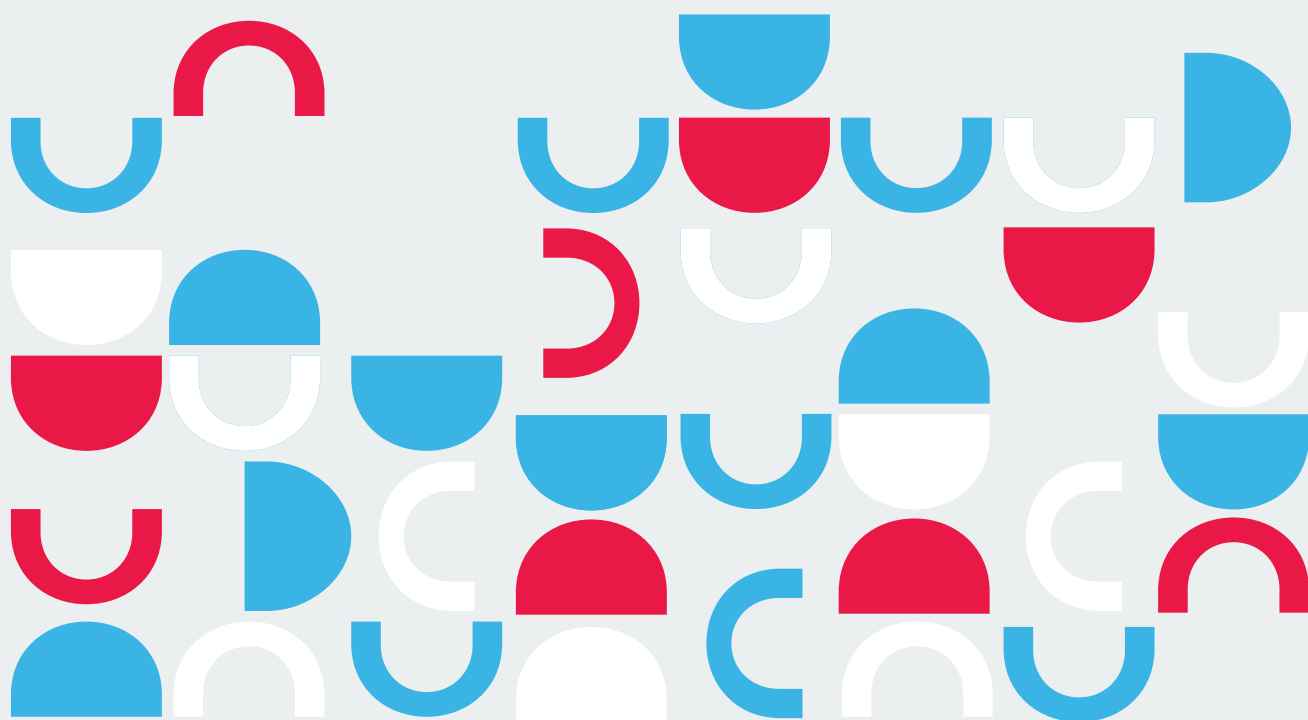


A practical
guide for health
professionals using
Munchee products



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179 Union St
The Junction NSW 2199

Disclaimer:

The contents of this manual have been written for primary and allied health practitioners wishing to use the Munchee suite of appliances in their clinical work. While we attempt to thoroughly address broad and specific topics, it is not possible to include discussion of everything necessary to ensure clinical outcomes on a case by case basis across all professions.

Thus, this information must be understood as a tool for addressing the use of the Munchee specific to a general clinical application and within broad professional categories. The information contained herein does not replace clinical assessment, treatment planning and individualised care nor are the research references contained intended to be definitive and a complete analysis of current evidence.

Individual clinicians must combine their own judgement, clinical reasoning and experience to determine if the Munchee and the suggested protocols contained herein are appropriate for each patient case.

A NOTE FROM MARY

My father was Dr Kevin Bourke, the dentist who invented the original "Myo Munchee" way back in the 1960s and who passed away in 2016 aged 91. I am now tasked with the challenge of keeping his legacy alive and raising a whole new generation of chewers!

Just what is this legacy and how did it evolve? By understanding the evolution of the Munchee it's my wish you'll come to appreciate my Father's work and the Munchee as much as I do.

Dr Kevin was an incredibly passionate clinician spending over 50 years in practice. He was a "big picture dentist" who was looking outside the square for answers and creating solutions that did not yet exist. As a dentist in rural NSW he had many patients with very poor oral health and hygiene and from this need as the saying goes "necessity becomes the mother of invention".

Having accidentally stumbled on the jaw bone of a First Nations Australian, coupled with reading the work of Weston A. Price, Dr Kevin started thinking about how he could improve this oral health crisis of his patients by exercising the jaws and massaging the gums. Then, after a chance encounter with some new materials his prototype was born.

Clinical and practice based research over many years began to show that children who chewed improved dental hygiene, lip and facial muscle strength. Surprisingly to Dr Bourke, those with malocclusions were also achieving changes in the bony architecture from chewing 10 minutes per day. Open bites, cross bites and over-bites were all improving with chewing.

Who would have thought this simple appliance could have all these amazing benefits!

Combining this knowledge with these results, Dr Kevin began trialling the Munchee as an orthopaedic device, particularly passive nocturnal use. He became amazed at the ability of the Munchee to facilitate arch expansion, teeth repositioning (without the need for retention), nasal breathing and improved tongue posture.

Upon retiring from full time dental practice in 2002 Dr Kevin continued to sell his Munchee appliances and this legacy of exploration, testing, research and development of products is preserved as our product line today.

This leaves me with big shoes to fill to continue the legacy of development and inspired, passionate practice. I welcome your participation, feedback and partnership in our Munchee Movement, see where it takes you...



Dr Mary Bourke
B.Sc.B.App.Sc (Chiro)

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WELCOME TO THE #MUNCHEEMOVEMENT

Our world is straining under the burden of related and preventable health problems. Diagnoses rise, our children are in the firing line - the need to make a change is urgent.

What if we connected the dots between chewing, breathing, sleeping, and health? What if we found a simpler, and more collaborative way, bringing kids, adults and clinicians together to engage and collaborate around health?

That's what we call The Munchee Movement.

The Munchee Movement brings parents, children and practitioners together with the common purpose of reclaiming natural, functional chewing and oral motor function.

We are building the movement for positive change and a healthier world by bringing more awareness and empowering people and parents through new skills and knowledge in terms of:

- Integrating facial, jaw and tongue muscles working together for better jaw function and breathing.
- Helping people to function better from birth to maximise healthy development.
- Connecting with a new generation of professionals who want more ways to help their clients with minimal intervention.

This means:

- Connecting with a new generation of practitioners and families who value the intuitive growth of the human body.
- Taking the time and care to help build the critical aspects of preventative healthcare, namely ongoing assessment and non-threatening early intervention processes.

The Munchee Movement has a very clear mission and vision, we hope it inspires you to join us!

#muncheemovement

FB @muncheemovement

www.myomunchee.com

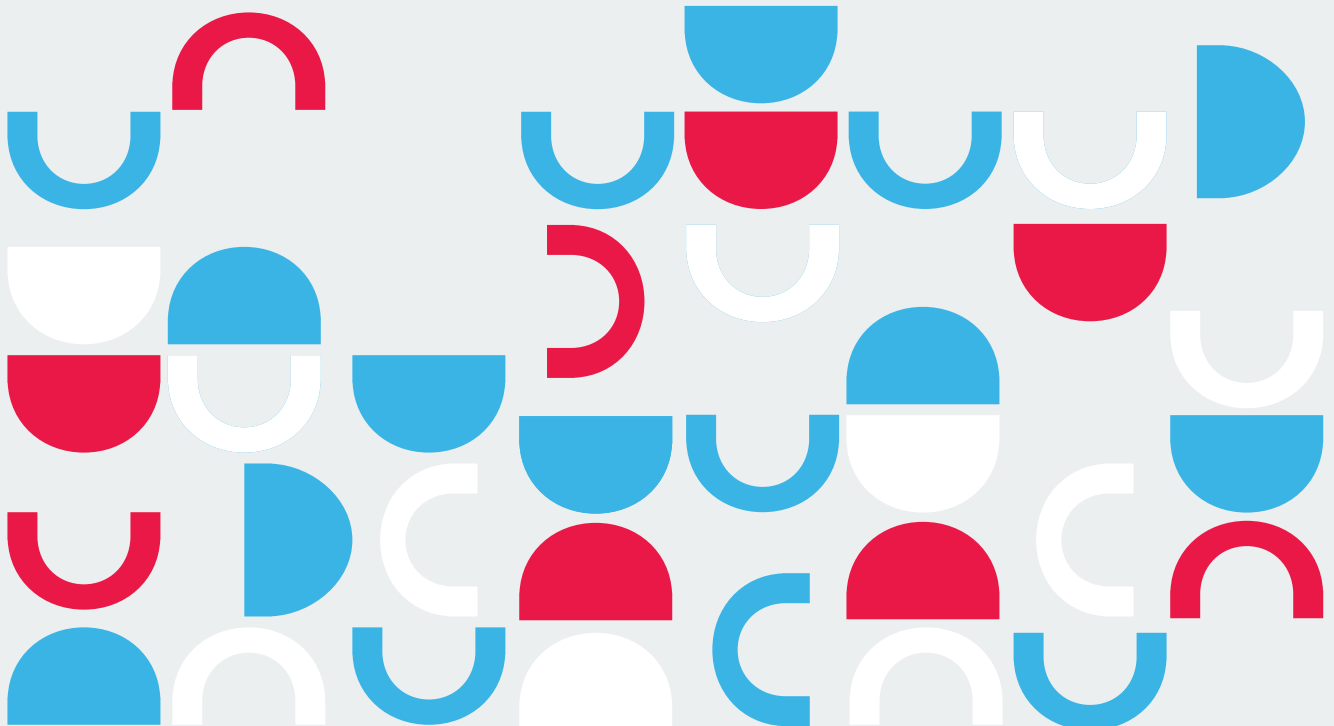
WHAT IS THE MUNCHEE MISSION?

