GROWTH FACTORS IN ORTHOPAEDICS AND IN TRAUMATOLOGY

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Introduction In case of unsuccessful setting of a fracture or in the presence of a loss of bone substance (cavity or segment), it is generally advisable to associate a biological contribution, able to lead the repairing process with a suitable mechanical stabilization. At present, the bone graft both autologous and homologous, is reputed the biological support to be chosen in these cases. In the last few years, the study of biology of repairing processes of fractures has led to the isolation of the chemical mediators that induce and modulate the bone reparation. Among these, we have focused our attention on the growth factors of platelet derivation and, in particular, PDGF (platenet derived growth factor), TGF-B (Trasforming growth factor – B), FGF (fibroblast growth), IGF1 and 2 (insulin like growth factor), VEGF (vascular endothelial growth factor) and EGF (epidermic growth factor). In addition, the development of biomaterials led to the synthesis of some substances able to repeat the mineral stage of the bone since they possess osteoconductive capacity and remove the risks of immunogeneticy and of bacterial or viral contamination such as hydroxiapatite. The authors explain their preliminary experience in the employment of autologous growth factors or associated with Coralline Hydroxiapatite (Pro-Osteon 500 R-Interpore-Cross International, ltd, Irvine, CA, USA) in the treatment of unsuccessful fracture setting and of bone substance loss as well. **Materials and methods** From October 2001 to 2003, we have treated 14 patients of whom 10 men and 4 women aged between 15 and 69 (average age: 41) for a total of 17 bodily districts. The indications were heterogeneous both for their seat and pathology: delay in setting (1) (shin bone), loss of bone substance (2) (thigh bone-shine-bone, 1), deficiency in ossification in extension (6) (humerus,1-tibia, 5), periprothesis osteolysis (5) (acetabulum,4-thigh bone, 1), arthro-prosthesis in rheumatoid arthritis (2) (cotyloid cavity) and arthroprosthesis in acetabulary displasia (1) (tectoplastics). In all cases we employed a gel shaped platenet extract, prepared by our Transfusion Service. From a drawing of 450 ml of entire blood from the patient, 24 hours before the operation, we obtained a platenet extract of 10 ml containing 1.000.000 ph/ml and a proteinic cryoprecipitate of 8 ml containing coagulation factors (factor VIII and 13, fibrinugenous and fibronectina). At the time of the operation 5 ml of plate concentrate and 2ml. of cryoprecipitate were mixed and 0.5 ml of CaCl and 1 ml of Batroxobina (Botropase-Abbott Spa, Rome, Italy) were added to the compound as catalysts, thus getting about 8cc. of platelet gel. When the compound was still in its liquid state, we added the granules of ProOsteon 500R to obtain, in 15 minutes' time, a compact mouldable compound ready to be placed in the seat of the bone defect. The compound of platelet gel and proOsteon 500R was applied in the established seat after surgical preparation of same (decertification). After the operation Rx checks were performed every 3 months with a follow-up of 24 months at most. **Results** In the postoperative checks no local systemic phlogistic or septic processes were fund. No tissue intolerance reactions of the applied compounds were found. During the check after 18 months, in 13 cases we noticed the restoration of the regular skeleton filling, that is: cortical and spongy in diaphysis applications; spongy in the applications for cavitary defects. In 4 cases (1 post-traumatic loss of bone substance of tibia, 1 bone transport of tibia in neurofibromatosis, 1 extension of tibia and 1 tectoplastics for acetabulary displasia), we found the reabsorption of the graft applied. In these latter cases the signs of unsuccessful taking root were already present in checks

at 3 and at 6 months. These results were unchanged in checks at 24 months. **Discussion** On the whole, the results we achieved were very good in the cases of periprosthesic reabsorption, good in the applications for deficiency in extension ossification, whereas they were discordant in the cases of pseudoarthrosis or loss of bone substance. To sum up, we can consider this method as a possible coadjutor in the treatment of cavitary or segmentary bone defects also thanks to its simple application, to the almost absolute lack of infections or immunogenic risk and to its cost in terms of the patient's health and, from the economic point of view, it is comparatively cheap considering the risks connected with the donation seat of an eventual graft of homologous bone or with the employment of allo/or xeno grafts.
Given the experience we have gained so far, we will have to go on studying in order to understand the right directions to the employment of autologous growth factors both as regards the base pathology and the times when to intervene and the application ways as well (alone or associated with hydroxiapatites, ceramic substrata or engineerized tissues).