

Dear Editor,
Recent literature has associated obesity with peri-implantitis.^{1,2} The human metabolism is a conglomeration of complex chemical interconnections that maintain life. Among these chemicals are cytokines that regulate metabolism.

Leptin is a cytokine that influences multiple tissues, but primarily the regulation of adipose tissue. It is made by adipose cells and small intestine enterocytes. Leptin is also involved with energy regulation, hunger inhibition, and food intake.³

Leptin is produced primarily by white adipose tissue. Leptin serum levels vary with body fat mass and time of day.^{4,5} Emotional stress, insulin, and dexamethasone cause increases of leptin production.⁶ Obstructive sleep apnea in obese patients causes an increase in leptin production but after sleep apnea treatment the production level returns to normal.⁷ Increases in testosterone cause a decrease in leptin and an increase of estrogen causes an increase of leptin.⁸

In obesity there is a decreased leptin sensitivity, similar to that as may occur in type 2 diabetic insulin resistance. This results in a lack of satiety even though there are high levels of glycogen and leptin.⁹

Leptin acts directly on a wide range of cell receptors and acts in concert with other regulatory metabolic agents.¹⁰ Leptin can augment angiogenesis and endothelial proliferation.¹⁰

Leptin participates in bone mass regulation.¹¹ Cancellous bone is attenuated, and cortical bone is augmented with metabolic leptin. Leptin acts in the hypothalamus and also directly to regulate bone metabolism.¹¹

Leptin generation is a response to fat-cell derived inflammation and increased production of leukocytes.¹² It prevents metabolic stress on tissue caused by overeating and metabolic stress leads to inflammation and ectopic fat storage.¹³

Leptin is found in tooth gingival crevicular fluid (GCF).¹⁴ The leptin in GCF in obese patients can be reduced after non-surgical periodontal treatment and local tetracycline treatment but the GCF leptin level returns after about 45 days post-treatment.¹⁴ Nonsurgical periodontal treatment is not effective in keeping a low level of leptin in GCF in chronic periodontitis.²

A statistically significant positive correlation was seen between the levels of IL-1 β , a major proinflammatory cytokine in peri-implant sulcular fluid and waist circumference.¹⁵

Peri-implant sulcular fluid contains diagnostic markers that can aid in the diagnosis and monitoring of peri-implant disease. There may be key biomarkers that can be identified for this end.¹⁶ Levels of interleukin (IL)-1 α , IL-1 β , IL-6, IL-8, IL-10, IL-12, IL-17A, tumor necrosis factor (TNF)- α , C-reactive protein, osteoprotegerin, leptin, and adiponectin were assayed in GCF and peri-implant sulcus fluid. There were higher levels of IL-17A and TNF- α fluid in peri-implant sulcular fluid than GCF.¹⁶ There was significant correlation between probing depth around implants and levels of IL-1 β and IL-8 in peri-implant sulcular

fluid. Peri-implant sulcular fluid biomarkers, including leptin, may be useful in diagnosis and monitoring peri-implant health and disease.^{2,16}

Titanium and zirconia are both very biocompatible materials. Nonetheless, during peri-implantitis leptin is elevated and acts as a pro-inflammatory cytokine around titanium abutments.^{16,17} The significance of this is yet to be seen.

Leptin is found in the sulcular fluid around dental implants and may be reduced after surgical treatment for peri-implantitis.^{1,17} Leptin is considered to be a biomarker, but even though leptin is present, it is not an effective marker to monitor peri-implantitis progression.^{1,17}

We know that the patient's metabolic inflammatory reaction to disease is more important than the pathogen itself.¹⁸ The panoply of involved cytokines will need to be identified as to their importance as metabolic actors or as simply byproducts of enzymatic reactions. It remains to be seen if metabolic markers like leptin truly have active roles in peri-implantitis. The obese dental implant patient may need to have an informed consent that mentions this parameter.

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