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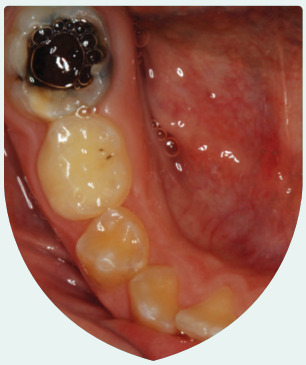
Feature article

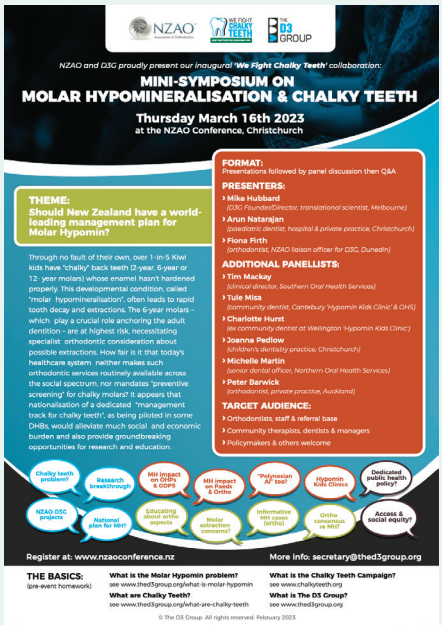
NZAO+D3G MINI-SYMPOSIUM ON

Molar Hypomineralisation and Chalky Teeth

Hot on the heels of their world-first International Symposium on Molar Hypomineralisation and Chalky Teeth—held October 2022 in Toronto, Canada—The D3 Group (D3G) for developmental dental defects (D3s) partnered with the New Zealand Association of Orthodontists (NZAO) to hold a mini-symposium on the same cutting-edge topic in Christchurch. Opportunities now abound for Kiwi dental professionals to design and help implement a world-first public health innovation.



The NZAO+D3G event specifically asked "*Should New Zealand have a world-leading national plan for kids with chalky teeth?*"—a socially impactful question that's exquisitely topical given all 20 district health boards amalgamated into a single national entity last year. The 2-hour symposium addressed 'the chalky teeth problem' as it manifests today before discussing a potential "national fix" that would have far-reaching benefits in NZ and beyond. The subject matter and local background to this ground-breaking gathering were featured by **NZDA News** in 2019 (free download at D3G). Readers are encouraged to consult these three articles for introductory basics (translational science, paediatric, & orthodontic perspectives) and to refresh on NZ's public system for oral healthcare up to 18 years.



>> **read more about the 'Toronto D3 Symposia' at: www.thed3group.org/toronto2020**

>> **see the NZAO+D3G mini-symposium flyer at: www.thed3group.org/uploads/images/news/NZAO-D3G-Poster_h.pdf**

Feature article

How did this Kiwi innovation and its orthodontic leadership come about?

For NZ to be at the forefront of the global 'D3 movement' is no surprise given the Kiwi heritages of D3G founder/director, **Mike Hubbard** and D3 pioneer **Grace Suckling**—whose 1970s research underpinned the WHO-mandated dental survey tool ('DDE Index') and much more. There's also a strong connection between orthodontics and molar hypomineralisation (**MH**, or '**Molar Hypomin**') via specialist guidance about extraction decisions for severely-affected molars. In 2015, **Peter Barwick**—an exceptionally MH-savvy orthodontist and then president of NZAO—invited D3G to provide three lectures on MH (scientific, paediatric, and orthodontic perspectives) at NZAO's national conference. That wonderful exposure to Kiwi orthodontists triggered a variety of D3 advances across NZ, including the '*Sam's Story Club*' initiative and continuing education days hosted by the New Zealand Dental Association (**NZDA**) in 2019.

Subsequent NZAO president, **Marguerite Crooks**, is also long passionate about MH having published on D3s while at University. She accelerated the Kiwi 'D3 movement' by joining firstly her private practice, and then NZAO itself, to D3G's '*We Fight Chalky Teeth*' network. Engagement of **Fiona Firth** (private orthodontist & Otago Dental School) as NZAO-D3G liaison officer soon followed. Constructive interactions with government (Ministry of Health), and an education event for community dental professionals in 2020, brought other prime stakeholders to D3G's fold. Together, these ground-breaking interactions both inspired the 2023 symposium and amalgamated the eight MH experts who kindly donated their time as presenter/panellists.