“To optimise the genetic potential of
the next generation”



MUNCHEE MOVEMENT VISION AND VALUES

1. We are an approachable family business that cares about getting our body's innate optimal functioning back on track.
2. We think outside the box and collaborate with a wide range of professionals to create new ways to motivate and help our chewers (young and old) optimise their bodies' function.
3. We see the world differently and champion natural approaches that promote cross-promotion of ideas and concepts to help our chewers bodies' function like they want to.
4. We are helpful and supportive of how we nurture a growing body of credible and very passionate practitioners from all professions who share our vision for health.
5. We are accessible to everyone and our business is driven to put Munchee and our practitioner community in the hands of millions of consumers, serving our mission for positive change.



MUNCHEE MOVEMENT BASICS



THE STORY OF A CHEWER

The Munchee began as an idea to assist periodontal (gum) disease in a rural dental practice. Dr Kevin Bourke, a dentist in regional Australia developed "The Chewer" over a number of years. His first concepts were designed as a chewing brush, made of rubber, with the intention of stimulating the gums and bony development of the face while addressing the poor oral hygiene he saw in practice.

The results of his early trials surprised Dr Bourke, observing great improvements in oral health and function in the patients that used the chewer. He presented his information for the first time to the Australian dental community in 1974.

Dr Bourke continued to travel and present his concept. A group of Japanese researchers at Osaka University decided to run a clinical trial examining chewing for oral health in children, demonstrating the chewing brush as a very powerful tool for addressing plaque and gum health in young children.

Over time, Dr Bourke and in conjunction with the Japanese researchers noticed children chewing the appliance had positive changes in bone growth, facial shape and ultimately occlusion. Seemingly by accident, Dr Bourke had discovered the passion that was to dominate his long career from then on; orthopaedic growth and development in children. A passion that still lives through new generations of Munchee practitioners and patients worldwide.

Today, Munchee is still a family business developing and distributing the appliances throughout the

world. Within the rapidly expanding function dental, myofunctional therapy, manual therapy and speech pathology fields the Munchee has a legacy that will continue to evolve over time.

Chewing since 1967 - Historic timeline

- 1950 – Registration
- 1966 – First patent
- 1967 – Red rubber Munchee
- 1975-79 – Japanese research, Oral Physiotherapy, works on technique
- 1980's – continues work with infants and children, connects oral health and total body health
- Mid 1989 to 1991 – MRC formed with the first myofunctional appliance "MYO"
- 1990's – U-Trim developed
- 2000 – retirement from practice still running Munchee
- 2016 – Dr Bourke passes



Dr Kevin Bourke October 2016

THE CONCEPT OF MUNCHEE

It is important to state from the outset; the Munchee is not only a dental appliance. The device was invented and developed by a dentist, however it was always Dr Bourke's intention for the chewing brush to be available for use by everyone, just like a tooth brush.

Clinical use of the Munchee has become more nuanced than simple teeth cleaning. Practitioners who work within the field of head, neck and jaw are finding the Munchee a useful adjunct to therapy encompassing a broad range of specific and general applications.

Munchee Manual

The Munchee Manual is designed to reflect the diversity of practitioners using the appliance and follows a "conditions guide" format. Each condition is broken down by definition, practitioner type, why and how to use the Munchee and suggested starting points for research/further reading.

The order of conditions is in order from Dr Bourke's initial trials and treatments, commonly used conditions, further applications and finally, progressive applications



GETTING STARTED- EXPERIENCE THE MUNCHEE



The basic premise of the Munchee is extraordinarily simple; put it in your mouth and chew on it!

Behind everything that is simple, yet has big impacts there exists complexity. Getting the basics right is an important start. Following these simple guidelines preserves the appliance and maximises the benefits;

Top three criteria for successful chewing:

1. Lip seal around the appliance – correct chewing should maintain lips together at all times around the appliance. Those having difficulty maintaining lip seal should participate in Myofunctional Therapy to strengthen orbicularis oris and surrounding muscles.
2. Nose breathing while chewing – chewers should breathe exclusively through the nose while chewing. Mouth breathing, gulping air or taking the Munchee out to breathe weakens the appliance and negates the benefits. Cases of nasal obstruction should be investigated as appropriate.
3. Correct swallow – chewing a Munchee generates a lot of saliva! This saliva needs to be managed while chewing and correct swallow mechanics are essential to use. If swallow is aberrant, assessment and corrective strategies should be implemented.

GETTING STARTED

Once you've got the basic three criteria established or corrected you're ready to chew!

Points to always reinforce and remember:

- Chew the appliance the right way up.
- Make deliberate regular paced chewing movements in all planes of motion.
- Exaggerate the chewing motion slightly more than normal.
- There are some common mistakes that can limit the lifespan of the appliance in particular chewing mouth open or chewing the edges of the appliance.



SIX EASY STEPS TO GET STARTED

1. Rinse before each use

A quick cold rinse before use is important before any chewing commences to clean any residues, dust and freshens the appliance before placing in the mouth.



2. Get it the right way up

Make sure the "lip" indent is at the top before placing the Munchee in the mouth. A Munchee placed in the mouth upside down will damage the appliance very quickly and compromise results.



3. Ready, set, chew!

Place the Munchee into the mouth, ensuring the teeth fit within the arches of the appliance and the lips are closed around the walls of the appliance. Having the jaws in an ideal resting relationship, means the muscles will work as close to ideal length tension relationships as possible.





4. Serious Munching...

Always keep the lips closed around the Munchee while chewing. The movements of chewing should be slightly exaggerated ("like a hippo chewing gum" - Dr Zeus) and incorporate all ranges of motion. Keep the lips together throughout the entire chew session.



5. Trouble shooting

Some children have difficulty maintaining lip seal over the appliance causing damage. The two most common issues are chewing lips open (pictured) and chewing on one side or corner of the appliance. These habits need to be checked as early as possible as they will shorten the Munchee's lifespan.



6. Munchee Tales

Chewing with children works best when they have a defined beginning and end point. Using a sand timer, reading a story or listening to a song enables children to engage in something that will distract their attention, yet maintain enough awareness to keep the correct form with minimal prompting.

COMPLIANCE AND MOTIVATION

All myofunctional appliances and therapy require two key components, commitment and consistency. The Munchee is no different and it is very important that both patient and practitioner are clear on the requirement that a "chewing habit" is essentially the key outcome required in much the same way as a flossing habit may be. This consistency of use is what creates the results and must be made clear to all parents, guardians and patients.

- Ultimately it's up to every individual practitioner, their scope of practice and their patient engagement to encourage compliance as effectively as possible however the following points have proved effective over the last 50 years...
- Use the "Munchee Tale" - Dr Kevin Bourke always had a vision of children chewing the Munchee while being read a story by their parents. In honour of this Munchee Australia developed "The Myo Tale" a story to be read while chewing. The characters in the Myo Tale specifically reflect Dr Bourke's interest and lifelong study of anthropology.
- Munchee Movements – the Munchee Movements are a specifically arranged 8 week neurodevelopmental sequence of breathing, oral-motor and whole body movements designed to both enhance compliance and assist with cessation of sucking habits. The Movements are sequenced to both story and song. For more see munccheemovements.com
- Daily routines – munching can be easily incorporated into daily routines; chew in the bath, in the shower or as part of the teeth cleaning process.

- Using a sand timer – many young children have no sense of how long 5mins is, however a sand timer gives them a measurable sense of how far they have come and how long they have to go.
- Use music – another way of measuring time is using a 5 minute song or dance. Music helps to motivate and keeps a record of time. Make up dances based on animals, occupations or nature based ideas to keep the child's interest through variation.
- Present time with parents – using the Munchee is a great time for parents and kids to stay present with each other. Parents can be encouraged to spend 5 minutes a day sitting with their children while they chew, no phones, screens or distractions. This way children come to associate the Munchee with positive parental interactions.

"...it is very important that both patient and practitioner are clear on the requirement that a "chewing habit" is essentially the key outcome required, in much the same way as a flossing habit may be."

DR KEVIN'S TOP FIVE



Dr Kevin Bourke was prolific in time spent researching and developing the Munchee relative to his main clinical interests of oral health and later orthopaedics and orthodontics. He used the Munchee over and over for many years particularly to address the following:

- Gum disease
- Oral Health
- Oral Exercise
- Malocclusion
- Posture



GUM DISEASE (GINGIVITIS)

Background:

Gingivitis is an inflammatory process limited to the mucosal epithelial tissue surrounding the teeth and the alveolar processes. Gingivitis has been classified by clinical appearance (eg, ulcerative, hemorrhagic, necrotizing, purulent), etiology (eg, drug-induced, hormonal, nutritional, infectious, plaque-induced) and duration (acute, chronic). The most common type of gingivitis is the chronic form induced by plaque.

Professions:

Dental

Why use Munchee:

- Dr Kevin Bourke originally developed the concept of a "chewer" to treat gingivitis and gum disease.
- His initial clinical trials astonished him in terms of how effective a "chewing brush" was at addressing gum issues.
- He went on to study and research saliva and oral pH throughout his career.
- His published article said: "by therapeutic massage of the oral tissues, it maintains them in states of health through extensive treatment periods".
- Today the Munchee is still effective on gum health due to the effect of the prongs massaging the periodontal tissues and stimulating salivary production.

Suggested Protocols:

- Research in Japan in the 1980's showed a significant decrease in plaque for children who used the Munchee actively.
- Active use is required to assist gum health and prevention of gingivitis induced by plaque.
- In this capacity the Munchee is recommended to be used as an adjunct to regular brushing and active chewing can be encouraged after teeth brushing. Particularly in very young children.

Other Exercises:

- The Munchee should not replace regular at-home dental care. Brushing and flossing should still be part of a daily routine.

What the research says:

Published research by Dr Kevin Bourke is still available:

Bourke, K. (1991). The effects of the MYO appliance in children with malocclusions of the primary dentition. The Journal of clinical pediatric dentistry, 15(2), 90-95.

ORAL HYGIENE

Background:

Oral hygiene involves the maintenance of the oral tissues through cleaning and flossing. This is essential to prevent gum disease, tooth decay and promotes the long term prevention of dental caries while fostering a clean and odour free oral environment.

