

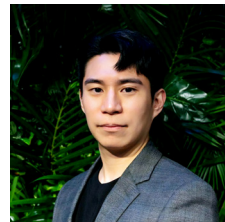
# The Australian & New Zealand JOURNAL OF DENTAL AND ORAL HEALTH THERAPY



## Guest Editorial

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## Another tool in our toolbox: Silver Diamine Fluoride

Silver Diamine Fluoride (SDF) is a topical agent used globally to arrest dental caries and relieve hypersensitivity. Its value has been highlighted in effective caries management among young children, elderly people, and patients with disabilities (Gao et al., 2021). Regardless of the current acceptance and global usage, the journey to introduce SDF in Aotearoa New Zealand has been lengthy, only recently achieving a significant milestone for its use. In Australia, despite renewed interest developed over the past decade and the current evidence supporting the positive role in reducing caries progression, regulation has impacted some health care providers being slow in its uptake.

### NEW ZEALAND REGULATION

In May 2023, the NZ Pharmacology and Therapeutics Advisory Committee recommended SDF as a high priority to approve as a medicine to address inequitable health outcomes affected by dental caries. This advocacy led to another application to Medsafe (file ref: TT50-11196), resulting in the provisional consent for its use by dental practitioners granted in September 2024 for SDF 38% w/v under Section 23 of the Medicines Act (Gazette, 2024). This includes:

- SDF (Topamine SDF®) - TT50-11196

### AUSTRALIA REGULATION

SDF and Silver Fluoride (AgF), carious status

disclosing solution, are both Therapeutic Goods Administration (TGA) approved for use as a desensitising agent in Australia. This includes:

- SDF (Riva Star® and Riva Star Aqua®) - ARTG ID 201267
- AgF (CSDS®) - ARTG ID 230364

In Australia, the Therapeutic Goods Act 1989 does not regulate clinical practice. There is a provision for 'off-label' use of therapeutic goods (Therapeutic Goods Administration, 2023), meaning treatments can be used in ways not specified in their official approval if deemed clinically advantageous. This flexibility enables practitioners to use SDF for arresting dental caries and managing disease progression based on their professional judgment. This approach empowers Australian practitioners to utilise SDF effectively as a caries-arresting agent, provided they adhere to these guidelines and prioritise patient safety and informed decision-making.

### USES OF SILVER DIAMINE FLUORIDE

New Zealand oral health practitioners, including oral health therapists and dental therapists, will be able to use SDF like Australian practitioners as an adjunctive therapy in the management of carious lesions in high-risk groups. Practitioners must obtain informed consent from patients, ensuring they understand the treatment's benefits, risks,

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potential side effects, and expected outcomes. Therefore, it is critical to understand its uses, benefits, and risks so that safe and accountable care can be provided to patients in need.

The effectiveness of SDF is well-documented. A randomised controlled trial in preschool children showed a 72% caries arresting rate within 14 to 21 days following SDF application, a significant improvement over the 5% arrest rate with placebo (Milgrom et al., 2018). Another study by Duangthip et al. (2016) compared the outcomes among children aged three and four years who had active dentine carious lesions (ICDAS 5 or 6 – close to pulp tissues) receiving different SDF treatment regimes and those treated with sodium fluoride. The results highlighted that frequent applications of SDF resulted in substantially higher caries arrest rates, affirming its enhanced efficacy compared to fluoride varnish, a common treatment in Aotearoa New Zealand. It is important to note that the tooth type, tooth surfaces, and presence of plaque on the lesion surface affect the effectiveness and the time to caries arrest (Duangthip et al., 2016).