Marguerite Crooks

>> read more about Grace Suckling and her DDE Index at: www.thed3group.org/grace-suckling

>> read more about orthodontic aspects of MH at: www.thed3group.org/orthodontists

>> read more about 'Sam's Story Club' at: www.chalkyteeth.org/sams-story-club

>> read about Marguerite Crook's D3 study at: pubmed.ncbi.nlm.nih.gov/2371001/

Symposium origin and translational format

The NZAO+D3G symposium idea arose during discussions (Crooks, Hubbard) about NZAO joining D3G's '*We Fight Chalky Teeth*' network alongside existing member, the Australian Society of Orthodontists. Such neighbourly teaming-up offered obvious benefits in several areas (e.g. shared education resources), and NZ was better positioned to tackle the desirable 'national plan' concept given its single-state structure. With the pandemic having honed D3G's symposium skills, it was agreed their well-oiled translational recipe be applied under contract to NZAO using the freshly launched '*D3G Rent an Event*' service. The symposium was designed collaboratively (Hubbard, Crooks) to build out from the national plan foundations reported in 2019. Consequently, in addition to conference attendees (orthodontists, support staff, industry reps), community oral health professionals were invited to participate. Effort was made to represent multiple stakeholder perspectives on "the big picture" (not just orthodontic aspects) and to showcase D3G's 'translational lingo' (chalky teeth, chalky molars, MH etc, as used in this report).

Sorely lacking in the academic literature (cf. >20 terms for MH), such a standardised vocabulary provides for effective and scientifically accurate communication across the sector (from home to front desk, clinic, policy, industry, educators and research lab).

>> **read more about the '*We Fight Chalky Teeth*' network at: www.chalkyteeth.org/we-fight-chalky-teeth-practices**

>> **read more about '*D3G Rent an Event*' at: www.thed3group.org/learning-loop**

>> **read more about D3G's 'translational lingo' at: www.thed3group.org/molar-hypomin-terminology**

What's the 'chalky teeth problem' and how does it impact NZ?

Although D3G's deliberately loose definition of 'chalky teeth' includes four developmental defects of enamel (MH, dental fluorosis, enamel hypoplasia, amelogenesis imperfecta) plus early enamel caries (white spot lesions), their main focus is on MH. The latter reflects the shocking prevalence of MH (affecting 1-in-5 kids worldwide), alongside its direct dental impacts (pain, cosmetic & psychosocial), downstream risk of rampant decay (10-fold higher for severe cases), and potential preventability at dental and primary/medical levels. D3G teaches that, besides such troubles surrounding MH itself, the 'chalky teeth problem' comprises two additional levels—**(1)** widespread ignorance about this topic, and **(2)** ensuing lack of research and its dependencies (evidence-based management, policy, products). It follows that, like everywhere else, NZ has a major MH problem that's neither widely recognised or well-managed, on the whole. Fortunately, with so many Kiwis now involved in the D3 movement, NZ is exceptionally well-placed to make a national attack on the chalky teeth problem—an exciting prospect both in itself, and as a role model for the world. Thanks to multiple Kiwi inputs across D3G's three Toronto Symposia (**Arun Natarajan**, **Charlotte Hurst, Tim Mackay**), the D3 world is well-aware if not in awe of what's happening with '*D3G Down Under*'.

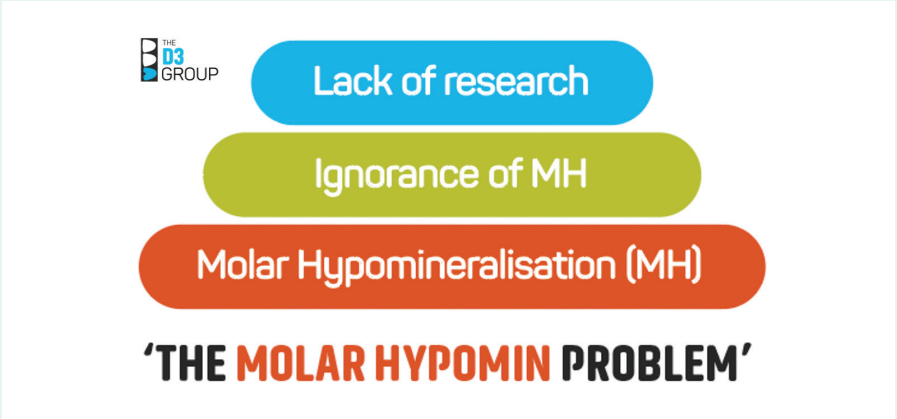
>> **read more about D3G's definition of chalky teeth at: www.thed3group.org/what-are-chalky-teeth**

>> **read more about MH prevalence at: www.thed3group.org/prevalence**

>> **read more about decay risk and other health risks of MH at: www.thed3group.org/health-risks**

>> **read more about medical prevention of MH at: www.chalkyteeth.org/prevention**

>> **read more about the 3-level MH/chalky teeth problem at: www.thed3group.org/what-is-molar-hypomin**



Feature article

Symposium focus – don't 'chalky teeth kids' deserve special care?