Professions:

Dental

Why use Munchee:

- The prongs on the Munchee have a similar role to the bristles on a tooth brush.
- Initial studies in Japan in the 1980's showed significant reduction of plaque in children when they actively chewed a Munchee.
- This research showed the Munchee "chewing brush" to be more effective at cleaning the lingual surfaces of teeth in the 3-6 age group.
- The Munchee is easy for young children to use and can be used outside the bathroom during other activities such as reading, car travel and TV time.
- The Munchee can be a great adjunct to oral hygiene in older children and adults.
- There are further benefits to chewing a Munchee including muscle strength and function (see Section 4.3)

Suggested Protocols:

- Active chewing should be performed twice daily and works best in conjunction with brushing and flossing

- Chew gently for 3-5 mins with mouth shut, breathing through the nose

Other Exercises:

- Chewing the Munchee is not intended to take the place of brushing and flossing, these practices should be maintained and encouraged while using the Munchee.

What the research says:

In his articles and lectures Dr Kevin Bourke wrote about saliva and the benefits of the chewing brush on oral hygiene (see appendix for full article):

"Not only does the chewing brush produce copious amounts of saliva to nullify any acid production in plaque but it also produces a very alkaline saliva because of the rate of flow. That rate is 30 times the normal rate for parotid saliva.

This ability of the chewing brush to raise the PH of saliva from PH 5.8 to PH 7.4 in 30 seconds must have a resounding effect on acid production in plaque and on the oral microbia in general."

Recent research also supports Dr Bourke's observations and writing. A 2015 review of human saliva and its functions concluded;

"Clearly, saliva has many functions which are needed for proper protection and functioning of the human body. " (Dawes 2015)

These excerpts demonstrate that as far back as the late 1960's Dr Kevin Bourke was correct in pursuing his ideas of the chewing brush/Munchee in encouraging salivary flow and genetic expression of health states.

ORAL EXERCISE

Background:

Many populations are concerned with maintaining and improving aesthetic appearances. Many practitioners are aware that form follows function, meaning what appears to “look good” also points to optimal function and symmetry.

The Munchee can be used as an Oral Exercise tool to improve gum health and function, muscle tone and to generally assist in decreasing the rate of bone resorption during the ageing process. Please note the Munchee will not re-grow lost bone, but will assist in prevention or slowing of resorption depending on individual case presentations/conditions.

Professions:

Dental, Speech, Manual Therapy

Why use Munchee:

- Simple to use and easy to teach.
- Effective with a short amount of daily usage.
- Functions on muscle, bone, teeth and gums.
- Assists enhances and preserves structure and function.
- Can be used effectively in cases where cognitive function is impaired e.g. early stage dementia.

Suggested Protocols:

- Active use is best suited to promote oral health and function.
- The Munchee can be chewed up to three times a day for periods of up to 10 minutes.
- For this kind of therapeutic effect consistency and frequency are the most important variables. Meaning, it is better to chew actively for 3min x 3 times per day than for 10 mins every few days.

Other Exercises:

- Myofunctional therapy has also been shown to improve the health and function of the lips face and tongue in the same way that exercise and movement may help posture and function.

What the research says:

Current evidence in this field is not prolific (Homem 2014) however the field is emerging. While there may be less research published specifically to oral exercise there is emerging evidence to suggest that oral based exercises have positive effects on functions such as sleep and sleep disordered breathing (Camacho 2015).

Camacho, M., Certal, V., Abdullatif, J., Zaghi, S., Ruoff, C. M., Capasso, R., & Kushida, C. A. (2015). Myofunctional therapy to treat obstructive sleep apnea: a systematic review and meta-analysis. *Sleep*, 38(5), 669-675.

Homem, M. A., Vieira-Andrade, R. G., Falci, S. G. M., Ramos-Jorge, M. L., & Marques, L. S. (2014). Effectiveness of orofacial myofunctional therapy in orthodontic patients: A systematic review. *Dental press journal of orthodontics*, 19(4), 94-99.

MALOCCLUSION

Background:

Edward Angle coined the term malocclusion meaning a misalignment or incorrect relationship of the upper and lower teeth with the mouth closed. There are many categorisations of malocclusion and treatment for malocclusion remains a rigorously debated and researched area of dentistry.

The National Child Oral Health Study 2012-14 undertaken in Australia (Do LG & Spencer AJ 2012-14) shows a total combined incidence rate of severe to handicapping malocclusion to be 14% of children aged 12-14 years. These statistics account for only the most severe malocclusion within a population group. There are numerous geographic and population based studies and reports on malocclusion widely available.

Professions:

Dental (Treatment).

Speech Pathology, Manual Therapy and Occupational Therapy should be able to recognise malocclusion and assist and refer for treatment as required.

Why use Munchee:

There are two common uses for the Munchee relative to malocclusion:

1. Assistive therapy for orthodontic interventions:

- Active use of the Munchee works via soft tissue

therapy, stimulating muscle action and function to assist length tension relationships and strengthening skeletal muscles within correct occlusal relationships.

2. A tool for early intervention/prevention of malocclusions:

- Replacement/therapy for non-nutritive suck habits (NNS) such as pacifier use. NNS are commonly linked to malocclusions within academic literature.
- Intervention appliance for children aged 2-6 who may be showing symptoms/signs of malocclusion due to NNS or other aetiology and are too young to commence orthodontic treatment.

Suggested Protocols:

Relative to the two common uses outlined above:

1. The active chewing protocol can be maintained during pre-orthodontic treatment and with growth appliances.
 - Dr Kevin Bourke utilised a combination of light removable appliances and active use of the Munchee in his practice to assist arch development, tooth positioning and retention.
 - Dr Bourke also trimmed appliances to assist tooth positioning and forces. Dental practitioners should use their judgement and skillset to determine if and when using the Munchee in this way is warranted. The practitioner only U-Trim appliances can be particularly helpful for this purpose.
 - If using removable growth appliances removing the appliance and chewing a Munchee for 5 minutes 2-3 times a day can be invaluable. Especially for those that do not use or have

- Patients in braces are still able to use the Munchee although only passive use is recommended as the prongs on the Munchee can dislodge brackets while chewing.

2. There are two components to using the Munchee as an early intervention tool:

i) As a replacement for Non Nutritive Suck (NNS) habits:

- The Munchee can be a very powerful tool to substitute for NNS habits such as pacifier use, thumb sucking and other passive suck habits.
- The Munchee should be carefully introduced in concept to the child before attempting to replace the NNS habit. A straight up swap is often most effective.
- Begin by using the Munchee for up to 5mins at times when the child may not be typically triggered to suck.
- Once the child is comfortable with chewing introduce the Munchee as an alternative during times when suck habits are more prevalent for the child, for example; bedtimes, story times, in the car or watching TV.
- Working in this way can take up to 2-3 months to change and re-pattern the sucking habits.
- Myofunctional therapy interventions are also incredibly useful as an adjunct therapy to help with NNS.

ii) Early intervention tool for young children:

- Children who are showing signs of developing malocclusion but are too young to begin orthodontics can use active chewing as a tool to improve the muscular forces acting on the growing bone following "form follows function" principle.

- Children younger than seven can perform daily chewing activities with the Munchee building to 2-3 times a day for up to 5-10 minutes.
- For children in this age group it is strongly recommended to use other activities as a "distraction" as 5 minutes can feel like a long time for these children.
- Listening to a song, audio story or having a book read to them are activities that will last 5+ minutes.
- Chewing while watching screens or TV is not recommended as concentration on chewing can be lost due to the hypnotic effect of screens and TV.

Other Exercises:

- A full myofunctional therapy program is highly recommended for both presentations of malocclusion.
- Breathing retraining for those with a mouth breathing habit and a patent nasal airway can be very important step for orthodontic outcomes. While the Munchee promotes nasal respiration some children may require specific breathing retraining.

What the research says:

To summarise the research on this relatively new and expanding topic is well beyond the scope of this manual.

As an initial start point, the case study below by Sugawara et al in 2016 (see reference list on the following page) provides an interesting case history

combining myofunctional therapy and orthodontic approaches. Similar in many ways to the approach used by Dr Kevin Bourke.

“A satisfactory occlusion and a balanced smile were achieved after orthodontic treatment combined with orofacial myofunctional therapy, including muscle exercises.”



Australia



Before



After

Arch Expansion



Japan



Before



After

Anterior Cross Bite

Fig 1: Archival cases of Dr Kevin Bourke using Munchee

POSTURE

Background:

The term "posture" refers to the alignment of the musculoskeletal system and the integration of the parts within the whole. Posture has two components of equal importance:

1. Static posture – the position/alignment that movement begins and ends from.
2. Dynamic posture – the alignment of the axial and appendicular skeleton during movement.

Posture has no one perfect, or ideal measurement or position and asymmetry is considered the norm. There are however postural traits and compensations that commonly occur and are clinically significant and markers of both dysfunction and treatment or intervention progress. Common causes of postural compensation include:

- Airway compromise
- Mouth breathing
- TMJ pain and dysfunction
- Lack of movement
- Poor ergonomics
- Digestive dysfunction
- Mood and emotional disorders
- Aging process

Professions:

Manual Therapy, Occupational Therapy, Dentistry and Speech Pathology

Why use Munchee:

- The stomatognathic system utilises up to 40% of the motor nervous system output to perform oral and communicative tasks, making the Munchee a powerful appliance for improving head, neck and jaw position.
- Improving function and position of these muscles and joints can have a strong effect on the cervical spine thus acting as a descending postural driver on the structures below and improving overall posture.
- Dr Kevin Bourke developed a theory on the dental mechanics that drive forward head posture.

Suggested Protocols:

- Passive use helps with jaw positioning creating biofeedback and resetting of oral posture.
- Active use is recommended for improving posture with particular attention to total body posture while chewing.
- Chewing while slumped or lying down will not be a beneficial neurological input.
- The Munchee is very useful as an adjunctive neural stimulus when performing floor or standing exercises and can enhance both the form and benefits of exercises that are specifically working to improve posture.

Other Exercises:

There are many approaches, articles and theories on improving posture

Within the oral-motor sphere, particularly if aiming to address forward head posture, attention must be paid to:

DYNAMICS OF FORWARD HEAD POSTURE



Fig 2: Dynamics of forward head posture by Dr Peter Bourke and Dr Bourke

- The thoracic and lumbar spine
- Mechanics and alignment of the pelvis
- Mechanics and alignment of shoulders
- Work, sports or study environments the body is exposed to

What the research says:

Much has been written and debated in regards to posture. The paper by Kolar (2012) provides insight and a starting point into exploring the complex relationship between posture and airways/ breathing within a pathological population.

