

Introduction: Collagen is the base component for the majority of dermal scaffolds. Smart Matrix™ (SM) is a new fibrin based scaffold showing rapid integration and vascularisation *in vivo*. Wound healing involves both recruitment and differentiation of un specialised cells and fibroblasts to the site of injury. This is regulated by cytokines and growth factors such as tumor necrosis factor- α (TNF α) (increased in acute and chronic wounds), transforming growth factor β (TGF β) (increased in scar tissue), interleukin-8 (IL-8) & vascular endothelial growth factor (VEGF) (initiate vascular growth in response to injury).

The aim: To analyse the cytokine/growth factor expression of human placental mesenchymal stem cells (hP-MSCs) and primary human dermal fibroblasts (HDFs) on collagen and fibrin matrixes.

Materials and Methods:

➤ 500,000 Human Dermal Fibroblasts (n=3) seeded into contractile collagen gels (CCGs) (2.5 cm diameter), Integra® (collagen-based-6mm diameter), Matriderm® (collagen-based- 6mm) and SM dermal scaffolds (6mm diameter)

➤ Expression of VEGF, TGF β and TNF α , was analysed by ELISA array.

➤ 5000 passage 4 hP-MSCs (n=3) were seeded onto fibrin (25 μ g/ml) or collagen-I (50 μ g/ml) coated cover slips. Non coated cover slips were used as control

➤ Immunocytochemistry was used to analyse the expression of VEGF and IL-8, 1 and 6 hours post seeding

Results:

✓ Higher expression of VEGF and lower TGF β and TNF α observed on Smart Matrix (Fig 1)

✓ Other cytokines/growth factors were similar between matrixes

✓ Cell attachment to both collagen and fibrin coated surfaces was observed as early as 1 hour post seeding (Fig 2)

✓ Cell spreading was more prominent on Fibrin and Collagen surfaces in comparison to control discs (Non coated cover slips) as early as 1 hour post seeding

✓ Cell spreading and cell-cell contacts were observed 6 hours post culture (Fig 2)

✓ Positive staining for both IL-8 and VEGF on the adhered cells to both fibrin and collagen-I coated samples 6 hours post seeding