A separate randomised clinical trial showed similar arresting rates between SDF and the alternative restorative technique (ART) (removal of affected tissues followed by glass ionomer cement with a protective varnish on the surface). In the 6-month follow-up, SDF and ART had 100% and 89% arresting rates (stopping the progression and being inactive), respectively, while in the 12-month follow-up, two had 99% and 80%, respectively (Abdellatif et al., 2021). Silver ions can destroy bacterial cell walls, inhibit enzyme activities and inhibit cell growth (Zhao et al., 2018). SDF will benefit patients who are not compliant with invasive or time-consuming treatments. SDF can be applied with the intention of halting the caries activity and preventing progression to infection and wider systemic effects. A study by Yawary and Hegde (2022) combined the use of SDF with comprehensive oral health education to determine its effect in diverting high-risk children in Victoria, Australia, from receiving dental treatment under general anaesthetic. At the 6-month follow-up, the proportion of active caries in the intervention group had arrested by 78%, with a significant reduction in the rate of preventable hospitalisations for DGA's by 88%.

While Silver Diamine Fluoride (SDF) is highly effective in halting the progression of dental caries, one of its known effects is the darkening of treated areas. Silver ions in SDF react with proteins and other compounds in the demineralised dentine and form various dark-coloured silver compounds while reducing the growth of cariogenic bacteria. As dental caries becomes less active, the colour becomes much darker, and when completely arrested, turns black. This effect has been met with some reduced acceptance, especially for visible teeth (Bagher et al., 2019; Bahathiq & Arafa, 2021). Nevertheless, caregivers demonstrated higher acceptance for their child's primary teeth compared to permanent teeth and posterior teeth compared to anterior teeth (Bagher et al., 2019). Increased acceptance was also noted when SDF was applied prior to shifting to restorative treatments

under general anaesthesia (Bahathiq & Arafa, 2021) or when patients had a history of uncooperative behaviours during past dental treatments (Bagher et al., 2019). It is critical to explain the benefits and risks of SDF to caregivers and show clinical photos of SDF-treated teeth, so to ensure caregivers can have a visual understanding of black staining.

Pre-formed stainless steel crown (SSC) placement using the Hall Technique has been widely accepted in Aotearoa New Zealand for its non-invasive nature, but there were some concerns from caregivers regarding its metallic appearance (Page et al., 2014). It is noted that the metallic appearance could act as a social stigma (Choi et al., 2021), which influences people's decision-making. The challenge now is to manage public perception and ensure that the black staining associated with SDF does not become a social stigma. There are some arguments about the potential use of Potassium Iodide, which is known to reduce black staining (Bassam et al., 2022). There are questions about its impact on caries arresting ability as well as the longevity of colour-masking ability. Nonetheless, Potassium Iodine will not be available in Aotearoa New Zealand as it is not included in the registration of SDF.

## CLINICAL RESOURCES FOR PRACTITIONERS

The Guidelines for Use of Fluorides in Australia advise that as a professionally applied fluoride product, "silver diamine fluoride or silver fluoride might be used for people with caries in situations where traditional treatment approaches to caries management might not be possible" (Do & Australian Research Centre for Population Oral Health, 2020, p. 36). Several universities, including Curtin University, have detailed guidelines for the uses and applications of SDF AgF to assist practitioners in clinical decision-making.

To support the integration of SDF into clinical practice, the Oral Health Clinical Advisory Network is developing an equity-focused clinical guideline informed by Te Tiriti o Waitangi, emphasising culturally responsive practices. The guideline consists of literature review explaining uses, benefits and risks, a step-by-step application guide, photos of black staining on anterior and posterior teeth, and a consent form. These resources aim to equip practitioners with the knowledge to effectively communicate the benefits and risks of SDF, facilitating informed decision-making by patients and caregivers. This will be published and made available to all oral health practitioners.

Silver Diamine Fluoride adds another tool for use by Aotearoa New Zealand's oral health practitioners to address inequitable oral health outcomes (Zhang et al., 2024). As we witness the introduction of SDF, it is important that practitioners to remain informed and responsive to both the scientific evidence and the community's perceptions to maximise the benefits of this significant addition to oral health care.

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