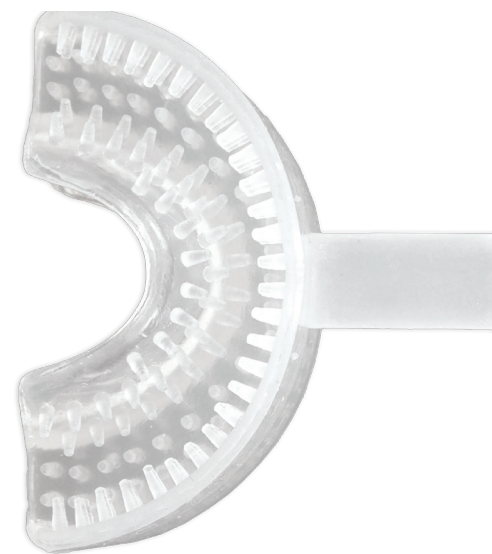
“Patients with chronic low back pain appear to have both abnormal position and a steeper slope of the diaphragm, which may contribute to the aetiology of the disorder.”

PRACTICE “BREAD AND BUTTER”



After his initial frustration of being 40 years ahead of his time Dr Bourke spent many years collaborating and sharing ideas with other dentists, speech pathologists, dental hygienists and chiropractors around the world who “got it”. Many of these practitioners still use and recommend the Munchee.

These discussions and collaborations resulted in new and practical applications for the Munchee beyond the dental focus. As his career progressed Dr Bourke's felt the Munchee was in fact a myofunctional appliance and could therefore be integral to addressing the “bread and butter” conditions of myofunctional disorders.



DRIBBLING AND DROOLING

Background:

Dribbling and drooling are characteristic of many specific and non-specific conditions and disorders of the orofacial system. Dribbling and drooling are relatively normal in young babies and become a management issue in young children over 2 years. Some common causes of dribbling and drooling in these children include, but are not limited to:

- Tongue thrust
- Malocclusion
- Reverse suck/swallow patterns arising from oral habits such as pacifier use
- Ankyloglossia

Professions:

Speech Pathology, Dental, Occupational Therapy, Manual Therapy

Why use Munchee:

- Active use of the Munchee encourages saliva production and helps train the child to manage saliva.
- With the Munchee in place the patient is required to employ correct swallowing strategies using the tongue to clear the saliva and opposing the lips and facial muscles.
- The size of the Munchee inhibits aberrant function of the lip and facial muscles.
- Lips closed around the appliance inhibits suck-swallow and ensures the tongue drives new swallow pattern in addition to other myofunctional strategies.

- Use of the Munchee assists strength development of orbicularis oris, helping maintain lip seal and subsequent saliva management.

Suggested Protocols:

- Begin slowly. The extra saliva produced can be overwhelming for a young child.
- Start with passive use for 30 to 60 seconds.
- Once tolerated, start chewing for small periods and build up as tolerated.
- Small, slow progressions are ideal in a younger age group.
- Additional myofunctional exercises and swallow training are highly recommended.

Other Exercises:

- Bite/smile/swallow (See Appendix 2)
- Breathing retraining

What the research says:

A study by Giuca (2008) showed 47% of 57 enrolled patients improved swallow with myofunctional therapy and 62% treated with both functional orthodontics and myofunctional therapy corrected aberrant swallows. The researchers also stated:

"many factors can cause alterations of the orofacial muscles, malocclusion and persistence of infantile suck/swallow patterns. Thus demonstrating evidence that dribbling and drooling is multi-factorial and requires an integrated approach."

MOUTH BREATHING

Background:

Mouth breathing refers to predominant and persistent oral respiration. The aetiology of mouth breathing is multi-factorial and tends not to follow a consistent pattern or presentation. Mouth breathing is symptomatic of a range of dysfunctions relating primarily to the upper respiratory system and secondarily to structural presentations of the stomatognathic system and other metabolic processes.

Professions:

Medical, Dental, Speech Pathology, Manual Therapy

Why use Munchee:

- Using the Munchee assists in conditioning the orbicularis muscles to maintain lip seal.
- Active use of the Munchee promotes nasal respiration.
- Active use promotes afferent input to chewing and swallowing cranial nerves (CN IX, X, VII and XII) assisting coordination and re-patterning of breathing, chewing and swallowing.
- An extremely useful adjunct to breathing retraining/therapy programs.
- Helpful tool to address some structural and myofunctional imbalances that contribute to mouth breathing via pacifier and thumb sucking.
- Helpful tool to retrain and rehabilitate nasal respiration following ENT procedures.

Suggested Protocols:

- Protocols for use in Mouth Breathing vary depending on intent for therapeutic outcome.
- If the practitioner intends to use the Munchee passively please ensure the patient has a patent nasal airway and can comfortably tolerate the appliance while nasal breathing.
- Active use assists development of orofacial muscles and maintenance of lip seal with consistent chewing up to 2-3 times a day for 5 mins.
- Addressing mouth breathing can be both a complex and individual process that requires assessment and diagnosis.

Other Exercises:

- There are various breathing retraining methods and trainings available. Many utilise education and controlled hypoventilation exercises to retrain breathing control
- Forms of meditative movement such as yoga and tai chi (qi-gong) have their basis in breathing focus and control.
- Many meditation and mindfulness practices use breathing as a foundation for practice and can be useful as adjunct breathing retraining tools.

What the research says:

Research on breathing and the effects on physiology and health is a growing and emerging field. One of the most significant papers, published by Zelano et al (2016) shows there is a link in human function between nasal breathing and the functions and oscillations of the limbic system. This research is significant, especially in relation to working with children, as those who can restore nasal breathing are enabling not only improved functioning of airway health but the capacity of children to process and self-regulate their emotional states and well-being.

A paper that discusses the influence of breathing on many aspects of growing children by Dr Rosalba Courtney is also a recommended starting point (see reference below).

“The state of a child's airways and their breathing habits should be a fundamental consideration if we wish to optimize their health, facial attractiveness, postural and skeletal development, cognitive function and development”

Courtney, R. (2013). The importance of correct Breathing for raising healthy good looking children. *Journal of the Australian Traditional-Medicine Society*, 19(1), 20.

Zelano, C., Jiang, H., Zhou, G., Arora, N., Schuele, S., Rosenow, J., & Gottfried, J. A. (2016). Nasal respiration entrains human limbic oscillations and modulates cognitive function. *Journal of Neuroscience*, 36(49), 12448-12467.

PACIFIER (DUMMY) SUCKING

Background:

Pacifiers (dummy, binky) are non-nutritive appliances used to soothe infants or as a feeding/suck aid for premature infants. Munchee has examined published evidence on the adverse effects of pacifier use to determine the impact of these common appliances. Use of a pacifier beyond 6 months of age can begin to have negative effects on a number of aspects of growth and development of the child including;

- Reduced breastfeeding duration.
- Negative effects on development of the palette and occlusion.
- Soft tissue disorders such as tongue thrust.
- Increased incidence of ear infection.
- Psychosocial factors including mother/child bonding, difficulties with facial mimicking and later issues of attachment, obesity and addictive habits (e.g. smoking).

Professions:

All

Why use Munchee:

- Pacifiers create and prolong suck habits that detract, delay and interfere with normal developmental progressions of biting, chewing and swallowing and can be difficult habits to cease.

- The Munchee is a perfect replacement for a pacifier as it promotes correct occlusion, chewing and swallowing and reverses the impacts of non-nutritive sucking.
- The prongs of the Munchee provide sensory input in addition to chewing stimulus helping break the habit without the negative effects of withdrawal or "cold turkey".
- The Munchee is also a "thing". Children who use pacifiers often have an attachment to the object and the Munchee is an ideal replacement, preventing withdrawal and creating positive sensory and motor inputs.

Suggested Protocols:

- Intervention depends on the age and developmental stage of the child.
- Infants and pre-verbal children can simply be given the BeBe as a replacement for the Munchee.
- Verbal children (who can say "no") may need staging to introduce the idea Munchee recommends the following sequence:
 1. Preparation – young children should be introduced to the idea that the pacifier will be going.
 2. Introduction – the concept of a "Big Kid" pacifier aka Munchee.
 3. Transition – swapping the pacifier for the Munchee.
 4. Integration – the Munchee becomes a permanent and positive part of the daily routine.

Other Exercises:

- Myofunctional therapy is extremely beneficial for these cases and should be initiated with any intervention for pacifier cessation.

What the research says:

A detailed and fully referenced literature review is available to practitioners by contacting Munchee. The highlights of the review are as follows:

- Harm from pacifier use is based on length of use (weeks/months) and duration (mins per session sucked).
- Pacifiers may be useful for first 6 months of an infant's life, for pre-term babies and may help prevent SIDS.
- After 6 months (in some cases before) pacifiers may interrupt with breastfeeding mechanisms, except for mothers with post-natal depression.
- Pacifier use extended beyond 18 months (conservatively) result in malocclusion.
- Pacifiers are associated with soft tissue dysfunction.
- Pacifier use may prevent infants and toddlers from using facial mimicking which is crucial to social-emotional development.
- Pacifier use has been linked to negative adult behaviors and attributes such as smoking and obesity.

ANTERIOR OPEN BITES

Background:

Anterior Open Bite (AOB) is a classification of malocclusion occurring when the upper and lower incisors do not overlap when the posterior teeth are in full occlusion. This leaves the appearance of space between the upper and lower front teeth and is often coupled with a tongue protrusion/thrust into this space.

Examining multiple papers shows the estimated prevalence of AOB is between 1.5 – 11% and varies according to geography and researchers' findings. AOB is associated with a number of causative factors including pacifier use for >36 months (Silvestrini-Biavati 2016).

Professions:

Dental

Why use Munchee:

- Clinically shown for the last 50 years to assist in open bite cases in young children with non-nutritive suck habits (NNS).
- Munchee replaces NNS and provides appropriate growth forces to bone by way of active muscle function in Class 1 Occlusion, particularly in primary dentition.
- For mixed dentition cases the Munchee is an ideal adjunct to removable growth guidance appliances via Munchee's ability to stimulate correct muscle function and force. Always be mindful that mixed dentition cases can cause damage to the appliance if occlusal forces are too strong.

- The Munchee is simple to understand and very easy to use for young children with NNS and/or open bite presentations.