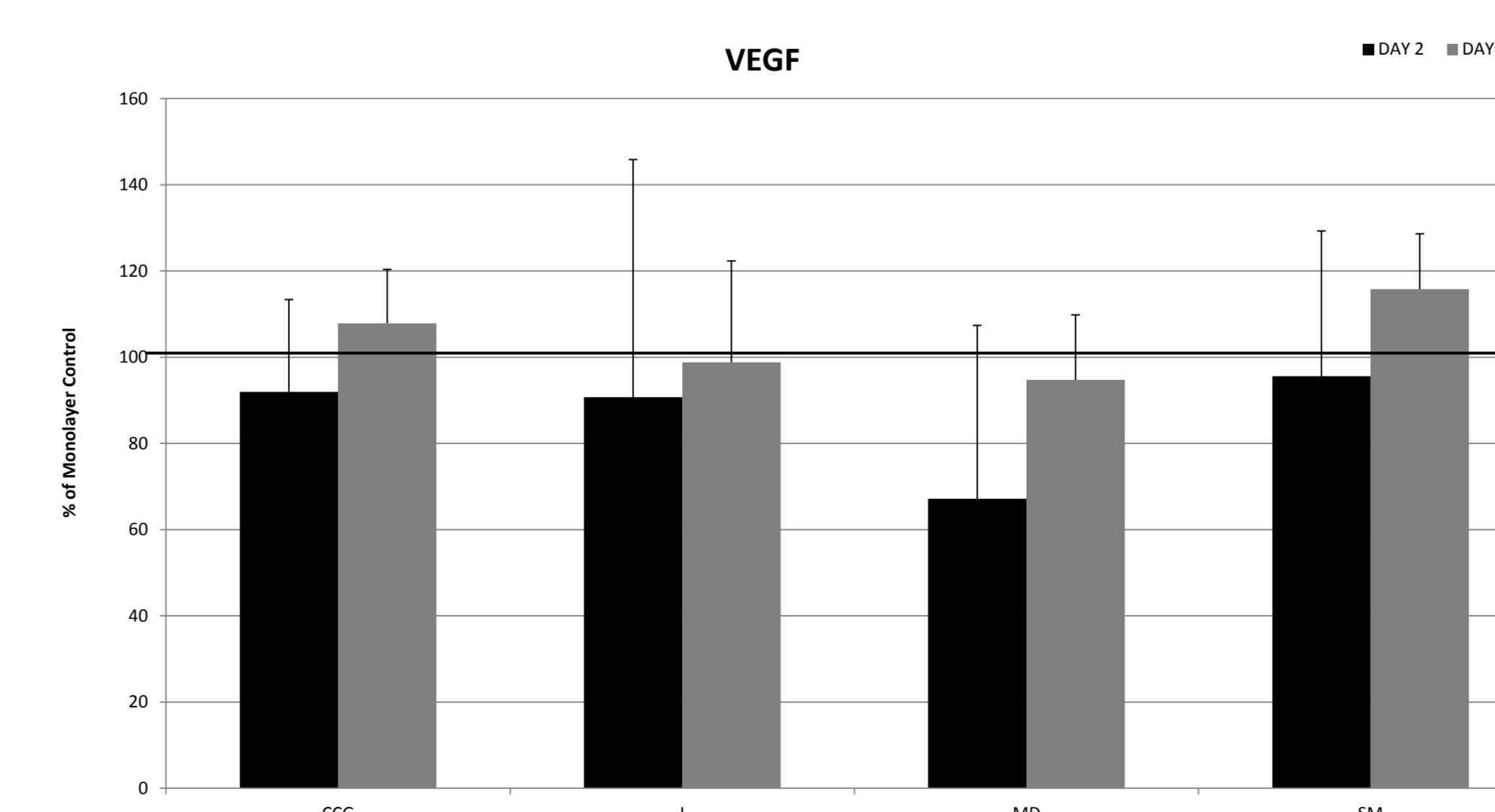
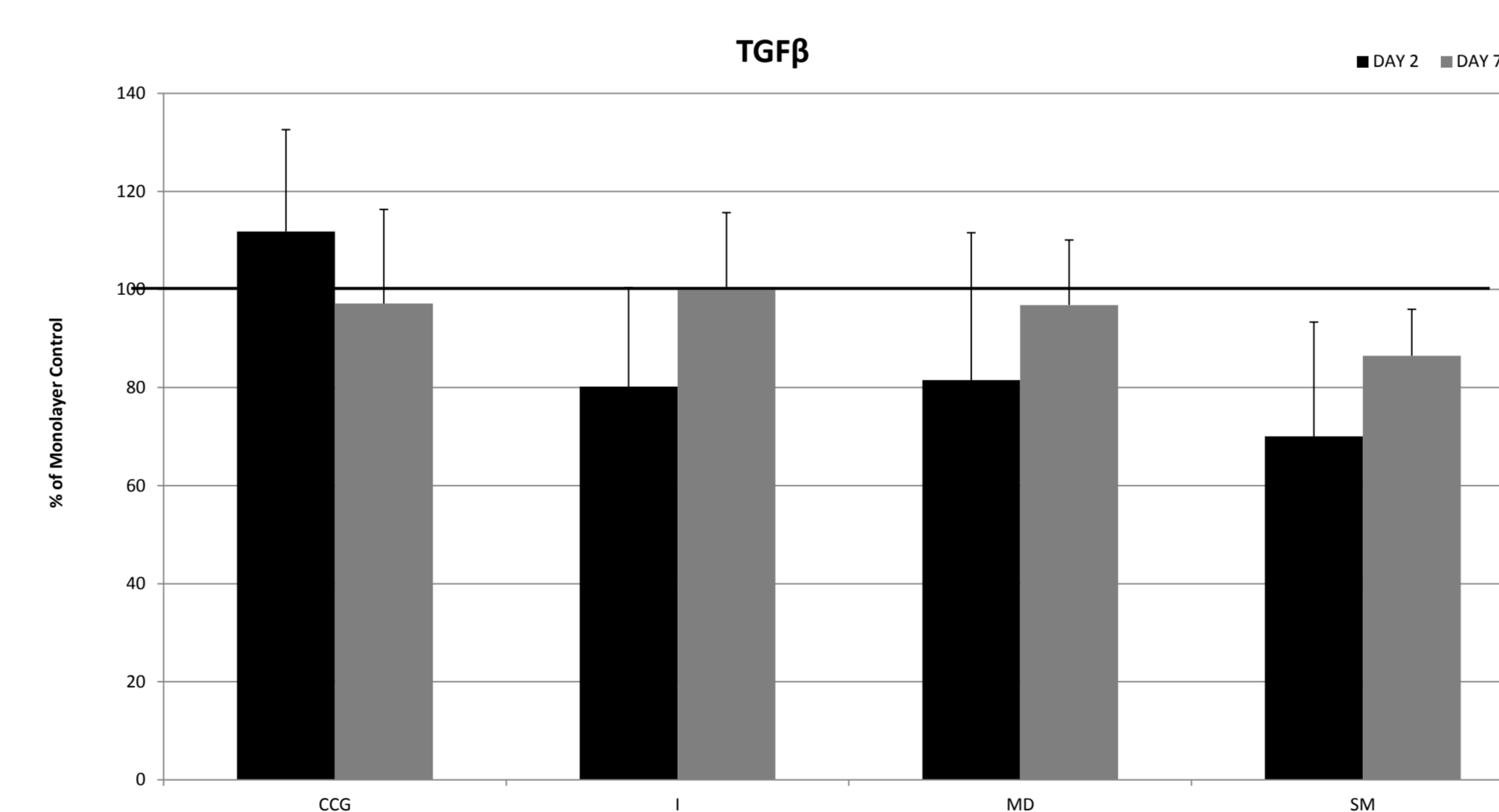
