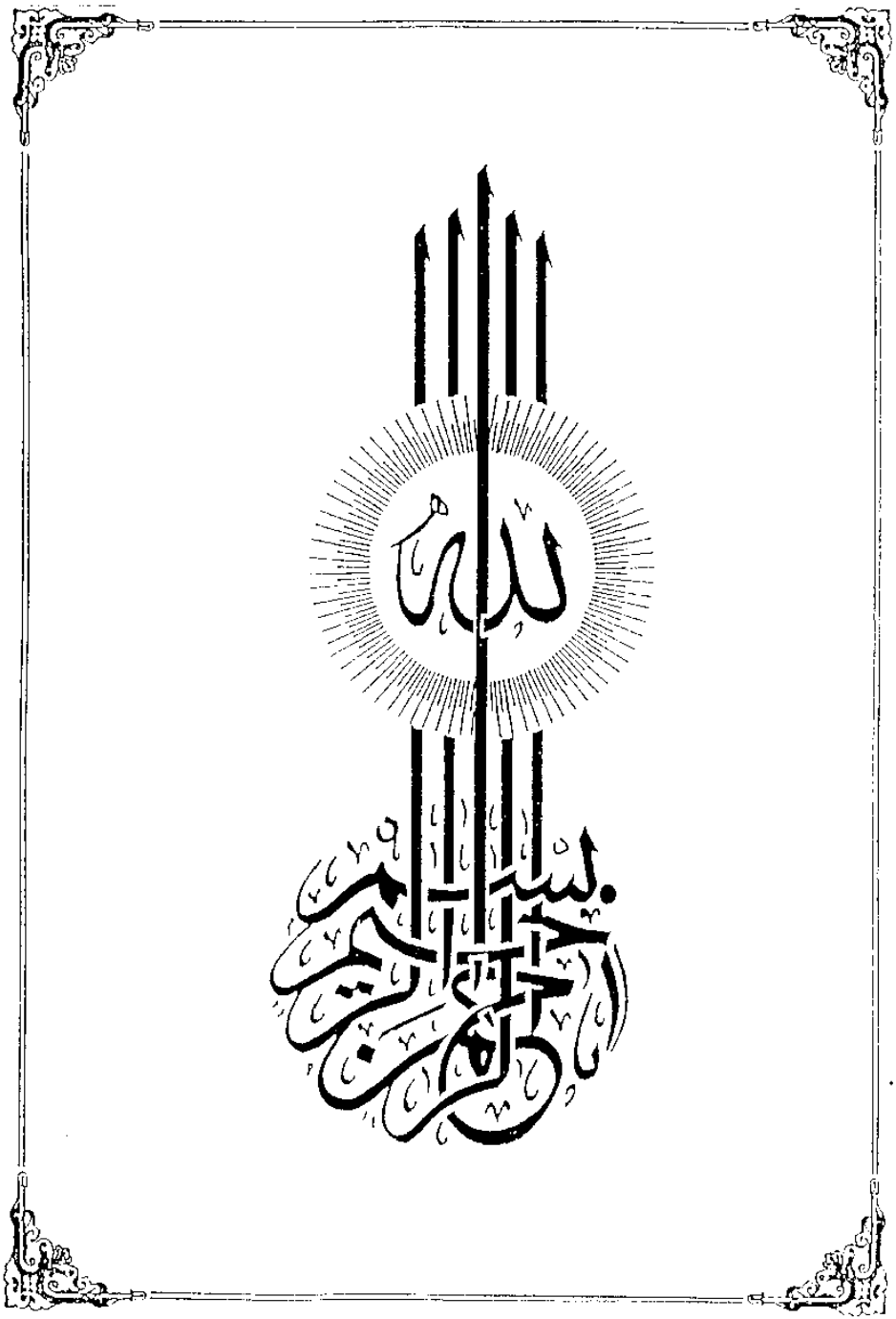
Khaled Hassan SAAD
(M.B., B. Ch.; M. Sc. "Anaesthesia")

Supervised By

Professor Doctor
Yehia A. Rehim HEMAIMI
Professor of Anaesthesia
Faculty of Medicine
Ain Shams University, EGYPT

Professor Doctor
Suzanne ESTANOVE
Professor of Anaesthesia
Faculty of Medicine
Lyon University, FRANCE

Faculty of Medicine
Ain Shams University
1996



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INTRODUCTION

One of the practical problems encountered in heart transplantation is the limited preservation time of the donor heart, which is usually less than 6 hours. Long-term preservation, however, is necessary to increase the donor pool and to provide adequate time for graft assessment and tissue typing. Current techniques of donor heart procurement for clinical transplantation use a simple method of donor heart preservation consisting of rapid cooling by immersion in a saline bath at 4°C with infusion of a cardioplegic solution.

However, Dureau and associates, in 1990, demonstrated the possibility of extending the storage time of human hearts to 12 to 14 hours. Reitz in 1974, Kohno in 1987 and their colleagues, showed the possibility of preserving hearts using cold storage with a combination of an intracellular-type high-potassium solution and hypothermia.

Conversely, Larese and co-workers in 1990, demonstrated the superiority of hypothermic heart perfusion in rats over the immersion technique. Before this work, Proctor E. in 1971 had reported the successful experimental transplantation of hearts after hypothermic perfusion storage.

Wicomb and Collins in 1989, described a new method of preserving rabbit heart for 24 hours, which involved hypothermic microperfusion. Recently, Ferrera et al in 1993, applied this method to preserve pig hearts for 24 hours. Hypothermic microperfusion (very low flow perfusion) offers a compromise between perfusion and immersion.

The present study attempted to compare these different methods of heart preservation. Studies were performed on pig hearts preserved for 24 hours in cold St. Thomas' hospital modified solution, and included an investigation into the changes in myocardial high-energy phosphates and the electronic microscopy appearance.