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Dental adhesive effects on human gingival fibroblasts: viability, extracellular matrix and inflammatory gene expression

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The development of aesthetic dentistry has led to an increase of composite materials and dental adhesives, both in restorative and prosthetic practice [1]. Dental adhesives are resinous biomaterials used for bonding the composite material to dental tissues (enamel or dentin). These materials consist of an organic matrix of methacrylates, like BisGMA, HEMA, TEGDMA, UDMA, EGDMA, DEGDMA and other additives as benzoylperoxide and camphoroquinone [2,3]. Some studies have focused on the toxicity of materials with metacrilic monomers, responsible for cytotoxic, local inflammatory and allergic reactions (1). This study investigated the effects of two self-etching systems, Adhese Universal (Ivoclar, USA) and Optibond (Kerr, USA), on viability and on extracellular matrix (ECM) proteins and inflammatory cytokine expression in human gingival fibroblasts, involved in ECM remodelling, immune reaction and inflammation. Cell viability was assessed up to 72h in presence of adhesive extracts at different dilutions (from 3,125% to 100%) by MTT assay. ECM proteins and cytokines gene expression was analyzed by RT-PCR [4] after 1, 3 and 48h of exposition to 100% adhesive extracts. It was observed a significant stimulation of proliferation, especially for Universal adhesive in the short times (up to 24h), while no proliferation was observed at 48 and 72h. The 3,125% dilution had no effects at all times for both adhesives. Adhesive extracts induced an early or late upregulation of collagen type I (1h) and fibronectin (48h), respectively, to support of enhanced proliferation. The increased VEGF expression at 1 or 3h was another signal of active cell growth. In concert with higher metabolism, it was observed high MMP1 expression with Universal. Finally, the cytokine pattern analysis showed an upregulation of IL-1b by both adhesives; on the contrary, IL-6 and IL-8 were upregulated by Universal and Optibond adhesives, respectively. In conclusion these findings showed that used adhesives stimulated the proliferation with the unbalance of cytokine signaling and ECM synthesis and degradation, with some difference due probably to their composition.

References

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Key words

Dental adhesive, gingival fibroblasts, proliferation, gene expression.