

Periapical lesions in two inbred strains of rats differing in immunological reactivity

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Aim: To investigate the influence of strain differences in immune responses on the pathogenesis of experimental periapical lesions in Dark Agouti (DA) and Albino Oxford (AO) inbred strains of rats.

Methodology: Periapical lesions were induced in male DA and AO rats by pulp exposure of the first mandibular right molars to the oral environment. Animals were sacrificed 21 days after pulp exposure. The mandibular jaws were retrieved and prepared for radiographic, pathohistological, immunohistochemical analysis, real-time PCR and flow cytometry. Blood samples and the supernatant of periapical lesions were collected for measurement of cytokines and oxidative stress marker levels. Statistical analysis was performed the Kruskal-Wallis H and Mann-Whitney U non-parametric tests or parametric One-Way ANOVA and Independent Samples T-test to determine the differences between groups depending on the normality of the data. A significant difference was considered when p values were < .05.

Results: DA rats developed significantly larger ($p < .05$) periapical lesions compared to AO rats as confirmed by radiographic and pathohistological analysis. The immunohistochemical staining intensity for CD3 was significantly higher in periapical lesions of DA rats compared to AO rats ($p < .05$). In DA rats, periapical lesions had a significantly higher ($p < .05$) percentage of CD3+ cells compared to AO rats. Also, the percentage of INF- γ , IL-17 and IL-10 CD3+CD4+ cells was significantly higher in DA rats ($p < .05$). DA rats had a significantly higher Th17/Th10 ratio. RT-PCR expression of IL-1 β , INF- γ and IL-17 genes was significantly higher in periapical lesions of DA compared to AO rats ($p < .05$). The receptor activator of nuclear factor kappa-B ligand/osteoprotegerin ratio was higher in DA compared to AO rats with periapical lesions ($p < .05$). Systemic levels of TNF- α and IL-6 were significantly higher in DA compared to AO rats ($p < .05$). Levels of lipid peroxidation measured as thiobarbituric acid reactive substances and reduced glutathione were significantly higher ($p < .05$) in the supernatant in the periapical lesions of DA rats.

Conclusion: After pulp exposure, Dark Agouti rats developed much larger periapical lesions compared to Albino Oxford rats. Genetically determined differences in immunopathology have been demonstrated to be a significant element defining the severity of periapical lesions.

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