Before considering solutions, the presenters provided various perspectives on "*what's wrong with the status quo?*"—described as a classical 'ambulance at bottom of the cliff' scenario by some. With tongue firmly in cheek, Mike Hubbard likened the current dental care pathway to a fictitious hiking track run by a 'Department of Conservation and Extractions', and which for 'chalky teeth kids' presents some unique dangers. Indeed, other presenters agreed that, although the current "one-size-fits-all" oral health service does have some flexibility to accommodate exceptional needs (e.g. advanced radiography unavailable in community clinics, specialist treatment for amelogenesis imperfecta), a raft of deficiencies remain for MH kids. Foremost, the general lack of early detection means that, more often than not, badly affected molars are severely decayed by the time they're identified (often denominated erroneously as severe caries or 'hypoplasia'). This in turn leads to molar-extraction decisions, which ideally should have specialist orthodontic input. That such orthodontic services aren't publicly funded creates a social-equity problem of substantial magnitude (cf. high prevalence of MH). Besides these bottom-tier deficiencies, the two higher levels of the chalky teeth problem (education, training, research) were also seen to be lacking. It was unanimously agreed that chalky teeth kids do indeed deserve special care, and that this should be approached holistically—that is, by attacking all three levels of the chalky teeth problem.

>> read more about a D3 perspective on oral healthcare provision in NZ at: www.thed3group.org/uploads/images/NZDA-NEWS-Chalky-teeth-feature-2019.pdf

Who spoke about what?

The symposium (moderated by Firth, co-hosted by Crooks & Hubbard) comprised three background presentations, five panellist talks offering diverse perspectives on problems and potential solutions, followed by panel discussion—all interspersed with substantial amounts of audience Q&A. An introductory segment on D3G and translating science to social good (Hubbard) was followed by commentaries on the MH problem from specialist paediatric (Natarajan) and orthodontic education (Firth) standpoints. Next, participants were treated to the hands-on perspectives of a children's dentist (**Joanna Pedlow**), regional public health manager (Mackay), 'Polynesian amelogenesis imperfecta' researcher (**Michelle Martin**), two 'D3 clinic' pioneers (Hurst, and Pedlow on behalf of unwell **Tule Misa**), and MH case records expert (Barwick). Threaded throughout the talks, and heading the final Q&A session, was the "how we can fix it" concept of a special (bespoke) public health pathway for kids with chalky teeth.

>> read more about specialist perspectives of Natarajan and Firth at: www.thed3group.org/uploads/images/NZDA-NEWS-Chalky-teeth-feature-2019.pdf

Charlotte Hurst & panel

Proposed national plan – what's the 'two-track solution'?

Being tailored for kids with normal hard enamel, today's one-size-fits-all approach is clearly inadequate for chalky teeth kids, many of whom end up in the proverbial cliff-bottom ambulance. Logic dictates that a bespoke pathway ("second track") is needed to manage MH and other D3s properly, and this should focus on prevention (cf. Hubbard's jocular "special track for chalky teeth kids overseen by the Department of Health and Prevention"). Key drivers for such innovation are the large numbers of kids involved, and their multiplicity of exceptional needs. Partial precedence exists in Norway, where lifelong management of amelogenesis imperfecta (**AI**) is covered by a publicly-funded 'AI track'—this is because, unlike caries associated with active neglect, the AI individual isn't to blame for their genetic susceptibility. However, being about 2,000 times more prevalent than AI, MH demands additional considerations. The draft concept plan developed by 'D3G-NZ' involves five elements, as summarised in **Box 1**.

BOX 1

Special-care pathway for kids with chalky teeth

1. **Early screening**—'chalky teeth check-up' in community and school clinics, starting at 18 months when the baby eye teeth (canines) erupt. Note hypomineralisation of the '18-month canines' is often a red flag for 'hypomin 2-year molars', which in turn often precede 'hypomin 6-year molars'. Allied conversations about chalky teeth are beneficial, regardless of screening outcome.
2. **Flexible recall**—implemented following any positive detections, so that their rapid breakdown and subsequent chalky teeth can be identified early and managed appropriately. Successfully trialled alongside early screening in Auckland before the pandemic.
3. **Public D3 clinics**—as successfully operating in Christchurch since 2003 as a hospital-based service, and in Wellington as community clinics since 2019.
4. **Specialist orthodontic guidance**—at the public D3 clinics, initially via the voluntary approach ("virtual orthodontic consultation") pioneered in Christchurch and Wellington.
5. **D3 education, training & research**—standardised translational approach (terminology/vernacular, curriculum & learning resources, clinical guidelines & policy, research protocols), integrated with 'D3G International'.

