INTRODUCTION Due to the presence of megakaryocytes, platelets and clotting factors, bone marrow aspirate (BMA) tends to coagulate. For the first time, starting from our previous studies on mesenchymal vertebral stem cells, it has been hypothesized that coagulated BMA represents a safe and effective autologous biological scaffold for bone regeneration in spinal surgery. The present research involved advanced preclinical in vitro models and the execution of a pilot clinical study. MATERIALS AND METHODS Evaluation of cell morphology, growth kinetics, immunophenotyping, clonogenicity, trilineage-differentiation, growth-factors and HOX and TALE gene expression were analyzed on clotted- and un-clotted human V-BMA. In parallel, a pilot clinical study on ten patients with degenerative spine diseases submitted to instrumented posterior arthrodesis, is ongoing to assess the ability of clotted-V-BMA to improve spinal fusion at 6- and 12-months follow-up. RESULTS Results demonstrated that clotted-V-BMA have significantly higher growth-factor expression and mesenchymal stem cell (MSCs) viability, homogeneity, clonogenicity, and ability to differentiate towards the osteogenic phenotype than un-clotted-V-BMA. Clotted-V-BMA also highlighted significant reduced expression of PBX1 and of MEIS3 genes negatively involved in osteoblast maturation and differentiation (Fig.1). From December 2020, eight patients have already been enrolled with first promising results concerning spinal fusion and clinical outcomes. CONCLUSIONS The application of V-BMA-clot as carrier of progenitors and cytokines and as natural scaffold with a structural texture represents a point-of-care orthobiologic product to improve spinal fusion. Clinical application seems to be efficacy, and we will confirm and strengthen these data with the final results of the pilot clinical study.