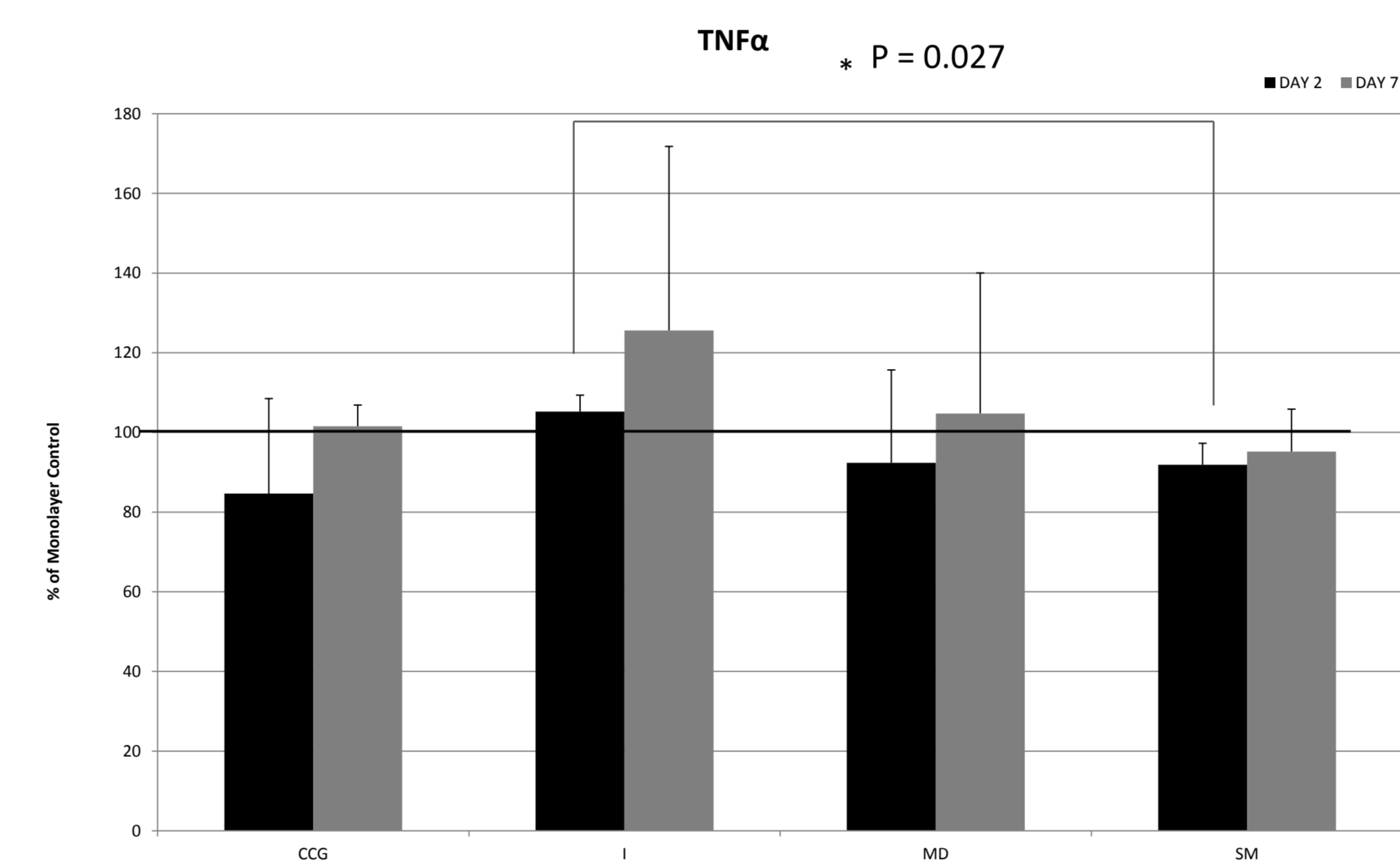