Suggested Protocols:

- Active use is very important in this patient group – begin with 30-60 seconds active use and increase time to 5mins over a 2-4 week period.
- The ultimate goal is achieving 2-5 minutes of chewing (depending on age) 2-3 times per day.
- Depending on the case and the practitioner's discretion nocturnal use of the Munchee can be beneficial for those with good motor function and a patent nasal airway.
- Myofunctional Therapy and basic breathing retraining are strongly recommended for this group.

Other Exercises:

- Myofunctional Therapy exercises (see Appendix 2) can assist and re-educate appropriate lip and tongue forces.
- Basic breathing exercises and meditations/ audio such as Larry Lip Seal are available at myomunchee.com

What the research says:

There is a developing picture within the literature that myofunctional approaches can have an impact on AOB (Van Dyck et al 2015). Dr Kevin Bourke spent many years treating and observing this clinically before myofunctional therapy was formally studied. A 2018 review of non-orthodontic approaches to AOB showed myofunctional therapy to be an effective treatment for AOB (Tanny et al 2018).

Silvestrini-Biavati, A., Salamone, S., Silvestrini-Biavati, F., Agostino, P., & Ugolini, A. (2016). Anterior open-bite and sucking habits in Italian preschool children. *Eur J Paediatr Dent*, 17(1), 43-6.

Van Dyck, C., Dekeyser, A., Vantricht, E., Manders, E., Goeleven, A., Fieuws, S., & Willems, G. (2015). The effect of orofacial myofunctional treatment in children with anterior open bite and tongue dysfunction: a pilot study. *European journal of orthodontics*, 38(3), 227-234.

Tanny, L., Huang, B., Naung, N. Y., & Currie, G. (2018). Non-orthodontic intervention and non-nutritive sucking behaviours: A literature review. *The Kaohsiung journal of medical sciences*.

THE NEW GENERATION



Towards the end of Dr Bourke's career and through the work carried out by his grown children, Dr Mary Bourke and Dr Peter Bourke and through his peers and friends in the speech pathology and manual therapy world, the Munchee has become useful in a range of applications outside of the device's original intention. This New Generation of protocols includes:

- Ear infections
- Swallowing
- Speech
- TMD
- Ankyloglossia (tongue tie)



OTITIS MEDIA (EAR INFECTION)

Background:

Otitis media (OM) is any inflammation of the middle ear, without reference to aetiology or pathogenesis. It can be classified into many variants on the basis of aetiology, duration, symptomatology, and physical findings.

OM is the second most common disease of childhood, after upper respiratory infection. OM is also the most common cause of childhood visits to a general practice.

Professions:

Dental, Medical, Manual Therapy

Why use Munchee:

- OM has traditionally been treated with antibiotic therapy, a treatment option that general practitioners are being encouraged to re-examine due to antibiotic resistance (Mallick et al 2018).
- This means other therapies that may assist can be explored as a non-pharmacological option.
- Clinically Munchee has been shown to be helpful in cases of OM. Potential research is currently being explored to substantiate these observations.
- One theory is that chewing and swallowing can assist with creating a vacuum effect on paediatric eustachian tubes via the pull from the salpingopharyngeus muscles and help in the prevention and short term treatment of OM.
- Children's eustachian tubes are positioned more horizontally than adults and when coupled with chew and swallow dysfunction can result in stagnation of fluid and poor drainage.

- In Class 2 overbite cases the mandible position can also impact ear drainage via the compressive forces on the temporal bone from mandibular condyle compression in the mandibular fossa.

Suggested Protocols:

- Active use is most effective to address ear issues in children.
- The Munchee should be viewed particularly as having an active role in prevention of OM.
- The standard protocol as tolerated is most effective for assisting treatment of OM; 5 minutes active use, 2-3 times a day.
- Discussion and education of parents around pacifiers and sippy cups is also essential.

Other Exercises:

- If reverse swallow is present it is strongly recommended that this is assessed and treated by professions ideally qualified in myofunctional therapy.
- Myofunctional therapy exercises such as tongue suction can also be helpful.

What the research says:

Many studies have reported on OM treatments, preventions and interventions. Each clinician is encouraged to enquire within their scope of practice and interest area on this topic. Munchee have undertaken a broad literature review of pacifier use in young children and found there are many papers highlighting the increased prevalence of OM in children using pacifiers (Niemelä et al 2000). Given pacifiers and non-nutritive suck habits can create aberrant swallow habits this research could point to the anecdotal observation that correlates poor swallow with OM.

“in a sample of 938 children, those who used pacifiers had a greater risk of developing four or more episodes of acute otitis media than those who did not use them”

Mallick, A., Sharma, H., Mishra, A. K., Maggon, N. V., & Sethi, A. (2018). Bacteriological profile and antibiotic resistance in cases of chronic otitis media and its clinical implications. *International Journal of Otorhinolaryngology and Head and Neck Surgery*.

Niemelä, M., Pihakari, O., Pokka, T., Uhari, M., & Uhari, M. (2000). Pacifier as a risk factor for acute otitis media: a randomized, controlled trial of parental counseling. *Pediatrics*, 106(3), 483-488.

ORAL SOFT TISSUE DYSFUNCTION AFFECTING SWALLOW

Background:

Dysfunctions in the soft tissue of healthy children can commonly arise from non-nutritive suck (NNS) habits and the associated sequelae, particularly tongue thrust and its effect on swallowing. These and other noxious oral behaviors and habits can cause poor motor sequencing and suck patterns during swallow and effect normal oral rest posture.

Swallow patterns are slow to mature and are thus vulnerable to dysfunction, particularly if NNS continue for longer than 18-36 months in infants.

Professions:

Dental, Speech Pathology

Why use Munchee:

- Chewing the Munchee increases salivary flow that must be contained and swallowed with the Munchee in place.
- The Munchee limits the potential use of suck muscles through mechanically inhibiting the function of suck muscles during swallow.
- The Munchee then functions as a training aid for swallow correction and/or a supplementary appliance to swallow and myofunctional therapy programs.

Suggested Protocols:

- Often children with reverse swallow patterns will struggle initially using the Munchee, particularly those with restricted tongue range of motion or who have not undergone previous swallow or myofunctional therapy.
- Start these cases initially with static use of the Munchee building to a minimum of one-minute tolerance before commencing active use.
- Active use should start slowly as tolerated, commencing with 30 seconds of gentle chewing.
- From this base build towards a gradual increase of time up to 5 mins twice a day in conjunction with other therapies/programs.

Other Exercises:

- The Munchee is a very useful and supportive adjunct to other therapies for swallow dysfunction.
- Myofunctional therapy exercises can be highly beneficial for this group, particularly older children, adolescents and adults.

What the research says:

A systematic review published by Caridi and Galluccio (2014) examined tongue thrusting and its effect on soft tissue dysfunction. Results showed significant changes in function and oral posture for those with tongue thrust habits.

“A Significant number of children with tongue thrusting showed lip incompetency, mouth-breathing habit, hyperactive mentalis muscle activity, open-bite and lisping when compared to children without tongue thrust. Children with tongue thrust showed increased upper lip thickness and proclination of maxillary incisors.”

SPEECH ISSUES

Background:

Speech is a broad and complex topic influenced by many variables and conditions too numerous to discuss within this context. The Munchee has been used by speech pathologists for over 30 years within the context of non-speech related oro-motor exercises and for specific interventions related to speech and swallowing. Clinically, the Munchee has been found to be beneficial for the following:

- Tongue thrust (lisp)
- Dribbling/drooling and saliva control
- Adjunct to swallowing and eating programs
- Assisting with tongue restrictions

Professions:

Speech Pathology

Why use Munchee:

- Adjunct tool to therapy sessions, particularly between sessions as a simple exercise.
- Salivary flow must be controlled during use.
- Promotes strength of orbicularis oris.
- Regulates facial muscle tone via the strength of muscles of mastication; masseters, temporalis and pterygoids integrated with the smaller muscles of lips and face.
- Promotes jaw control and strength through chewing providing a platform for improving control of the tongue.
- Useful as a "warm up" session for therapy.

Suggested Protocols:

- For assisting speech programs active use is suggested.
- Those with any soft tissue restriction and strong gag reflexes may need to start with passive use only.
- Build to chewing 2 x 5 minutes per day if using separately to therapy practice/sessions.
- Chewing can also be incorporated into therapy sessions and practice sessions at home.

Other Exercises:

- The Munchee can be used to ramp up neural function when a client is experiencing difficulty with particular sounds or tasks.
- Myofunctional therapy and breathing exercises can be used to assist intervention.

What the research says:

Within speech pathology, exercises of lips, face and tongue are termed “non-speech related oral motor exercises” (NSOMs). As part of its conclusion, a narrative review published in the American Journal of Speech and Language Pathology (2015) said:

“Controversy continues over the value of NSOMs in the assessment and treatment of communication disorders such as developmental speech sound disorders and motor speech disorders.”

A recent Australian study (Rumbach et al 2018) showed that within this evidence-based framework, speech therapy has not sufficiently endorsed non-speech related oral motor exercises such as Munchee.

Many SLPs are researching and using non-speech related exercises, including Munchee for a variety of clinical applications and outcomes. The growing

body of evidence will build over the coming years as to their ultimate effect on speech.

TMD

TEMPOROMANDIBULAR

JOINT DISORDER

Background:

Temporomandibular disorder (TMD) is indicative of a range of pathologies affecting the Temporomandibular Joint (TMJ) and its surrounding structures. These disorders are linked and contribute to pain and functional limitation of the TMJ. In the USA, TMD is the most common cause of facial pain after toothache.

Professions:

Dental, Medical, Manual Therapy

Why use Munchee:

- The Munchee brings the occlusion into a Class 1 position thus effecting the relationship of the condyloid process of the mandible and the mandibular fossa of the temporal bone.
- The Munchee can be a useful tool to create a "pattern interruption" for neuromuscular patterns of facilitation and pain by distracting the jaw joint and promoting physiologic muscle and joint relationships.
- A Munchee can be useful for dentists treating acute TMD who need a temporary emergency splint or a simple short-term nocturnal splint.

Suggested Protocols:

- Passive use of Munchee or U-Trim should be initially used for a period of 5-10mins as tolerated.
- Increase passive use for up to 30-60 minutes as tolerated.
- If passive use is beneficial, patients may progress to nocturnal use.

