Insulin Resistance, Diabetes and Systemic Diseases

* **Cytokines**
* Released as in response to WBC signaling during inflammation
* Also trigger the release of prostaglandins at the end of pregnancy to trigger labor
* Possible link between premature labor and periodontal disease
* Pro-inflammatory cytokines: increase inflammation – decrease bacteria
* Anti-inflammatory cytokines: decrease inflammation – carry away waste
* Cytokines in periodontal inflammation
* Interleukin 1
* A protein produced by various cells, including macrophages, interleukin-1 raises body temperature, spurs the production of interferon and stimulates the growth of disease fighting cells. Involved in immune response
* Pro inflammatory cytokine
* Present in periodontal disease. Inconclusive research for presence in insulin resistance.
* **Association of interleukin-1 polymorphisms with periodontal disease**
* A case-control study of 330 cases of periodontitis patients and 101 healthy controls was performed in Santiago, Chile.
* The prevalence of positive genotype (at least one allele 2 present at each locus) was significantly higher in cases (26.06%) than in controls (9.9%) and was significantly associated with periodontitis (OR 3.21, 95% CI 1.60 to 6.44, P = 0.001), irrespective of the smoking status and periodontitis severity
* Within the limits of this study, the results show that individuals carrying the positive genotype have significantly greater risk for developing periodontitis.
* López, N. J., Jara, L., & Valenzuela, C. Y. (2005). Association of interleukin-1 polymorphisms with periodontal disease. *Journal of periodontology*, *76*(2), 234–243. https://doi.org/10.1902/jop.2005.76.2.234
* **Does Ethnicity Play A Role**
* A convenience sample of 300 volunteers of Chinese heritage (ages 21 to 69 years)
* Only 7 of the 300 subjects (2.3%) carried the composite IL- 1 genotype consisting of allele 2 of both IL-1A +4845 and IL-1B +3954.
* Too few of the subjects were positive for the IL-1 composite genotype to establish any relationship with the susceptibility to periodontitis in Chinese patients.
* Armitage, G. C., Wu, Y., Wang, H. Y., Sorrell, J., di Giovine, F. S., & Duff, G. W. (2000). Low prevalence of a periodontitis-associated interleukin-1 composite genotype in individuals of Chinese heritage. *Journal of periodontology*, *71*(2), 164–171. <https://doi.org/10.1902/jop.2000.71.2.164>
* **Interleukin-1 and Type 2Diabetes**
* Epidemiologic studies have shown an increased frequency, severity, and risk of periodontitis in patients with diabetes.
* Periodontitis was significantly associated with IL-1 gene polymorphisms. No association between diabetes and IL-1A and -1B gene polymorphisms was found.
* No interaction between smoking status and polymorphisms was found.
* López, N. J., Valenzuela, C. Y., & Jara, L. (2009). Interleukin-1 gene cluster polymorphisms associated with periodontal disease in type 2 diabetes. *Journal of periodontology*, *80*(10), 1590–1598. <https://doi.org/10.1902/jop.2009.090134>
* **Correlations**
* Periodontitis is more prevalent with a higher incidence of severe disease in patients with diabetes.
* Patients with type 2 diabetes and not periodontitis do not show an increase in IL-1 genotypes
* Periodontitis and diabetes are correlated, thought not by this inflammatory marker.
* **Interleukin 6**
* Among the adipose-secreted factors (adipokines), the inflammatory regulator interleukin-6 (IL-6) has emerged as one of the potential mediators that link obesity-derived chronic inflammation with insulin resistance.
* Believed to be beneficial for insulin-regulated glucose metabolism in muscle
* **IL6 and Perio**
* Individuals carrying an IL6 G allele are associated with increased odds of having
* A. actinomycetemcomitans
* P. gingivalis
* T. forsynthensis
* **Tumor necrosis factor ~α**
* TNF-α decreases the cellular response to insulin
* Studies link TNF-α, obesity, insulin resistance and lipid metabolism
* Adipose tissue produces proinflammatory molecules as tumor necrosis factor-α
* Heightened in obesity
* **TNF ~α and Perio**
* Major inflammatory cytokine and toxic to host
* Elevated levels in gingival crevicular fluid associated with periodontal disease
* **CRP and insulin resistance**
* 2010 Study of 1,525 individuals (569 men and 956 women; mean age 39 years old) was conducted among residents in Lima and Callao, Peru. Fasting plasma glucose, insulin, and CRP concentrations were measured using standard approaches. Insulin resistance was assessed using the homeostasis model (HOMA-IR)
* Elevated CRP were significantly associated with increased mean fasting insulin and mean HOMA-IR concentrations (p < 0.001)
* When CRP level was above 2.53 mg/l
* Women had 2.18 fold increase in IR risk
* Men had a 2.54 fold increase in IR risk
* **Insulin Resistance (IR)**
* Chronic and low level inflammatory condition
* Related to glucose intolerance, hypertriglyceridemia, abdominal obesity and coronary heart disease
* **Exact Cause of IR Unknown**
* Predisposing factors include:
* Chronic stress
* Cushing’s disease
* Sedentary lifestyle – very low physical activity
* Obesity
* High blood pressure
* Steroid use
* Family history
* Pregnancy
* Sleep problems
* Infection or severe illness
* Previous diagnosis of gestational diabetes
* **Known Associations**
* precedes the development of type 2 diabetes (T2D).
* fatty liver
* arteriosclerosis
* skin tags
* reproductive abnormalities in women
* higher incidence in those of Latino, African-American, Native American, or Asian-American heritage