Fig 1. Graphs indicating TNF- α , TGF- β and VEGF expression profiles on Smart Matrix (SM), Matriderm (MD), Integra (I) and Contractile Collagen Gels (CCG) on days 2 and 7 of culture . "*" indicates statistical significance (P=0.027)

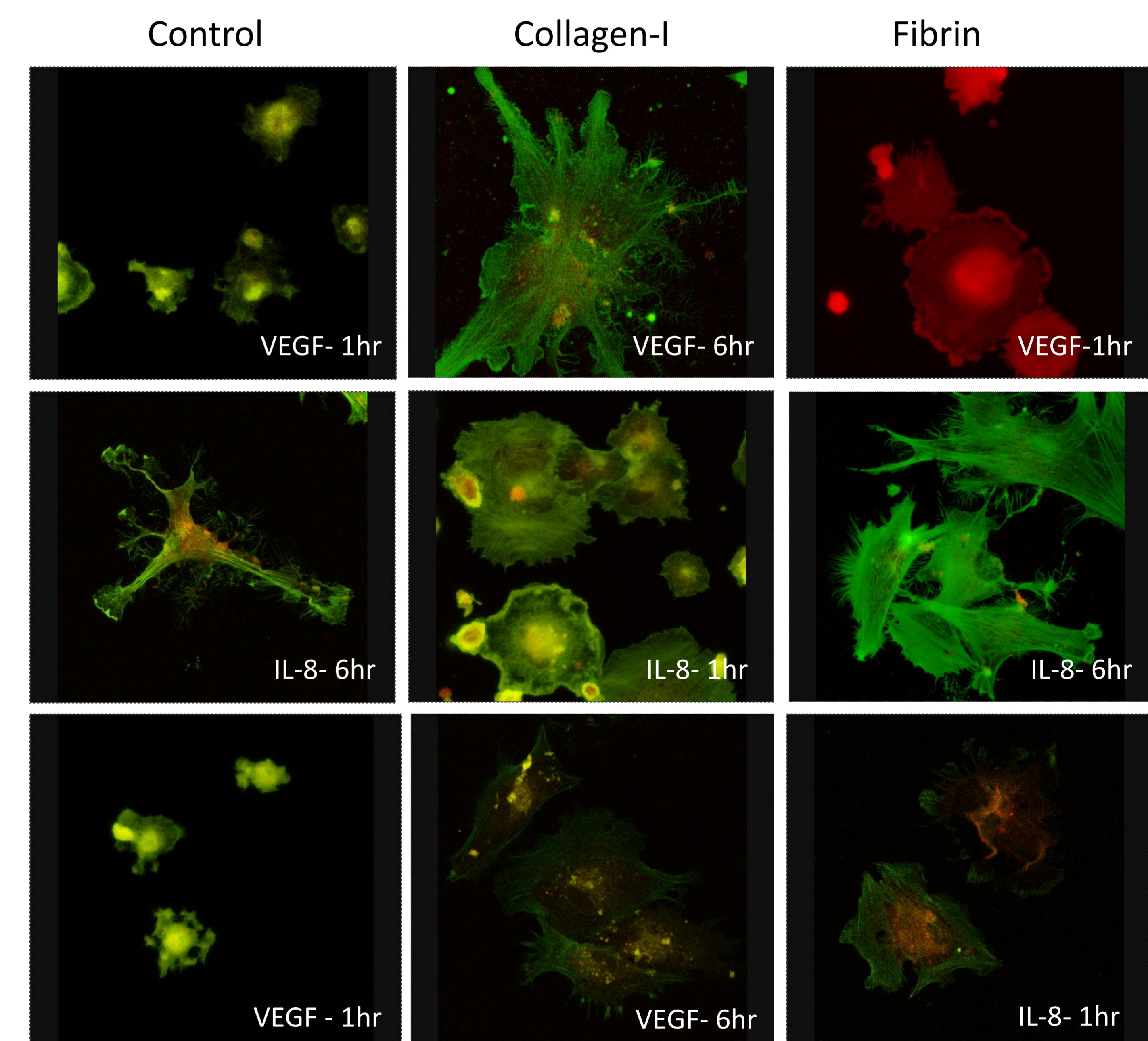


Fig 2. Confocal microscopy images of IL-8 and VEGF expressions on Fibrin, collagen I and Control cover slips at 1 hr and 6 hrs post culture of human placenta mesenchymal stem cells

Conclusions: Fibrin based matrices provide a greater angiogenic and reduced fibro-proliferative cell integration responses than collagen based matrixes. Quantification of the level of expression of IL-8, VEGF would provide better understanding of the mechanism of these molecules.