

TOOTHPASTE & ORAL PROTECTION

FACT FILE

GENGIGEL[®]
Hyaluronic Acid



HOW ORAL HYGIENE CAN AFFECT OVERALL HEALTH?

An optimal oral hygiene routine plays a pivotal role in maintaining optimal oral health (Duangthip & Chu, 2020).

Conversely, **poor oral hygiene can lead to various oral conditions**, most commonly dental cavities, periodontal diseases (i.e., gingivitis and periodontitis), and halitosis. Periodontal diseases, if left untreated, can progress and cause tooth loss, further complicating oral health and necessitating more complex dental procedures (Jepsen et al., 2017). Furthermore, inadequate oral hygiene has been **associated with systemic conditions**

such as cardiovascular disease, cancer, and diabetes mellitus (Chiżyński et al., 2023; Hashim et al., 2016; Carramolino-Cuellar et al., 2014).

These oral and systemic health issues can significantly impact both quality of life and overall health (Gupta et al., 2021; Komalasari et al., 2019; Haag et al., 2017; Nayak et al., 2017). Individualized and effective oral hygiene practices should be encouraged, taught, and supported. Additionally, oral hygiene instructions should

Poor oral hygiene raises the risk of periodontitis 2- to 5-fold

be enhanced with motivational approaches (Jepsen et al., 2017).

Regular and proper **brushing** along with **interdental cleaning** are es-

sential components of a good oral hygiene (Worthington et al., 2019; Wilder & Bray, 2016). Specifically, brushing teeth twice daily for a minimum of 2 minutes with fluoride toothpaste and cleaning interproximal surfaces once a day using appropriate tools such as traditional floss, floss picks, powered air or water flossers, or interdental brushes, is highly recommended (WHO, 2022).

It takes two minutes twice a day to safeguard smile and health

HOW CAN TOOTHPASTE MAKE A DIFFERENCE?

Toothbrushing with toothpaste represents the **most prevalent method of home dental care** in Western populations (Stamm, 2007; Sheen et al., 2001). Mechanical brushing removes plaque bacteria and food residue from dental surfaces through physical action, while the toothpaste provides additional cleaning and benefits (Stamm, 2007; Sheen et al., 2001).

A typical toothpaste formulation includes several key components: **binders**, which maintain the cohesion between solid and liquid phases, prevent drying, and ensure proper viscosity; **abrasives**, responsible for mechanically removing tooth stains; **foaming agents** (surfactants), which reduce surface tension to facilitate contact between the toothpaste

and teeth, aiding in plaque dissolution; **sweeteners** to enhance taste; and **water**, serving as a solvent (Florea et al., 2023; Stamm, 2007).

Toothpastes are manufactured as **three-phase** systems. The **continuous phase** consists of humectants, water, and dissolved salts. The **dispersed phase** includes an emulsion of surfactants and flavour oils, along with binders (gums) to gel the continuous phase. The **solid phase** primarily comprises abrasives suspended throughout the continuous phase by the gel network formed with the binder systems (Stamm, 2007).

Throughout the years extensive research and development have been dedicated to enhancing the quality, effectiveness, and functionality of toothpastes (Florea et al., 2023; Stamm, 2007).

80%
of the **population**
regularly
brushes
their teeth with
toothpaste

WHY SPECIALIZED INGREDIENTS?

Initially developed primarily for tooth cleaning, enamel stain removal, and breath freshening, toothpaste formulations have evolved significantly since the mid-20th century (Stamm, 2007; Sheen et al., 2001).

Modern toothpastes are now designed to offer a **broader range of benefits**, beyond mere oral cleansing and deodorization: they aim also at delivering fluoride, preventing cavities, reducing demineralization, promoting remineralization, preventing plaque, calculus, and periodontal diseases, and alleviating dentine hypersensitivity (Enax et al., 2022; Davies, 2008).

In fact, contemporary toothpaste formulations incorporate **specialized ingredients** such as antibacterial agents, remineralizing agents, or ingredients specifically aimed at gum care (Enax et al., 2022; Davies, 2008).



Antibacterial agents (e.g., chlorhexidine, lactoferrin, xylitol, zinc) are used to help control the number of microorganisms present in the oral cavity, thereby reducing the risk of infections. These agents work by inhibiting microbial growth, preventing bacterial aggregation, and disrupting the pathogens' cell walls (Marinho et al., 2022).

Remineralizing agents (e.g., fluoride, hydroxyapatite), are utilized to reduce tooth sensitivity by forming a protective layer over exposed dentin and strengthen tooth enamel (Florea et al., 2023).

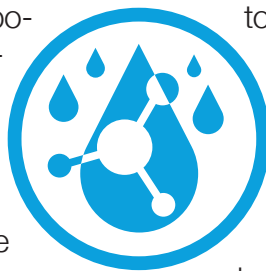
Special **ingredients for gum care** (e.g., allantoin, bisabolol, hyaluronic acid) have protective and soothing properties that can help reduce inflammation and pain, as well as improve wound healing (Enax et al., 2022).

WHY HIGH MOLECULAR WEIGHT HYALURONIC ACID?

Hyaluronic acid (HA) is a linear polymer composed of repeating units of glucuronic acid and N-acetylglucosamine. It is found naturally in vertebrates, where represents a major component of the extracellular matrix of connective tissues (Kobayashi et al., 2020).

