# GLO Science Professional
## THE SCIENCE OF WHITENING

GLO SCIENCE PROFESSIONAL

## The Biology of Tooth Color

Tooth color comes from a convergence of our genetics, environmental factors, and our ability to keep our mouth healthy. It is determined by the two outermost layers of the tooth: enamel and dentin. **Intrinsic and extrinsic stains** determine the overall color of the tooth (Fig 1).

### Extrinsic Stains

- A result of strain molecules attaching to the sticky layer of the bacterial biofilm on the tooth. Anything that stains a white shirt is a culprit to stain the teeth.
- Easier to remove extrinsic stains and whiten since they are on the outside of the tooth.

### Intrinsic Stains

- More difficult to remove stain because of location – lies within the dentin oF the tooth.
- Not caused by the foods we eat but as a result of genetics, aging, trauma, medications (i.e. tetracycline), environment (i.e. fluoride exposure), and systemic conditions.

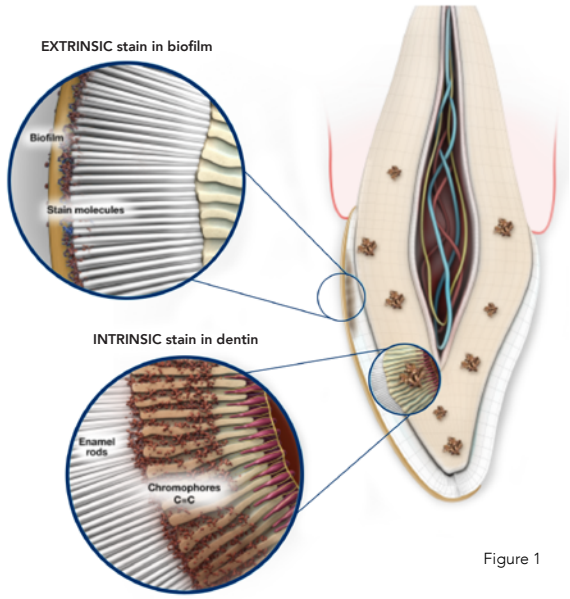



Figure 1

## The Science Behind Whitening with Hydrogen Peroxide ($H_2O_2$)

Double carbon bonds are responsible for the yellow color of stains on the teeth. The breakdown of $H_2O_2$ is a radical process that reacts with the double carbon bonds, breaking them down into single carbon bonds, making the teeth appear whiter and brighter. $H_2O_2$ is generally unstable. To prevent decomposition and increase efficacy, the whitening gel can be refrigerated, packaged in a hermetically sealed vial, or delivered in a dual-barrel syringe with a pH raiser at the time of extrusion. A higher pH will activate the whitening molecules for even more effective whitening.

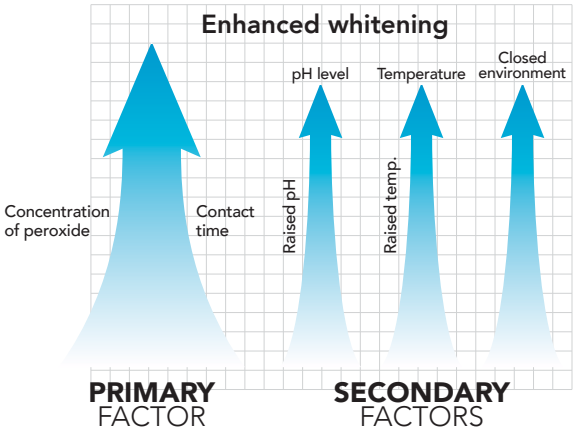
## Factors That Enhance Whitening

**Primary factors that influence the efficacy of whitening are:**

- Concentration of $H_2O_2$ gel
- Contact time of the gel to the teeth

**Secondary factors that increase efficacy of whitening oxygen molecules include:**

- **pH** – the optimum range is 9.5-10.8, which produces a 50% greater result. To maintain pH, store in a dual-barrel syringe with a pH raiser.
- **Temperature** – accelerates the reaction rate of $H_2O_2$ – for every 10°C the temperature increases, the rate of the chemical reaction is doubled.
- **Environment** – when whitening takes place within a sealed environment, whitening oxygen molecules cannot escape into the atmosphere. The better the seal, the more effective the whitening.




## What Causes Sensitivity (Zingers)

- Temperature can cause sensitivity and an irreversible pulpitis (inflammation of the tooth's pulp. which contains blood vessels, nerves and living cells) in patients if it is too high (over 53°C or 128°F). Those painful zingers are caused by overexposure to heat from the professional whitening lamps that do not control temperature, causing a rise in the intrapulpal temperature (Fig 2).
- Whitening with carbamide peroxide gel causes sensitivity because of the slower rate of decomposition, requiring longer exposure time of the gel to the teeth.
- Classic tray and gel whitening delivery method bathes the soft tissue in $H_2O_2$ for an extended period of time.