- Nocturnal use of the Munchee range of appliances is not recommended for longer than a 12 week period unless under specific guidance from a dental practitioner.
- Please be aware that active use of the Munchee is not recommended for TMD, particularly in acute cases.
- Once the acute phase has settled, the Munchee can be used as gentle, predictable exercise to rehabilitate function and the support.

Other Exercises:

- Breathing control and integrative breathing therapy has been shown to be a useful adjunct to TMD and chronic pain, particularly if there is a structural influence on the pathology (Bartley 2011).

The Munchee Roller Protocol:

- Use 10 minutes per night before bed to assist with TMD issues.
- Using a half or full Pilates style foam roller lie length ways.
- Both head and sacrum should be resting on the roller with arms out to the side.
- This posture promotes extension of the spine and decreased firing of the sympathetic chain.
- Pressure on the base of skull and sacrum also helps relax the body.
- The Munchee or U-Trim is placed in the mouth, lips closed, bringing the mandible forward into a relaxed oral posture.
- With the device in place the patient can nose breathe and swallow correctly assisting down-

regulation of the Autonomic System.

What the research says:

TMD is the most common cause of facial pain after toothache. A review from 2015 entitled TMD and Chronic Pain (Furquim 2015) concluded:

TMD symptoms should be understood as a complex individual response with unique complaints and which might get worse or improve depending on an individual's genetic composition.

Due to multiple etiological factors and different individual adaptation, multidisciplinary therapy should be encouraged. Likewise, future research elucidating neurobehavioral processes underlying chronic pain should also be encouraged.

The Munchee could potentially be a useful tool for a range of practitioners to use within this

TONGUE TIE (ANKYLOGLOSSIA)

Background:

Ankyloglossia, commonly known as "tongue tie", is a congenital abnormality resulting in reduced tongue mobility and/or range of motion due to an unusually short, thick lingual frenulum.

Treatment of ankyloglossia has become controversial in recent times due to a sharp rise in the number of cases undergoing procedures for the condition at various ages.

Professions:

Dental, Medical, Speech Pathology, Manual Therapy

Why use Munchee:

- In cases of tongue restriction, active use of the Munchee can assist tongue and saliva control via training muscles of mastication and swallow.
- Active use promotes improved function of chewing and swallowing with mouth closed. This assists the processing of food and drink which is often more difficult for those with tongue tie.
- Useful as a tool for pre and post frenectomy or frenuloplasty.
- Chewing stimulates and integrates Cranial Nerves V, VII, IX, X and XII contributing to sensory and motor control of the tongue.

Suggested Protocols:

- Active use is best suited for those with tongue restriction
- Many patients with tongue restriction can have strong gag reflexes so it is best to start by trialing the appliance passively at the beginning

of treatment (see Appendix 2 for help reducing gag reflex).

- Once the appliance is easily tolerated for 60 seconds, active use can commence.
- Build to 1min active chewing then increase until a minimum of 2 x 5mins chewing is achieved.
- A chewing habit should be encouraged just like teeth brushing. This is important for patients not electing to treat surgically or where surgery is not indicated.

Other Exercises:

- Myofunctional therapy is very important for these cases to help restore movement and function around the restriction.
- Working with a manual therapist who has a thorough understanding of ankyloglossia and the implications of the restrictions on the soft tissue can be highly beneficial.

What the research says:

Research on this condition is emerging. There is debate between professions regarding procedures and necessity. An Australian review published in 2018 details the growth rates of procedure and includes discussion on the evidence-based viewpoint.

TONGUE TIE BEFORE AND AFTER TREATMENT

Background:

Treatment for restriction in oral tissue can include myofunctional therapy before and after the procedure to improve outcomes of the surgery and in some cases actively assist during the procedure.

Professions:

Dental, Medical

Why use Munchee:

- The Munchee can assist myofunctional therapy programs pre and post procedure by increasing neuromuscular drive to the lips, face, tongue complexes and related neural function.
- The Munchee can be a particularly simple tool post procedure if there is pain and direct stretching/stimulation of the ventral surface of the tongue is difficult.
- The Munchee is a simple "sell" for parents and patients with a range of suitable sizing.
- The Munchee is not recommended post-lip tie procedure until the wound is fully healed.

Suggested Protocols:

Pre-Procedure:

- Many patients with tongue tie have an increased gag reflex. For these patients begin with passive use and increase to active use once 1-2 minutes of passive use is tolerated.
- For ease of use and results the Munchee can be incorporated into pre-procedure myofunctional therapy programs, usually as a "warm up" for 5 minutes active use or as an integrative exercise post-program, again 5 minutes active use.

- For maximum benefit the Munchee can be used actively for up to 10 minutes, twice daily.

Post Procedure:

- Active use of the Munchee is an ideal for indirect strength and function post procedure.
- Saliva, muscle function and tongue control are all incorporated into active use of the Munchee without providing direct pressure or stretch on the healing site.
- Practitioner must use their clinical reasoning skills to determine appropriate timing to incorporate the Munchee.

Other Exercises:

- Most providers of the surgery have their own protocols and procedures for incorporating myofunctional therapy pre and post procedure.

What the research says:

Tecco et al (2015) showed improvements on measured sEMG studies on muscle function for those undergoing myofunctional therapy following tongue tie surgery versus a control group.

PROGRESSIVE MUNCHEE MOVEMENTS



The Munchee is limited only by the theoretical and creative abilities within the scope of the practitioner. Part two details conditions that have been explored by Dr Bourke and many other practitioners. These conditions are divided into 3 parts;

1. Sleep

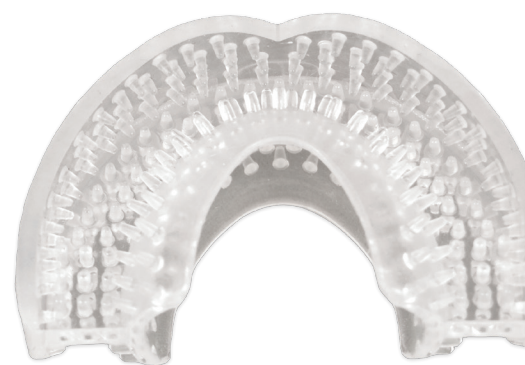
- Bruxism
- SDB
- Snoring

2. Special Needs

- Autism Spectrum Disorder
- Cerebral Palsy
- Down Syndrome
- Oral Motor Dysfunction
- Sensory Processing Disorder

3. Older populations

- Dementia
- Memory and cognitive dimensions
- Oral health in older populations



BRUXISM

Background:

Bruxism can be defined as a parafunctional tooth grinding habit consisting of grinding, gnashing and clenching of teeth. Sleep bruxism is most common, while some semi-voluntary clenching or grinding can also present during the day. The aetiology can be mixed and is often complex. While clenching and grinding can be a normal part of life, prolonged clenching and grinding that becomes habitual is problematic.

Some evidence suggests that before the teeth make contact a series of physiological events occur including; activation of the autonomic cardiac system, brain activity, a rise in jaw muscle tone coupled with 2 big breaths, and an increase in heart rate. This particular sequence has been found to occur in close to 80% of rhythmic jaw movements associated with tooth grinding during sleep (Lobbezoo 1997).

Professions:

Dental and Manual Therapy

Why use Munchee:

- To break the pattern of bruxism for patients with diurnal bruxism.
- Active use promotes the use of physiological patterns of rhythmical chewing within ideal occlusion and breathing patterns (nasal breathing).
- To assist other treatments such as neuromuscular dentistry and myofunctional therapy.

- Passive use during the day encourages a Class 1 occlusion helping distract the TMJ and assist to reduce inflammation in the joint
- Active or passive use promotes nasal breathing and stimulates saliva.
- Due to the structure of the prongs, Munchee is not recommended for nocturnal use in patients with moderate to heavy bruxism due to the danger of them being dislodged.

Suggested Protocols:

- Passive use building up to an hour per day during tasks to build proprioception and awareness of oral posture.
- Those with day-time bruxism can use during times/periods of stress if they aren't required to communicate.
- Light chewing (active use) building to twice per day for up to 10 minutes.
- Dentists may prescribe for nocturnal use based on diagnosis and their professional skill.

Other Exercises:

- Breathing Retraining Exercises; we have found anecdotally that breathing exercises can be particularly effective in eliminating sleep bruxism, particularly in the pediatric population. There is some evidence to support the correlation between breathing related disorders and bruxism (Amato 2015).

What the research says:

Research in this field is wide ranging and prolific. Practitioners should search the literature relative to their profession before looking at the Munchee as a potential therapy assist. The references below were cited while compiling this section.

Lobbezoo F, Lavigne GJ, Tanguay R, Montplaisir JY. The effect of the catecholamine precursor L-dopa on sleep bruxism: a controlled clinical trial. *Mov Disord.* 1997;12:73). *Mov Disord.* 1997. 12:73.

Amato, J. N., Tuon, R. A., Castelo, P. M., Gavião, M. B. D., & de Souza Barbosa, T. (2015). Assessment of sleep bruxism, orthodontic treatment need, orofacial dysfunctions and salivary biomarkers in asthmatic children. *Archives of oral biology*, 60(5), 698-705.

Murali, R. V., & Priyadarshni Rangarajan, A. M. (2015). Bruxism: Conceptual discussion and review. *Journal of pharmacy & bioallied sciences*, 7(Suppl 1), S265.

SLEEP DISORDERED BREATHING (SDB)

Background:

SDB represents a group of conditions that are categorised by an abnormal respiratory pattern during sleep. SDB can be isolated or can coexist with other respiratory, nervous, cardiovascular, or endocrine diseases and/or processes. The condition is now known to be widely prevalent in the general population.

Professions:

Dental, Medical, Manual Therapy

Why use Munchee:

- Active use of the Munchee promotes improved breathing and increased pharyngeal tone through sensory stimulation and oral-motor function.
- Emerging research shows myofunctional therapy improves outcomes in SDB through improved tongue posture and pharyngeal tone (Villa 2017).
- The Munchee can be a useful tool and contributing therapy to assist myofunctional therapy or as an active treatment in conjunction with passive therapies using dental appliances or CPAP.
- Munchee should only be used for active daytime use in CPAP cases and never as a passive nocturnal appliance.

