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New Storage Buffers for Micrografts Enhance Graft Survival and Clinical Outcome in Hair Restoration Surgery

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Introduction

Preparation and storage of human hair follicle grafts during micrograft transplantation procedures in hair restoration surgery are crucial steps in maintaining follicle cell growth and hair shaft elongation. High viability of follicle graft cells during transplantation is essential for survival of the transplant and therefore determines the clinical outcome of the procedure. There are different factors influencing the viability of the graft. Mechanical irritation of the follicles during preparation is one factor. Furthermore, it has been shown that during storage of micrografts in commonly used buffers the viability decreased, which limits the duration of the transplantation sessions. This might be due to the absence of nutritional factors, changes in environmental pH and osmolarity, depletion of energy stores for the anaerobic pathway in the follicle cells, or other not yet defined mechanisms. However, the commonly used conditions for graft storage in hair restoration surgery are not satisfactory today; this influences the outcome in micrograft transplantation procedures.

In the past, studies have been performed to optimize the storage buffers for micrografts. These studies focused on temperature conditions, salt composition, or the effect of nutrients supplied to the storage buffers.[1–4] Although some effect of storage temperature, nutrients, or salt composition has been demonstrated, no clear improvement of storage conditions was found in *in vitro* assay systems.

All the performed studies focused on prevention of follicle cell necrosis (which might be induced by the absence of nutrients for the aerobic or anaerobic pathways), mechanical damage of the follicle cells during preparation, or necrotic cell death due to the production of oxygen radicals or other toxic metabolites during the storage period.

Another pathway of cell death, apoptosis, has so far not been investigated as a possible cause of follicle cell death during storage. Apoptosis is an active form of cell death, in which fragmentation of DNA and cell death is induced by specific signals entering the cell. Many stimuli have been identified that can induce apoptosis, including death signals by soluble molecules like tumor necrosis factor, loss of survival factors (absence of insulin or other hormones), radicals released after tissue injury (oxygen radicals, nitric oxide (NO), and metabolites of the arachidonic acid (AA) pathway, respectively), or loss of cell-cell interactions.[5,6] All these mechanisms result in the activation of an

continued on page 333

Regular Features

Feature Articles

Salute to Arthur Tykocinski, MD Surgeon of the Month

Jerry E. Cooley, MD *Charlotte, North Carolina USA*

Arthur Tykocinski, MD, was born in São Paulo, Brazil in 1965. As a youngster, Arthur was very shy and loved science. His father was an economist and his mother was a manager, and both worked at the same company, a well-known Brazilian jewelry store. At the age of 5, his older sister, Tamara, was diagnosed with systemic scleroderma. The family visited many hospitals all over the world to get the best medical care for her. This experience had a profound impact on Arthur and helped inspire him to pursue a medical career.

Arthur attended private school in São Paulo. He studied medicine at the well-known Santa Casa de São Paulo Medical School. He then completed a residency in dermatology followed by a three-year fellowship in dermatologic surgery. During his fellowship, his chairman asked him to start performing hair restoration at the medical school. His initial impression was, "Hair transplantation? That's ugly!" But after reading many current articles on hair restoration, he began to change his mind.

The following year, he attended his first transplant conference, which was held in El Salvador in 1994. Although a small conference, many well-known surgeons were there. Arthur learned a tremendous amount from these experienced surgeons and made valuable friendships. While he did not have much knowledge about transplantation to share at the time, he did know a lot about soccer. Because the World Cup was being held at the same time, soccer was a hot topic, and the others seemed to know almost nothing about the game. So he shared his soccer knowledge and became "part of the team." He visited one of these friends, Dr. Paul Cotterill, in his office the following year. He remains grateful today for the knowledge he gained and for the hospitality of Paul and his family.

Arthur Tykocinski, MD, *São Paulo, Brazil*

In 1996, Arthur was exposed to the concept of follicular unit transplantation at the Annual Live Surgery Workshop in Orlando. He met Dr. Ron Shapiro there, and after visiting him in his office and watching his technique, he committed himself to this new technique and never looked back. "Ron was more than a teacher," Arthur says. "He was a great friend."

"As everyone wants," Arthur comments, "I also want in my hair transplants a great volume with perfect artistry. I am very interested in the relation between blood vessels and graft density. The goal is to increase density without increasing the risks." A typical case for Arthur now is over 2,000 follicular units. Occasionally he uses "follicular groups" when he believes it will add greater density and volume. In particular, he uses what he calls the "stick-and-place Brazilian technique" to plant grafts. An assistant helps place the graft immediately after Arthur makes the incision with a SharpPoint blade. He is proud to have his sister Tania, who is a dentist, assist him since beginning his practice. "She is my most important medical assistant and has helped me a lot in developing my techniques," he says.

In his free time, Arthur loves action sports such as surfing, skating, and snowboarding. He is not married yet, but believes it won't be long after meeting his "incredible girlfriend Daniela!" He is currently busy building a new house on a beautiful beach near São Paulo, and he says that he expects to be visited by many friends from the ISHRS. We hope he is building plenty of extra rooms.✧