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Low Expression Of TLR-1, -2, -4 And IL-2, -2R, -10, -10R In Pseudosynovial Tissues Obtained From Aseptically Failed Total Hip And Knee Arthroplasty

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Introduction: Aseptic loosening of total hip (THA) and knee arthroplasty (TKA) is causally linked at least in part to inflammatory response of host innate immunity cells to stimuli deliberated from artificial joints.

Objectives: However, it has been proposed that periprosthetic tissue could be at “burn-out” status at the late stage of loosening/ osteolysis in comparison to earlier stages of the disease.

Methods: In this study we investigated mRNA expression of key inducers of inflammation (TLR-1, TLR-2, TLR-4), and regulatory cytokines/receptors (IL-2, IL-2R, IL-10, IL-10R, TGFB1) in pseudosynovial tissues from 55 patients with aseptically failed THAs/ TKAs and 31 control patients with hip/ knee primary osteoarthritis using quantitative RT-PCR.

Results: The mRNA expression of TLR-1 ($p=0.006$), TLR-2 ($p=0.001$), and TLR-4 ($p<0.0001$) was lower in failed TKAs than in osteoarthritic controls and failed THA ($p<0.01$). Low protein expression of TLR-1 and TLR-4 was confirmed also by immunohistochemistry, whereas expression of TLR-2 protein varied between individuals with failed THA/ TKA. The number of IL-10 ($p=0.03$) and IL-10R ($p=0.002$) mRNA transcripts was lower in failed TKAs than in osteoarthritic controls and similar pattern was obtained for identical molecules in THA and corresponding controls. There was no difference in IL-2/IL-2R and TGFB1 mRNA expression in failed THAs/ TKAs when compared to osteoarthritic controls. When compared THA and TKA, higher number of IL-2R ($p>0.05$) and TGFB1 ($p=0.03$) mRNA transcripts was detected in THAs than in TKAs.

Conclusions: Despite there is growing body of evidence that inflammatory response is the leading mechanism of aseptic loosening and periprosthetic osteolysis in THA and TKA, there is limited information about the prosthesis-induced immune response in various stages of loosening/ osteolysis. In this study, low expression of TLR-1, TLR-2 and TLR-4 and regulatory cytokines and their receptors IL-2/IL-2R, IL-10/IL-10R, TGFB1 was observed in pseudosynovial tissues retrieved from aseptically failed THAs and TKAs. This might reflect “burn-out” status of tissue at the end-stage of aseptic loosening.

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