Genetics

Definition: The study of inheritance and inheritable traits. Two broad groups of genetic diseases,

1. Simple genetic diseases - Alteration of a single gene locus causing monogenic disorders e.g. PapillonLefevre Syndrome - shows severe periodontal disease manifestations
2. Complex genetic diseases - alteration of more than one gene loci causing polygenic disorders e.g periodontitis.

Periodontitis associated genotype (PAG) a composite of IL-1 (cytokine) is a combination of two rare alleles at separate Single nucleotide polymorphism (SNPs) in the IL-1A and IL-1B gene. Polymorphisms taken from these genes were tested and it was concluded that there was some evidence that they had a relationship with generalized aggressive periodontitis (GAP). Individuals who have higher levels of IL-1 have a greater chance of having severe periodontitis than those who have lower levels of IL-1.

Epigenetics

Definition: Environmental factors that chemically change genetic expression during DNA transcription.

Process: It is through (de)methylation, and (de)acetylation or any combination either express or repress genes during replication.

These processes regulate cytokines such as IL-1 and IL-6 known to be responsible for inflammatory tissue destruction as seen in chronic periodontitis.

Epigenetic Risk Factors: primarily diet and aging followed by smoking, diabetes, gender, BMI, race and education determined an individual's predisposition for immune or inflammatory response. These changes are reversible and environmental in nature which may be inherited due to in utero exposure.

For the Hygienist:

Genetic Salivary Test: Tests for IL-1 as part of routine dental diagnosis. The test would allow for early identification of patients vulnerable to periodontal disease thus allowing frequent recalls.

Calculating Epigenetics: Thorough health history and nutritional assessments allow hygienists to identify environmental factors that increase a patient's risk to inflammatory diseases. By altering or eliminating these epigenetic factors in turn would change a person’s susceptibility to inflammatory diseases such as periodontitis.

Conclusion:

Although there is considerable insight into the hereditary patterns of aggressive periodontitis due to autosomal-dominance with reduced penetrance, influential environmental factors should also be taken into consideration when determining the individual’s susceptibility to periodontal disease.
References