References

<https://www.ncbi.nlm.nih.gov/pubmed/17167471/>

<http://genesdev.cshlp.org/content/21/12/1443.full>

<https://www.ncbi.nlm.nih.gov/pubmed/11103847>

Eckel, R.H. (2008) Clinical practice. Nonsurgical management

of obesity in adults. *New England Journal of Medicine*, **358**, 1941–1950

Semple, R. (2010) CLINICAL QUESTION: What is the best

management strategy for patients with severe insulin

resistance? *Clinical Endocrinology,* **73,** 286-290.

De Souza, A., Irfan, K., Masud, F., & Saif, M. W. (2016). Diabetes Type 2 and Pancreatic Cancer: A History Unfolding. *JOP : Journal of the pancreas*, *17*(2), 144–148

<https://www.aao.org/eye-health/diseases/what-is-branch-retinal-vein-occlusion>

* According to the NIH, good blood glucose control is key to controlling and preventing mouth problems. People with poor blood glucose control have more periodontal disease and more severely than people whose diabetes is well controlled. Daily brushing and flossing, regular dental check-ups and good blood glucose control are the best defense against the oral complications of diabetes.
* https://www.slideshare.net/JohnSmith2B1G/alzheimer-powerpoint

https://www.slideshare.net/JohnSmith2B1G/alzheimer-powerpoint

https://www.nia.nih.gov/health/alzheimers/causes

2023 statistics National Institute on Aging

https://www.alz.org/alzheimers-dementia/facts-figures

Biessels et al. Lancet Neurology 5(1); Jan 2006

CNS insulin deficiency may potentially lead to impairments in memory, neuroprotective effects, synaptic transmission, as well as likely contributing to the development of neurodegenerative disease Importantly, negative impacts of insulin resistance occur years prior to the development of clinically defined diabetes. Early defects in insulin signaling may be associated with pathologic brain changes even decades before clinical symptoms of the disease. Moreover, patients may not appreciate significant symptoms until the disease process has already exerted a negative, and potentially irreversible impact on peripheral tissues and the brain.

Front. Aging Neurosci., 31 October 2017,https://doi.org/10.3389/fnagi.2017.00345

https://www.mayoclinic.org/diseases-conditions/alzheimers-disease/in-depth/diabetes-and-alzheimers/ART-20046987

***P. gingivalis and demintia***

*Science Advances* 23 Jan 2019:  
Vol. 5, no. 1, eaau3333  
DOI: 10.1126/sciadv.aau3333

**Provide Resources:**

Symptomfind.com

Diabetes.org

Endocrineweb.com

Healthy(er) Carbs

* Whole wheat bread or pasta
* Whole grain cereal/oatmeal
* Brown rice
* Quinoa, couscous, barley, popcorn
* Beans
* Lentils
* Whole wheat tortillas
* Green beans, broccoli, peppers, cauliflower, jicama

Glove ‘n Care

Self Care

Qr code

Description automatically generated

Qr code

Description automatically generated

**Bio Gaia**

**Ivoclar**