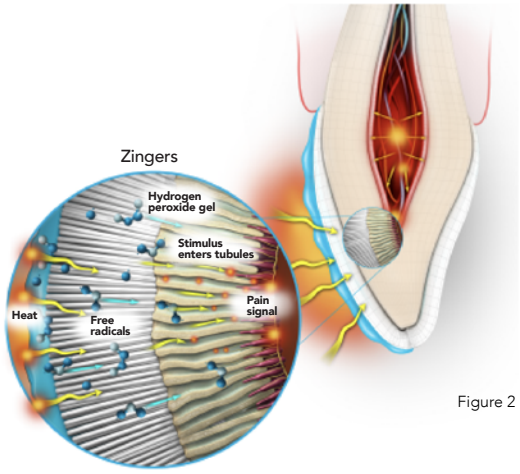



Figure 2

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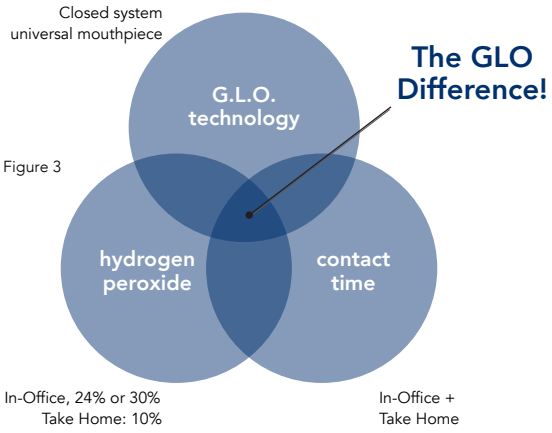


Figure 3

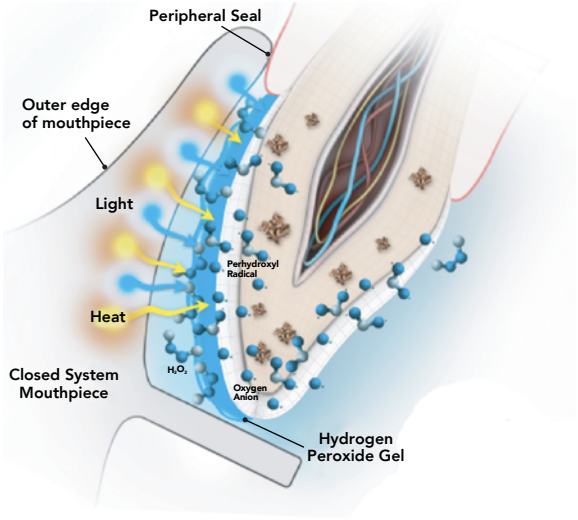


Figure 4

## It's A Smile Revolution™

GLO Science Pro combines the factors that enhance whitening and eliminates the compromises that cause sensitivity and lack of compliance. Our dual whitening approach combines an in-office and take home procedure and addresses the primary factors of whitening – contact time of the gel to the teeth and concentration of $H_2O_2$. When coupled with G.L.O. technology, the GLO Difference is achieved – a whitening scenario where the primary factors that affect whitening are maximized to reach optimal patient results and satisfaction without sensitivity (Fig 3).

## GLO Science Pro Mouthpiece Technology

GLO's breakthrough patented innovation is a universal sized mouthpiece that combines light and heat in a closed system. The controlled warming heat accelerates the reaction of the highly reactive $H_2O_2$ and the closed system prevents the whitening oxygens from escaping the tooth surface into the atmosphere (Fig 4). This results in shorter exposure time to the $H_2O_2$ gel and therefore, less sensitivity. The warming heat is modulated to the optimal temperature, preventing the pulpal response (zingers) that happens with other professional whitening lights that generate too much heat.

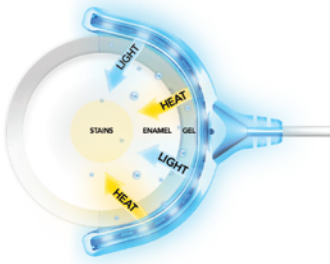


Figure 5

## How GLO Delivers $H_2O_2$

GLO Science Pro, under the dual whitening approach, uses a $H_2O_2$ gel delivered in a dual-barrel syringe for chairside whitening. The formulation uses a safe level of $H_2O_2$ in-office – 24% for younger and more sensitive patients and 30% for everyone else. Both include a pH raiser in the dual-barrel syringe to increase efficacy.

Chairside whitening is followed by take home whitening to maintain results, using the GLO mouthpiece and innovative GLO Vial technology (Fig 5). The GLO Vial features a targeted delivery system with a highly adhesive 10% $H_2O_2$ gel.

## GLO Science Professional Case Studies

### Case Study #1

**A winning solution for tetracycline cases**

Before

After

28-year-old male patient presented with a class 1 tetracycline case – the most difficult teeth whitening scenario. After two in-office whitening sessions using GLO 30% $H_2O_2$ and each session followed by 14 days of GLO take-home whitening with the professional strength GLO Vial whitening gel, the patient moved 16 shades on the VITA shade guide, starting at C4 and ending at 1M1, with minimal sensitivity and easy compliance. The result, a happy patient.

### Case Study #2

Before

After

A 40-year-old female presents with A2 shade whitened to an 0M3 with the in-office GLO Professional Whitening 30% $H_2O_2$ gels. Her take-home regimen was five days in a row with four 8-minute applications per day.