PRP stimulates human chondrocytes proliferation and matrix formation

Introduction
Platelet-rich plasma is an osteoinductive therapeutic approach that is used in treatment of bone and cartilage healing process. The purpose of this study was to investigate the effect of PRP on human chondrocytes.

Materials and Methods
Human articular chondrocytes were collected from patients, single chondrocytes obtained by enzymatic digestion were pooled and expanded in vitro for several weeks in Han’s F12 medium plus 10% FCS or plus 5%PL (platelet lysate). In parallel, we performed in vitro pellet culture, to test the capability to maintain chondrogenic potential. Proliferation and differentiation analysis was performed at different time during in vitro expansion.

To evaluate the rate of cell proliferation, at regular intervals the cell were counted and the number of cell duplication was calculated as ratio to starting value. Cell viability was assessed by MTT analysis.

To test the ability to maintain cartilage phenotype, chondrocytes expanded in monolayer, were successive cultured in vitro in micromass pellet and in presence of chondrogenic medium, moreover some cellular pellet was implanted in nude mice.

Results
Preliminary results shown that cell proliferation and number of cell doublings were drastically enhanced in cultures supplemented with PL compared to cultures in FCS. Real-time analysis of mRNAs collected at different time of culture, shown that during the expansion in presence of PL, drastic decrease of the collagen type II mRNA was observed, while in the control culture grown in FCS, collagen type II expression remain during the cell expansion. In the same time the expression of collagen type I was detected.

Discussion and Conclusions
PRP may be useful to stimulate the proliferation of human chondrocytes cells. Even if, the articular chondrocytes grown in presence of PL dedifferentiate in vitro and lose collagen type II expression, these cells are able to redifferentiate under stimulation with chondrogenic inducers and formed cartilage tissue in vivo.

From these preliminary data PRP is an effective substitute for FCS to support in vitro expansion of human cells and we hypotize the tissue-engineering applications.