Suggested Protocols:

- For these cases the Munchee can be used intensively to start with, chewing up to 3 times daily for 5-10 minutes for a period of up to 8 weeks.

- Usage may be less if used in conjunction with myofunctional therapy.
- On conclusion of the initial phase, continued active use 2 x 5mins per day will maintain improvements and assist other therapies.
- Please do not prescribe Munchee for nocturnal use for cases on CPAP or in conjunction with dental sleep appliances.

Other Exercises:

- Emerging evidence is demonstrating the effectiveness of myofunctional therapy for SDB and specifically Obstructive Sleep Apnea (OSA) (Villa 2017).
- Exercises that lift and tone the anterior and posterior aspects of the tongue should be encouraged.
- Breathing exercises can also assist mild to moderate presentations.
- Playing the didgeridoo has also been shown as a novel approach in treating SDB (Puhan 2006).

What the research says:

A systematic review in 2015 showed that myofunctional therapy decreased the apnea-hypopnea index (AHI) by approximately 50% in adults and 62% in children (Camacho et al 2015). There are still many unanswered questions and long term data needs to be collected. However, initial results do indicate that active therapies for the muscles and structures surrounding the stomatognathic system can have a positive effect as part of the management of SDB.

Camacho, M., Certal, V., Abdullatif, J., Zaghi, S., Ruoff, C. M., Capasso, R., & Kushida, C. A. (2015). Myofunctional therapy to treat obstructive sleep apnea: a systematic review and meta-analysis. *Sleep*, 38(5), 669-675.

Villa, M. P., Evangelisti, M., Martella, S., Barreto, M., & Del Pozzo, M. (2017). Can myofunctional therapy increase tongue tone and reduce symptoms in children with sleep-disordered breathing?. *Sleep and Breathing*, 21(4), 1025-1032.

Puhan, M. A., Suarez, A., Cascio, C. L., Zahn, A., Heitz, M., & Braendli, O. (2006). Didgeridoo playing as alternative treatment for obstructive sleep apnoea syndrome: a randomized controlled trial. *BMJ*, 332(7536), 266-270.

SNORING

Background:

Snoring is a generic term referring to loud and noisy breathing during sleep, usually due to lack of tone or obstruction of the posterior pharynx. Snoring is symptomatic of sleep disordered breathing (SDB), particularly obstructive sleep apnea and can be the first sign of these disorders.

Professions:

Dental, Medical, Manual Therapy

Why use Munchee:

- Promotes nasal breathing.
- Tones the muscles of the face, lips and tongue.
- Holds the jaw in Class 1 occlusion by bringing the mandible forward. For those with deep bites and over-jets this can assist airway function.
- A low-cost aid to those unable to afford dental appliances/splints.

Suggested Protocols:

- Snorers should begin with active use as tolerated, building to 2-3 x 5 minutes daily active chewing.
- At the discretion of the practitioner's airway assessment the Munchee can be used nocturnally as tolerated.
- The U-Trim appliance has been particularly helpful to practitioners working with snoring and obstructive sleep apnea, however practitioners should continue to assess and re-assess a patient's bite if treating long-term with the U-Trim.

Other Exercises:

- Myofunctional Therapy can be indicated for snoring and is well tolerated (Camacho et al 2017).
- Breathing training can also be beneficial if indicated.
- Singing, wind instruments and didgeridoo playing can all contribute to strengthening the posterior pharyngeal wall.
- For those patients with high BMI/obesity a weight loss program consisting of diet and exercise can be beneficial (Ieto 2015).

What the research says:

A systematic review published in 2017 shows promising results for myofunctional therapy as a tool for improving snoring outcomes.

Camacho, M., Guilleminault, C., Wei, J. M., Song, S. A., Noller, M. W., Reckley, L. K., ... & Zaghi, S. (2017). Oropharyngeal and tongue exercises (myofunctional therapy) for snoring: a systematic review and meta-analysis. *European Archives of Oto-Rhino-Laryngology*, 1-7.

Ieto, V., Kayamori, F., Montes, M. I., Hirata, R. P., Gregório, M. G., Alencar, A. M., ... & Lorenzi-Filho, G. (2015). Effects of oropharyngeal exercises on snoring: a randomized trial. *Chest*, 148(3), 683-691.

Franklin, K. A., & Lindberg, E. (2015). Obstructive sleep apnea is a common disorder in the population—a review on the epidemiology of sleep apnea. *Journal of thoracic disease*, 7(8), 1311.

AUTISM SPECTRUM DISORDER (ASD)

Background:

Autism is a condition that manifests in early childhood and is characterised by qualitative abnormalities in social interactions, markedly aberrant communication skills, and restricted repetitive and stereotyped behaviours.

Professions:

Speech Pathology, Occupational Therapy, Manual Therapy, Medical

Why use Munchee:

- The prongs on the Munchee provide a sensory stimulus for chewing. This chewing action can assist oro-motor function, neuromuscular control, coordination of chewing muscles, aid in swallow mechanics and help via the calming effect of sensory afferent nerve pathways. In addition, the bristles provide sensory afferent stimulation potentially assisting and enhancing the mechanical aspect of chewing. This patient group also benefits from Munchee use through the therapeutic effect on oral hygiene provided by chewing.

Suggested Protocols:

- Introduce Munchee slowly, those working with children in this population will be aware of how crucial timing is with this population group.
- Start by having the child interact with the Munchee with their hands first, then gently licking or kissing (if they are very young) the Munchee.

- Always work within their tolerance to avoid resistance.
- Begin with static use up to 60 seconds as tolerated.
- Progress to active chewing beginning with 20-30 seconds and gradually increasing over a period of days/weeks to 5 minutes.
- Once threshold of 5 minutes is reached, implement twice daily chewing with or without other activities such as music/movement depending on the child.
- Many of these children will happily chew for longer periods of time and this can be highly beneficial for self-regulation.
- A minimum period of 6 months consistent use is required to achieve results.

Other Exercises:

- Tongue and lip strength exercises with myofunctional therapy.
- Music has also been shown to be beneficial for this cohort and chewing the Munchee while listening to soothing/low tone music could be a unique way to assist down-regulation of the system. The length of the music track also gives the child a fixed timeframe for chewing.
- See Appendix 2 for suggestions desensitising the gag reflex and improving Cranial Nerve function.

What the research says:

Chewing and its relationship to feeding issues and motor development is a complex area with research still emerging. A full presentation is beyond the scope of this manual, however a succinct quotation from the literature sums up how chewing training may be of benefit in eating and food related disorders in ASD children.

"Generally speaking, a child's difficulty with eating may be related to physical issues, behavioural issues, or both. That is, a child who lacks necessary oral-motor skills may be less motivated to eat because eating is difficult. By contrast, a child may possess the necessary oral-motor skills to consume age-appropriate textures but may develop disruptive patterns that relate to his/her exposure to specific categories of foods. Lastly, a child may simultaneously possess physical limitations related to eating and displaying difficult behaviours during meals" (Kadey 2013).

We strongly suggest those with interest in this area make their own clinical decisions, judgements and observations on the effectiveness of the Munchee with these children. Results of clinical and independent research on the Munchee are welcomed.

CEREBRAL PALSY

Background:

The term Cerebral Palsy was coined more than 100 years ago and could be translated as "brain paralysis". Cerebral Palsy is an umbrella term that describes non-progressive brain lesions involving motor or postural abnormalities. Cerebral Palsy has been described as follows:

"A group of disorders of the development of movement and posture causing activity limitations that are attributed to non-progressive disturbances that occurred in the developing foetal or infant brain. The motor disorders of cerebral palsy are often accompanied by disturbances of sensation, cognition, communication, perception, and/or a seizure disorder"

Professions:

Dental, Speech Pathology, Occupational Therapy, Manual Therapy

Why use Munchee:

- Potential to assist sensory oral stimulation, motor function, swallow and dental hygiene.
- It is best to use the appliance with a handle so that a parent/carer can assist the patient.

Suggested Protocols:

- Practitioner discretion is required.
- 5 minutes per day of chewing is recommended.

- Recommended to begin chewing straight away for short periods to ensure the Munchee stays in place and is not being damaged.
- Smaller sizes may be better for efficiency in fitting and removing the appliance.
- PLEASE NOTE: If using the Munchee in this group special care must be taken to monitor and manage the extra saliva produced and avoid choking hazards.

Other Exercises:

- Active chewing can be included with other speech and swallow interventions specific to patient needs.

What the research says:

Of those with 'earlyonset' CP (n=1268), 36% had motor speech problems, 21% had swallowing/chewing difficulties, 22% had excessive drooling, and 42% had communication impairments (excluding articulation defects). All impairments were significantly related to poorer gross motor function and intellectual impairment. (Parkes 2010)

DOWN SYNDROME

Background:

Down Syndrome (DS) is by far the most common and best known chromosomal disorder. Down Syndrome is characterised by intellectual disability, dysmorphic facial features and prominent tongue thrust.

Professions:

Speech Pathology, Occupational Therapy, Special Needs Dentistry

Why use Munchee:

- Myofunctional Therapy has been shown to be effective in early years to assist and treat orofacial dysfunction (Faulks et al 2008).
- Useful for improving oral health due to hygiene suffering from poor tone, function and awareness of the lips and tongue.
- Improves muscle function of lips and tongue and promotes nasal breathing.
- Improving muscle function increases the chances of impacting occlusion and occlusal balance.

Suggested Protocols:

- Recommended to begin with passive use before active.
- Sometimes a "tongue guard" can be used prior to using a Munchee.
- Smaller sizes are better than larger sizes when fitting and removing the appliance.
- Build to active use up to 5-20 minutes per day as tolerated.

- Using a Mini Munchee is recommended for these children. A Mini Munchee allows the child to use the handle to maintain control of the appliance.

Other Exercises:

- Myofunctional Therapy has been shown to be helpful for younger children, introducing the Munchee as early as possible is ideal with the Bebe available from 9 months.
- Oro-facial massage around the lips, facial muscles and intra-orally using a finger brush can be very helpful for these children particularly from a young age.

What the research says:

"The data demonstrate a high prevalence of malocclusions stemming from vertical or transversal occlusal alterations in children and adolescents with DS. Age, nail or finger biting, mouth posture, and upper airway infections were related to malocclusions in these patients." (Oliveira 2008)

The functional and anatomical characteristics of Down Syndrome have direct repercussions on oral health. Orofacial dysfunction may result and feeding and swallowing can be impaired.

