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Autologous Skeletal Myoblast Transplantation: First Clinical Experience

Heart failure secondary to a myocardial infarction is now a frequent disease, the incidence of which is expected to further increase in the forthcoming years because of the ageing of the population. It is responsible for an high yearly mortality and substantial costs. Although several therapies yet exist, the most radical of which is cardiac transplantation, they have their limitations which justify the search for alternate options. Cellular therapy might be one of them.

Assuming that cardiac cells that have been irreversibly damaged by a « heart attack » cannot regenerate, the underlying concept of cellular therapy is to repopulate the noncontractile fibrous postinfarction scar with living cells that can revive contraction in this area. The simplest way of achieving this objective is to take a piece of muscle from the patient's thigh (which is easily done under local anesthesia), to grow it in a laboratory so as to obtain hundreds of millions of muscular *contractile* cells (named skeletal myoblasts) and then to reimplant these cells into the infarcted area. At the completion of 7 years of experimental studies, we have initiated a phase I human trial which started on June, 15, 2000 in the Department of Cardiovascular Surgery of the Hôpital Bichat (Paris, France). The abovementioned procedure was applied to a 72-year old patient suffering from severe congestive heart failure. Eight-hundred millions of cells were grafted into and around a postinfarction scar which involved a large part of the posterior wall of the left ventricle 2 weeks after the muscular biopsy. Multiple injections were made with a special microneedle and there was no bleeding from any of the puncture sites. Two coronary artery bypasses were constructed concomitantly in other areas of the heart. Almost five months after the operation, the symptomatic status of the patient has dramatically improved with objective evidence (based on echocardiography and positron emission tomography) for new viability and contraction in the previously « dead » area which has been grafted.

This trial, coordinated by Dr Philippe Menasché (Department of Cardiovascular Surgery, Hôpital Bichat, Paris), has involved a multidisciplinary group including cardiac surgeons (Drs Marcio Scorsin, Bruno Pouzet and Philippe Menasché), cardiologists (Drs Albert Hagège and Michel Desnos, Hôpital Européen Georges Pompidou, Dr Denis Duboc, Hôpital Cochin and service hospitalier Frédéric Joliot/ Commissariat à l'Energie Atomique - CEA), a cellular biologist (Jean-Thomas Vilquin, INSERM unit 523 headed by Ketty Schwartz, Groupe Hospitalier Pitié-Salpêtrière) and an hematologist specialized in cellular therapy (Dr Jean-Pierre Marolleau, Hôpital Saint-Louis). Preclinical studies have been primarily supported by the French Institute of Health and Medical Research (INSERM) and l'Association Française contre les Myopathies (The French Neuromuscular Dystrophy Association/French Telethon) whereas the clinical trial is carried out under the aegis of the Assistance Publique-Hôpitaux de Paris.

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