HA plays a **paramount role in physiology in the oral cavity**, as contributes to providing mechanical support, maintaining, and restoring tissue integrity (Casale et al., 2016).

HA has many different functions, including maintenance of tissue homeostasis and cell surface protection, but is involved also in many physiological processes, such as cell attachment, migration and proliferation, wound healing and regulation of immune response and inflammation (Kavasi et al., 2017).



High molecular weight HA (HMW-HA) is deposited in normal tissues and interacts with other components of the extracellular matrix (ECM) to control the ECM structural organization and signalling. In addition, endogenous HMW-HA possesses enhanced anti-angiogenic, anti-inflammatory and immunosuppressive properties (Kavasi et al., 2017). The amphophilic nature of HMW-HA allows this molecule to trap large amounts of water while binding to hydrophobic molecules such as cell membrane lipids.

The aforementioned characteristic plays a crucial role in regulating hydration levels and delaying the passage of viruses and bacteria across the hyaluronan-rich pericellular zone, as well as in situations of inflammation (Chen & Abatangelo, 1999).

Why Gengigel®?

Gengigel® are sophisticated products based on the modern concept of combining an extremely safe but effective molecule (high molecular weight hyaluronic acid – **HMW-HA**) with a **complex matrix**.

HMW-HA performs a moisturizing and soothing action on the oral tissue, while the innovative combination of highly bioadhesive polymers and bioadhesive patented boosters instead ensures that Gengigel® products adhere well to the gums and teeth to exert their action.

Gengigel® Gum Protection toothpaste also features this unique ingredients combination.

Gengigel® Gum Protection toothpaste is a newly designed oral care product that combines cleaning effectiveness with the beneficial effects of specially selected ingredients to **keep the gums healthier and strengthen the teeth**.

Therefore, its formula includes **antibacterial agents** (lactoferrin and xylitol), **remineralizing agent** (fluoride), and **special ingredients for gum care** (*Aloe vera* leaf juice, betaine, bisabolol, hyaluronic acid).

Lactoferrin and xylitol are known for their antibacterial properties, but they act in different ways.

Lactoferrin, a protein found in many bodily secretions such as saliva and milk, primarily **destabilizes the bacterial membrane**. This effect leads to the disruption of the bacterial cell membrane, compromising the structural integrity of bacterial cells and facilitating their elimination. Lactoferrin's ability to bind to iron, an essential nutrient for bacteria, further contributes to its antibacterial effect by depriving bacteria of the iron needed for their growth.

On the other hand, **xylitol**, a sugar alcohol commonly used as a sweetener, exerts its antibacterial effect mainly by slowing down bacterial growth. Xylitol **interferes with bacterial metabolism**, reducing the bacteria's ability to proliferate, and **enhances saliva secretion**.

Fluoride enhances tooth remineralization by **accelerating the formation of fluorapatite crystals** on partially demineralized areas of teeth. This process promotes the closure of dentine tubules and covers the intratubular dentine with significant mineral deposits on the dentin surface.

***Aloe vera* leaf juice, betaine and bisabolol** have **moisturizing and soothing effects**, and they can help reduce inflammation and redness of the gums.

A unique feature of Gengigel® Gum Protection toothpaste

is that it combines high molecular weight hyaluronic acid (**HMW-HA**) with a **complex matrix**, ensuring an effective protective action on gums and teeth.

Gengigel® Gum Protection Toothpaste **can reduce signs of occasional gum inflammation**, making it particularly suitable for persons suffering from gingivitis and irritation of oral cavity tissues, like those suffering from periodontal diseases (i.e., gingivitis, periodontitis) or who have undergone dental surgery.

Gengigel® Gum Protection toothpaste is **suitable for individuals with sensitive teeth**; Ricerfarma commissioned specific tests to evaluate its abrasivity index according to ISO 11609 standards and the American Dental Association (ANSI/ADA) No. 130.

According to these standards, a toothpaste must have an abrasivity index of 40 or lower on the Relative Enamel Abrasion (REA) scale and 250 or lower on the Relative Dentin Abrasivity (RDA) scale, in order to avoid causing damage to enamel and dentin, respectively.

Gengigel® Gum Protection toothpaste's abrasivity indices are well below the established limits, confirming its gentle nature.

The protective and moisturizing action of Gengigel® Gum Protection toothpaste is ensured by its effective **adherence to the oral mucosa**, as demonstrated by a specific *in vitro* test.

This test measured the detachment strength of a mucin tablet from samples of the toothpaste at various dilutions. Gengigel®

Gum Protection toothpaste exhibited mucoadhesive properties that were maintained even after dilution.

As evidenced by a test conducted on 40 subjects with bleeding gums, aged 18 to 65, showed that Gengigel® Gum Protection Toothpaste was **well tolerated** by all participants and rated positively by the majority. Most subjects reported a significant **decrease in mouth dryness, oral cavity irritation, and gum irritation** after using the product for both 15 and 30 days.

While there are everyday toothpaste products designed to maintain good oral hygiene, there are also advanced formulations – such as Gengigel® Gum Protection Toothpaste – that not only ensure proper oral care but also provide additional benefits. These toothpastes are particularly recommended for individuals with suboptimal periodontal health, as they may help improve gum health and soothe inflammation.



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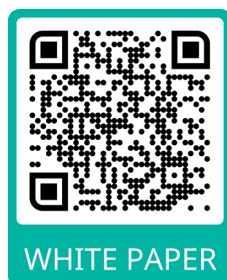
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