

## **Phase I Clinical Trial - Treatment of Knee Osteoarthritis with Autologous Mesenchymal Stromal Cell Product**

**Chih-Hung Chang<sup>1,2</sup>**

<sup>1</sup>Department of Orthopedics, Far Eastern Memorial Hospital, New Taipei City, Taiwan

<sup>2</sup>Graduate School of Biotechnology and Bioengineering, Yuan Ze University, Taoyuan, Taiwan

### **Abstract**

Knee osteoarthritis (OA) is a common disease that mostly occurs in elderly population. Taking NSAIDs, hyaluronic acid (HA) or platelet-rich plasma (PRP) injection are common non-operative treatment for OA. Recently, various cell-based therapies have become new popular treatment methods, among them, mesenchymal stem cell (MSC) therapy is the most high-profile therapy method. MSC exist in various human tissue, and it plays a vital role for tissue repair and regeneration. Besides, it possesses the ability of anti-inflammatory, chondrocyte differentiation and tissue repair promotion. Currently, we cooperated with EMO Corp. to develop MSC-related cell products by using infrapatellar fat pad (IPFP). IPFP is a piece of fat located near the patella bone within the knee, and we can isolate IPFP-MSC after collagenase digestion. IPFP-MSC have highly proliferative and differentiate capability, they can express CD73, CD90, CD105, lack expression of CD11b, CD19, CD34, CD45, and express aggrecan, type II collagen and SOX-9 mRNA after cultivation with chondrogenic differentiation medium. IPFP-MSC can also inhibited the proliferation of PBMC and decrease TNF- $\alpha$  synthesis in IPFP-MSC/macrophage co-culture system. In this phase I clinical trial, we enrolled 12 subjects with OA whose KL grade was range between 2~4. Their IPFP were collected and transport to EMO Corp. for IPFP-MSCs isolation and proliferation. When the cell number proliferated to  $1 \times 10^8$ , the cells were preserved in temperature recorded liquid nitrogen preservation system until injection. Clinical data was collected on Day-7, Month-1, Month-3, Month-6 and 1-year post-cell injection. Clinical results showed that VAS values were decrease significantly, knee function related score such as KOSS and IKDC were also improved. In order to promote the development of biological industries, Taiwan's government has launched "Special Management Regulation Amendment" regulations for autologous cell therapy, the draft related to regenerative medicine regulations has also been announced recently. We believe these policies will

be encouraging to the Taiwan's regenerative medicine industries.