

# Glass-ionomer cement vs. resin as fissure sealants

## Summarised from

Yengopal V, Mickenautsch S, Bezerra AC, Leal SC. Caries-preventive effect of glass ionomer and resin-based fissure sealants on permanent teeth – a meta analysis. *J Oral Sci* 2009; 51: 373-82.

## And:

Mickenautsch S, Yengopal V. Caries-preventive effect of glass ionomer and resin-based fissure sealants on permanent teeth: An update of systematic review evidence. *BMC Res Notes* 2011; 4: 22.

## Introduction

The evidence for the efficacy and cost-effectiveness of sealants in reducing occlusal caries in molars has been highlighted in a number of articles in highly rated journals. Pits and fissures of posterior molar teeth are considered to be highly susceptible to the adhesion of microorganisms and, consequently, caries. Therefore, a significant amount of tooth decay occurs at these sites. Fissure sealants are used to prevent occlusal caries with 71% percent of occlusal decay preventable after a once-off fissure sealant application. The aim is to establish the caries-preventing effect of GIC in comparison to that of resin-based fissure sealants.

## Resin

The most commonly used sealant material is resin composite. Its caries-preventive effect relies on the sealing of pits and fissures through micro-retention, created through tags after enamel acid etching. However, these are easily destroyed by saliva contamination, which reduces micro-retention and consequently, the caries-preventive effect. Nonetheless, resin based sealants possess a much higher retention to pits and fissures than glass-ionomers. However, resin-based sealants have been

shown to lose almost all of their protective effect once their retention is lost.

**Figure 1.** Resin products used in clinical trials as fissure sealants



**Conventional glass-ionomer cement (GIC)**

Under the generally wet conditions in the oral cavity, Glass Ionomer Cement (GIC) offers an alternative. Owing to its hydrophilic properties, GIC is not as moisture-sensitive as hydrophobic resin. In contrast to resin, GIC based fissure sealants show a lower retention to pits and fissures. However, although the GIC sealants appear clinically as “partially” or “totally” lost, small amounts of material remain. The effectiveness of GIC has been attributed to the isolation of bacteria from nutrients in the substrate below early carious lesions that have been sealed, the release of fluoride or a combination of both factors.

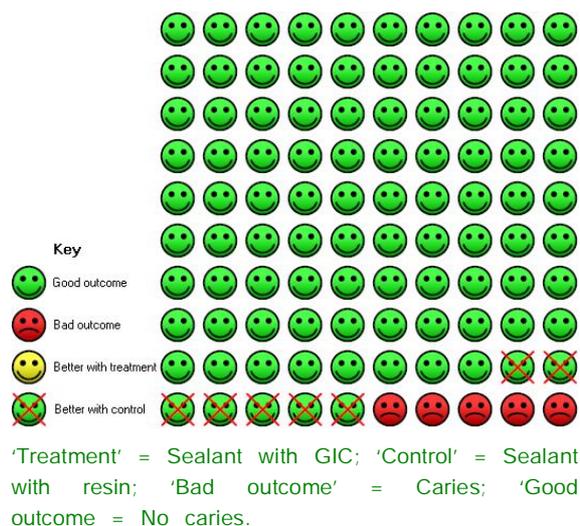
**Figure 2.** GIC products used in clinical trials as fissure sealants



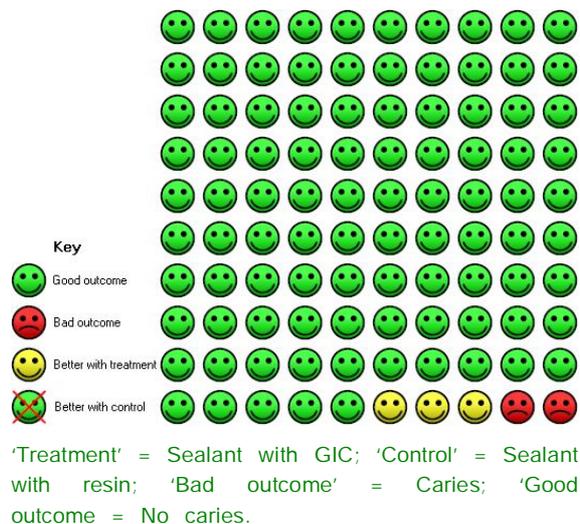
**How do both materials compare with each other?<sup>1</sup>**