>> read more about D3G's 'chalky teeth check-ups' at: www.chalkyteeth.org/we-fight-chalky-teeth-practices

>> read more about the MH initiatives in Christchurch and Auckland at: www.thed3group.org/uploads/images/NZDA-NEWS-Chalky-teeth-feature-2019.pdf

What got people talking?

It's fair to say just about every element of the symposium got people talking in the following hours and days—perhaps unsurprising given such diversity of interests among the 150-strong audience. With numerous "D3 newbies" present (including **Norman Nagel**, president of the American Association of Orthodontists), much surprise was expressed in regards to the gravity of the chalky teeth problem and extent of wins already racked up by D3G. That Polynesia has its own indigenous type of chalky teeth—dubbed '**PolyAI**' (short for 'Polynesian amelogenesis imperfecta')—was news to most including dental educators. Fortunately, this major failure to translate 1980s research to social good is now being addressed (Martin & D3G). Yet participants were quick to see how the current social-equity chasm might be turned to broader advantage (i.e. although PolyAI is rare, the personal devastation and its cultural envelope helps justify a national D3 track). A cautionary note on molar extractions in PolyAI kids (Martin) also generated much intrigue. The public D3 clinics in Christchurch and Wellington were exciting revelations to many, eliciting suggestions to establish more elsewhere along with offers to donate orthodontic services.

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The suggestion (Barwick, Natarajan), that virtual orthodontic consultations would be strengthened if referring practitioners were trained to complete an orthodontic check list, was popular. As a final example, it was pleasing that company reps were quick to recognise opportunities for industry to better acknowledge, and then help alleviate, the chalky teeth problem (cf. R&D, marketing, education, advocacy).

>> read more about Polynesian amelogenesis imperfecta here: www.thed3group.org/uploads/images/NZDA-NEWS-Chalky-teeth-feature-2019.pdf

Future aspirations and what's next?

Clearly, developing the national plan properly and then implementing it is going to require approval and much more from governing entities. To make a case the "public health gods" and purse holders find compelling, it should help to first establish what information they'd like to hear and from whom. Logically, we can anticipate that additional teaming up across the sector (old district health boards, oral healthcare networks, dental organisations, academia, industry) would be a sensible start. And while we can confidently assert that proper management of chalky teeth kids will bring huge social and economic benefits—noting MH imposes a similar burden on taxpayers as major cancers—a formalised social and economic impact report would surely hold more sway. Such impact assessment would be more compelling if based on hard numbers (MH prevalence and treatment burden)—which in turn would follow national adoption of a D3-friendly dental-charting software. To pull all these threads together and do the research is a substantial undertaking, raising need for dedicated staff (e.g. project officer). This takes us to the inevitable question of resourcing (e.g. who pays for personnel, impact assessment report, liaison etc?).

>> read more about the economic costs of MH here: www.thed3group.org/economic-cost

How can dental professionals and others help?

The more society hears about the chalky teeth problem the better—so talk, being cheap, is a great starting point for all. As translationally informed talk is even better still, alignment with the *Chalky Teeth Campaign* and familiarity with D3G's unparalleled network and resources seems wise. The pitch to government will be strengthened if there's more "proof of practice" across the nation (D3 clinics, orthodontic volunteers, uptake of D3 education/training), even if done on ad hoc basis temporarily. This in turn introduces hands-on opportunities to help establish D3 clinics, liaise with community practitioners, provide specialist support, and raise funding.

Sam Whittle joining '*We Fight Chalky Teeth*'

>> see the Chalky Teeth Campaign website here: www.chalkyteeth.org

>> read more about giving back to D3G here: www.thed3group.org/giving-back

Key takeaways from the Symposium

The chalky teeth problem causes massive social and economic damage in NZ as elsewhere, yet no other country is so well-placed to do something about it—both at national level, and by leveraging D3G's unique expertise in translating D3 science to social good. The timing is perfect, and a great start has been made (cf. national social-equity agendas, unified health boards, D3 clinics, MH management plan, donated virtual orthodontics, support for D3G). It now seems unarguable that the multitude of Kiwi kids with exceptionally decay-prone, chalky teeth would be better served by a bespoke pathway, rather than being forced through an overloaded system attuned to normally hardened teeth. Sensible steps in getting from D3G-NZ's draft concept plan to whetting governmental appetite are apparent, and resourcing required for next steps is just a tiny fraction of immediately realisable savings (taxpayer & private). Translational learnings made in fixing the chalky teeth problem would benefit other dental and healthcare areas (so-called transformative potential). Moreover, international interest in what's happening with '*D3G Down Under*' beckons cost-sharing opportunities. Readers are encouraged to add their weight to the national plan movement through bottom-up actions and top-down advocacy. And if a translationally informed chat seems the best place to start, any of the authors would love to hear from you.

More information

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