

## Clinical Significance

It's important to carefully consider the indications for short implants because they have a higher risk for failure than longer implants. However, short implants avoid many of the complications that attend the use of extensive bone grafting and other vertical ridge augmentation procedures in the posterior mandible that are required for the placement of standard implants. Splinting of multiple short implants appears to be a good option that distributes the occlusal forces over the entire implant-prosthetic complex.

The complications most commonly seen were related to intra-surgical and postsurgical events. The percentage of patients who had biological complications with their short implants was between 0% and 26%. For the longer implants, the percentage of patients

with biological complications ranged from 0% to 90%. Most of the complications occurred in the immediate postoperative period. Examples included transient paresthesia of the lower lip, Schneiderian membrane perforation, and mandibular graft infection.

## DISCUSSION

The survival rates of short implants were between 86.7% and 100%, and those for longer implants were between 95% and 100% over a period of 1 to 5 years. Short implants had a nominally lower survival rate than longer implants.

Papaspyridakos P, De Souza A, Vazouras K, et al: Survival rates of short dental implants ( $\leq 6$  mm) compared with implants longer than 6 mm in posterior jaw areas: A meta-analysis. *Clin Oral Impl Res* 29:8-20, 2018

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# Medication impact on dental implant failure



## BACKGROUND

As the population ages, not only is the prevalence of disabling disease higher but the intake of medications to address the disease increases significantly. Although implant-supported restorations are a highly successful treatment option with good long-term success rates up to 10 or 20 years, these disabling diseases and the medications used to manage them may have an impact on implant survival and failure rates. Among the medications that may be associated with impaired implant performance are thiazide diuretics,  $\beta$ -blockers, anti-inflammatory drugs, proton pump inhibitors, and serotonin re-uptake inhibitors. A systematic review of the literature was done to investigate the association between the intake of medications that may affect bone metabolism and implant outcomes.

## METHODS

Electronic and manual searches were done in the PubMed, MEDLINE (OVID), EMBASE (OVID), Cochrane Central Register of Controlled Trials (Cochrane Library), Cochrane Oral Health Group Trials Register (Cochrane Library), Web of Science (Thomson Reuters), and SciVerse (Elsevier) databases up to May 2017. In addition, the grey literature available at the New York Academy of Medicine Grey Literature Report and the register of clinical studies hosted by the US National Institutes of Health were also searched, as were the bibliographies of relevant publications and selected journal issues. The final selection included 17 articles, 5 of which were focused on the association

of implant failure and non-steroidal anti-inflammatory drugs (NSAIDs), 2 on selective serotonin reuptake inhibitors (SSRIs), 2 on proton pump inhibitors (PPIs), 7 on oral bisphosphonates (BPs), and 1 on anti-hypertensives.

## RESULTS

PPIs reduce the production of acid by blocking the enzyme in the wall of the stomach that produces acid. The implant failure (IF) rates with PPIs were 4.3%, which is significantly higher than for control groups. In addition, SSRIs, which are used for depressive or anxiety conditions, also had an increased IF rate. The difference between those taking SSRIs and controls was 7.5%. Just 1 study addressed anti-hypertensive agents (AHTNs), but they were associated with an increased implant survival rate. No implant effects were found for BPs or NSAIDs.

## Clinical Significance

Additional information is needed to guide the clinical care of patients taking medications for their chronic systemic diseases. An association has been shown between PPIs and SSRIs and implant failure, but other drugs may also cause problems with healing or osseointegration. Further research is warranted.

## DISCUSSION

Dentists should be aware of all the medications that patients take before planning for implant therapy. Both PPIs and SSRIs have a deleterious effect on the success of dental implants. It is possible that AHTNs offer a beneficial impact on the longevity of implants, although the results of this review were based on just 1 study.

Chappuis V, Avila-Ortiz G, Araújo MG, et al: Medication-related dental implant failure: Systematic review and meta-analysis. *Clin Oral Impl Res* 29:55-68, 2018

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# MASTICATION

## Effect of mastication on cognitive function



### BACKGROUND

Mastication is the process whereby food is crushed and ground up to increase its surface area and allow for more effective processing by digestive enzymes. Mastication is controlled by the central nervous system (CNS) and is associated with various neural networks in the brainstem and brain regions that control and create complex masticatory patterns. A critical analysis was done into how mastication is related to neuronal activities in various brain areas and the method by which it increases cerebral blood oxygen levels of the hippocampus and prefrontal cortex and thereby contributes to learning and memory processes.

### METHODS

Articles on mastication were sought in the Scopus, PubMed, ScienceDirect, Clinical Key, and Google Scholar databases covering the years from 1939 to 2015.

### RESULTS

#### Conveying Information Through Mastication

The hippocampus is a CNS region where learning, spatial memory, and the formation and retrieval of episodic memories reside. Multiple neural circuits connect mastication to the hippocampus. These help to maintain the cognitive functions of the hippocampus during mastication. It's hypothesized that 2 main pathways exist: the neuronal and humoral pathways.

The primary sensory somata carry nociceptive and proprioceptive sensations from the oral cavity to the CNS. They are found in the mesencephalic trigeminal nucleus and trigeminal ganglion. The mesencephalic trigeminal nucleus axons responsible for voluntary mastication end in trigeminal motor nuclei, supratrigeminal regions, and infratrigeminal regions. The central axons of the trigeminal ganglion terminate at spinal and principal sensory nuclei of the trigeminal nerve and sensory nuclei. The afferent fibers of the mesencephalic primary sensory neurons also reach the brainstem reticular formation, which regulates

the sensory input of the reticular activating system (RAS) to higher brain centers. Together the reticular formation and RAS are needed to stimulate the brain during conscious learning, perception, and attention. The sense of perception of the oral cavity may therefore influence memory and the ability to learn.

Various growth factors are produced in the salivary glands, with increased production during mastication. If occlusal disharmony is present, it can alter these levels. An alteration in the level of nerve growth factor (NGF) caused by malocclusion may be associated with changes in the negative feedback system of the hypothalamic-pituitary-adrenal (HPA) axis in the hippocampus. As a result, the secretion of corticosterone may increase, suppressing neuron excitability and causing neuron death. With mastication, metabolic activity increases, stimulating the autonomic nervous system and oral tissues. In turn, the partial pressure of carbon dioxide in the cortical sensorimotor neurons increases, resulting in increased blood flow to the brain and oral tissues. Multiple regions of the brain become activated during mastication, so this action can influence hippocampal function through numerous neural pathways.

#### Evidence Linking Mastication, Cognitive Function, and Memory

A study of 3063 Chinese adults over age 60 years analyzed the relationship between missing teeth and cognitive functions. Having an average of 18.7 teeth missing was associated with dementia and having 10.2 missing teeth was associated with mild cognitive impairment, but those missing an average of 9.2 teeth were cognitively normal.

A study of mastication's effects on cognitive function and memory revealed substantial improvement in both delayed and immediate recall of formerly learned words in patients who chewed versus those in a non-chewing control group. The learning performance of the chewing group increased a minimum of 30%.