Objectives: Nanoscale surface modification of titanium dental implants is known to achieve superior bone wound healing and osseointegration compared with smooth or microrough surfaces. As the recruitment of osseoinductive precursors to the wound site is facilitated by the action of cytokines, this study examined whether changes in macrophage cytokine expression from RAW 264.7 cells cultured on commercially pure and titanium alloy microrough or crystalline calcium phosphate nanoscale-modified surfaces, may influence downstream events in bone wound healing and osseointegration. Methods: Surface topography and chemistry of the modified titanium surfaces were examined by scanning electron microscopy (SEM) and energy-dispersive spectrometer x-ray (EDAX). Murine RAW264.7 cell attachment, proliferation, inflammatory cytokine gene expression and secretion following culture on the titanium surfaces were determined by MTT assay, PCR array and ELISA. Results: EDAX analysis and SEM of the nanoscale-modified surfaces demonstrated calcium and phosphorus elements in nanostructures on the same underlying surface as the microrough surface. Whilst no significant difference in the attachment or proliferation of RAW 264.7 cells was observed on the titanium surfaces, the nanoscale-modified surface elicited a gene expression profile with marked down-regulation (further enhanced by alloying elements) of a number of pro-inflammatory cytokines (IL-1β, TNFα and Ifnγ) and chemokines (CCL2, 3, 5, 8, 11 and 12). Conclusion: Down-regulation of pro-inflammatory cytokine gene expression (confirmed at the protein level for TNFα and CCL5), may therefore facilitate the enhanced bone wound healing and osseointegration observed clinically with nanoscale-modified implant surfaces.