The results seem to vary. One seems better than the other at various time intervals:

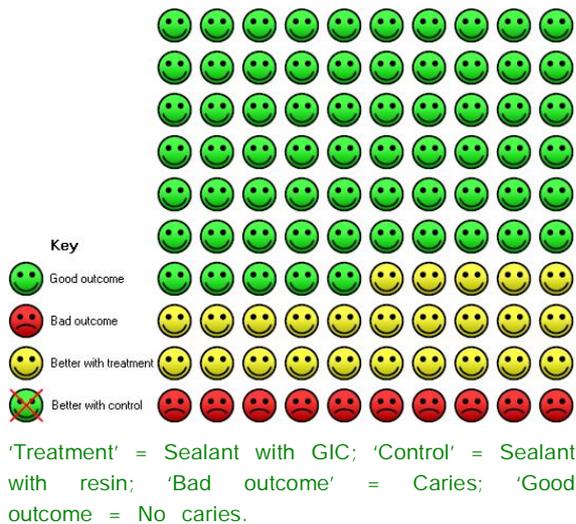
**Comparison results after 3 years for 1<sup>st</sup> permanent molar teeth:** In the resin treatment group 5 sealed teeth out of 100 developed caries over 3 years, compared to 12 out of 100 for the GIC treatment group:



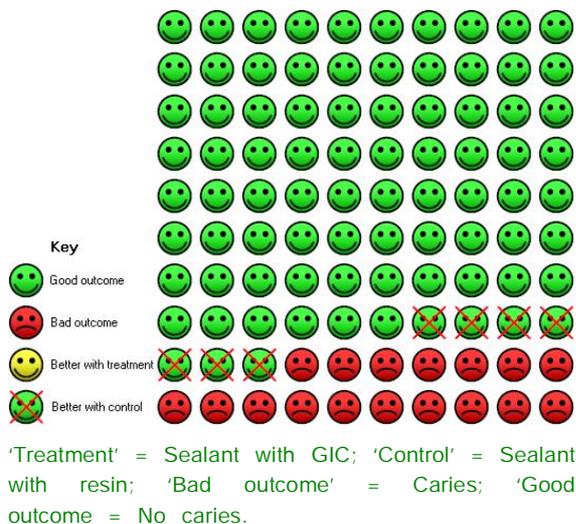
**Comparison results after 4 years for 1<sup>st</sup> permanent molar teeth:** In the resin treatment group 5 sealed teeth out of 100 developed caries over 4 years, compared to 2 out of 100 for the GIC treatment group:



**Comparison results after 5 years for 1<sup>st</sup> permanent molar teeth:** In the resin treatment group 36 sealed teeth out of 100 developed caries over 5 years, compared to 10 out of 100 for the GIC treatment group:



**Comparison results after 7 years for 1<sup>st</sup> permanent molar teeth:** In the resin treatment group 17 sealed teeth out of 100 developed caries over 7 years, compared to 24 out of 100 for the GIC treatment group:



It is important to note that all accepted trials investigated only obsolete low-viscosity GIC materials. New, high-viscosity GIC materials have been introduced for sealing pits and fissures. Clinical application of these materials for sealing fissures differs from the application of low-viscosity GICs. While the latter are applied onto pits and fissures in thin consistency, using a hand instrument, a gloved index finger coated with petroleum jelly is

used with pressure to apply high-viscosity glass-ionomer materials. This procedure may achieve deeper fissure penetration of the GIC material than is achieved through the application of thin low-viscosity GIC with a hand instrument.

**How good is the current evidence?**

The results may suffer from overestimations due to identified methodological weaknesses in all reviewed studies. More and better studies are needed.

**What is the bottom line?**

**Both, GIC and resin based sealants exhibit significant caries preventive effects. There is no evidence that either material is superior to the other in the prevention of dental caries. Therefore, both materials appear to be equally suitable for clinical application as fissure sealant materials.**

<sup>1</sup> Visual Rx - Statin Calculator and Cates Plot by Cates C. was used in order to illustrate the results:  
<http://www.nntonline.net/visualrx/examples/statins/>

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