Abstract: Polyvinyl alcohol hydrogel (PVA) is a synthetic polymer with an increasing application in the biomedical field that can potentially be used for vascular grafting. However, the tissue

and blood–material interactions of such gels and membranesare unknown in detail. The objectives of this study were to: (a) assess the biocompatibility and (b) hemocompatibility of PVA-based membranes in order to get some insight into its potential use as a vascular graft. PVA was evaluated isolated or in copolymerization with dextran (DX), a biopolymer with known effects in blood coagulation homeostasis.

The effects of the mesenchymal stem cells (MSCs) isolated from the umbilical cord Wharton’s jelly in the improvement of PVA biocompatibility and in the vascular regeneration were also assessed. The biocompatibility of PVA was evaluated by the implantation of membranes in subcutaneous tissue using an animal model (sheep). Histological samples were assessed and the biological response parameters such as polymorphonuclear neutrophilic leucocytes and macrophage scoring evaluated in the implant/tissue interface by International Standards Office (ISO) Standard 10993-6 (annex E). According to the scoring system based on those parameters, a total value was obtained for each animal and for each experimental group. The in vitro hemocompatibility studies included the classic hemolysis assay and both human and sheep bloods were used. Relatively to biocompatibility results, PVA was slightly irritant to the surrounding tissues; PVA-DX or PVA plus MSCs groups presented the lowest score according to ISO Standard 10993-6. Also, PVA was considered a nonhemolytic biomaterial, presenting the lowest values for hemolysis when associated to DX.

Key Words: mesenchymal stem cells, vascular graft, polyvinyl alcohol hydrogel, hemocompatibility, biocompatibility, sheep model.