Different techniques have been proposed to prevent the development of orofacial dysfunction in Down Syndrome. In particular, early myofunctional therapy coupled with appliance wear has been shown to be successful over the long term where multidisciplinary management is possible (1)

Faulks, D., MAZILLE, M. N., Collado, V., VEYRUNE, J. L., & Hennequin, M. (2008). Masticatory dysfunction in persons with Down's syndrome. Part 2: Management. *Journal of oral rehabilitation*, 35(11), 863-869.

Oliveira, A. C. B., Paiva, S. M., Campos, M. R., & Czeresnia, D. (2008). Factors associated with malocclusions in children and adolescents with Down syndrome. *American Journal of Orthodontics and Dentofacial Orthopedics*, 133(4), 489-e1.

ORAL MOTOR DYSFUNCTION (DYSPRAXIA AND MOTOR PLANNING)

Background:

Dyspraxia is a disorder of movement and coordination that can affect verbal, oral and motor skills. Children with a diagnosis of Dyspraxia often have trouble repeating oral movements on cue. They have an ability to use complex movements involuntarily, however motor planning can be compromised.

Professions:

Speech Pathology, Manual Therapy

Why use Munchee:

- Using the Munchee provides sensory and motor stimulus, particularly of cranial nerves.
- A Munchee allows for less concentration on attempting to mimic or reproduce movements. Rather, the bristles and chewing resistance allows the child to be guided by the appliance itself.
- The Munchee assists with tongue posture and coordination.
- Improving tongue position can have a beneficial effect on whole body motor function, balance and coordination.

Suggested Protocols:

- The Munchee can be a very positive experience for these children, many will take to it without much prompting.
- Using a mirror helps ensure they are chewing with their lips together.
- Aim for active use rather than passive use unless there is a gag issue (see Appendix 2).

- Build to a minimum of 5-10 minutes daily split across 2-4 chewing sessions.
- Some children will voluntarily want to chew more than this. Extra chewing should be encouraged provided the position and technique of chewing is correct.

Other Exercises:

- These children will find the specificity of Myofunctional Therapy difficult and an approach using integrated speech and chewing patterns (e.g. exaggerated chewing etc) can yield better results.

What the research says:

Speech therapy exercises of the lips, face and tongue have been termed non-speech oral movements. The American Journal of Speech-Language Pathology published a review of non-speech related exercises and mentions the positive outcomes it may have on oral motor dysfunction (Kent 2015).

SENSORY PROCESSING DISORDER

Background:

Sensory Processing Disorder (SPD) is a complex neurological condition that impairs functional skills. People with SPD can misinterpret everyday sensory information, such as touch, sound and movement. They may feel overwhelmed by sensory information, seek out sensory experiences (hypo-sensitive) or may avoid certain experiences (hyper-sensitive) and can react with strong emotional behaviours.

Professions:

Occupational Therapy, Speech Pathology and Manual Therapy

Why use Munchee:

- Hypo-sensitive children can really enjoy the stimulation and texture from the Munchee and can chew for long periods, often with a calming effect.
- Promoting lip seal, tongue position and swallow is important to help self-regulation and correct myofunctional imbalances.
- For those seeking stimulation the Munchee can help replace other non-nutritive habits of chewing and sucking. Anecdotally, we have found other oral behaviours such as chewing objects has ceased once these children begin with a Munchee.
- The Munchee can help hypersensitive children to learn to bite chew and swallow in a controlled way. Utilising the handle on the Mini Munchee can be particularly useful.

Suggested Protocols:

- For hypersensitive children it is important to start slowly and ensure that the Munchee does not cause over stimulation.
- If these children are resistant try some of the suggestions on cranial nerve integration suggested in Appendix 2.
- Introduce the Munchee slowly by touching and exploring with hands, then tongue and lips before finally placing it into the mouth.
- Start with the appliance in their mouth for 10 seconds, then build up slowly to chewing.
- Gradual and slow progression can assist tolerance and sensitivity.

Other Exercises:

- Once chewing is established, gross motor exercises such as one-leg balancing, squatting, wobble boards and balance beams can be used while the Munchee is being used. This assists neural tone and integration of Primitive Reflexes.

What the research says:

Sensory Integration Therapy has been trialed and used for those presenting with sensory processing disorders. While the Munchee has not been included in any of these trials or reviews, the principle of sensory stimulation and integration could theoretically apply to chewing a Munchee.

The following is a recent review of these therapies and demonstrates the evidence is still emerging at this stage:

Case-Smith, J., Weaver, L. L., & Fristad, M. A. (2015). A systematic review of sensory processing interventions for children with autism spectrum disorders. *Autism*, 19(2), 133-148.

DEMENTIA

Background:

Dementia is a term used to describe a number of neuropathologic processes most often occurring in the elderly. These include, but are not limited to:

- Alzheimer's disease
- Vascular dementia
- Dementia with Lewy bodies
- Parkinsons disease
- Creutzfeldt-Jakob disease

Professions:

Speech Pathology, Occupational Therapy, Dental, Medical

Why use Munchee:

- Some studies have demonstrated a significant correlation between loss of chewing mechanics and cognitive loss/impairment (Elsig et al 2015).
- Dental health has also been shown as critical to those patients with dementia (chalmers 2005).
- The effect of the Munchee on dental health was informally documented by Dr Kevin Bourke and further researched by the University of Osaka in Japan, showing the benefits to dental and periodontal health.

Suggested Protocols:

- Usage protocols are dependent on the level of dementia and comprehension.
- Begin with active use 1 minute as tolerated.

- Build to up to 10 minutes active use as tolerated.
- Saliva may need to be managed depending on swallow proficiency.

Other Exercises:

- Swallow training where indicated and appropriate.
- Physical activities in conjunction with chewing if appropriate e.g. chair aerobics, walking activities.
- Myofunctional Therapy exercises/programs may assist oro-motor function.

What the research says:

Some examples from recent literature to promote thought and discussion:

"...the odds of impairment remained significantly higher for persons with chewing difficulty even when adjusted for sex, age, education, depression, and mental illness." (Chalmers 2005)

"Chewing efficiency seems stronger associated with cognitive impairment than the number of teeth. Hence, in a more holistic approach for the geriatric assessment, the dental examination may be complemented by a chewing efficiency test." (Elsig et al 2015)

"Chewing induced an arousal level and alertness in addition to the effect on motor control and as a consequence these effects could lead to improvements in cognitive performance" (Hirano et al 2008)

"Chewing may accelerate or recover the process of working memory besides inducing improvement in the arousal level by the chewing motion." (Hirano 2008)

Chalmers, J., & Pearson, A. (2005). Oral hygiene care for residents with dementia: a literature review. *Journal of Advanced Nursing*, 52(4), 410-419.

Elsig, F., Schimmel, M., Duvernay, E., Giannelli, S. V., Graf, C. E., Carlier, S., ... & Müller, F. (2015). Tooth loss, chewing efficiency and cognitive impairment in geriatric patients. *Gerodontology*, 32(2), 149-156.

Hirano, Y., Obata, T., Takahashi, H., Tachibana, A., Kuroiwa, D., Takahashi, T., ... & Onozuka, M. (2013). Effects of chewing on cognitive processing speed. *Brain and cognition*, 81(3), 376-381.

Hirano, Y., Obata, T., Kashikura, K., Nonaka, H., Tachibana, A., Ikehira, H., & Onozuka, M. (2008). Effects of chewing in working memory processing. *Neuroscience Letters*, 436(2), 189-192.

MEMORY AND COGNITIVE DIMENSIONS

Background:

Older populations often have multiple conditions and presenting complaints including social/emotional and biochemical triggers for depression, confusion and anxiety.

This area is complex although it is known that mode of breathing, lack of masticatory activity and social isolation all contribute to a decline in cognitive function.

Professions:

Occupational Therapy, Speech Pathology, Dental, Medical

Why use Munchee:

- While not able to completely address the issues surrounding cognitive function in older populations, the stimulus from chewing exercise and lip seal while using the Munchee can have a positive effect on neurochemistry, particularly when mouth breathing and edentulism are present.
- Chewing can stimulate the sub-diaphragmatic Vagus branches. Increasing Vagal tone and nasal breathing can assist regulation of the CNS.
- Chewing can improve the process of working memory, cognitive function and concentration.
- Caution should be used in cases where there are pre-existing contraindications to forced nasal breathing such as COPD and Congestive Heart Failure or where use of the appliance causes physical or emotional stress.

Suggested Protocols:

- This area is very complex and the Munchee should be used with sensitivity. The protocol varies based on the presentation, age of patient and clinical reasoning of practitioner.
- Passive use as tolerated should be initiated firstly, followed by light chewing.
- Older populations, especially the sedentary, may not tolerate the usually recommended period of 5 minutes of active chewing and may need to be limited to a range between 1-5 minutes.

Other Exercises:

- Many elderly patients are mouth breathers for a number of reasons, often related to multifactorial chronic conditions.
- Chewing and food consumption can be problematic. Other myofunctional exercises and therapy to improve chew and swallow could complement Munchee use.

What the research says:

Breathing and nasal breathing in particular have been shown to have a calming effect (Zelano et al 2016, Ziemann et al 2009) and chewing contributes to both working memory and cognitive function (Hirano 2008 and 2013).

Hirano, Y., Obata, T., Takahashi, H., Tachibana, A., Kuroiwa, D., Takahashi, T., ... & Onozuka, M. (2013). Effects of chewing on cognitive processing speed. *Brain and cognition*, 81(3), 376-381.

Hirano, Y., Obata, T., Kashikura, K., Nonaka, H., Tachibana, A., Ikehira, H., & Onozuka, M. (2008). Effects of chewing in working memory processing. *Neuroscience Letters*, 436(2), 189-192. Zelano, C., Jiang, H., Zhou, G., Arora, N., Schuele, S., Rosenow, J., & Gottfried, J. A. (2016). Nasal respiration entrains human limbic oscillations and modulates cognitive function. *Journal of Neuroscience*, 36(49), 12448-12467.

Ziemann, A. E., Allen, J. E., Dahdaleh, N. S., Drebot, I. I., Coryell, M. W., Wunsch, A. M., ... & Wemmie, J. A. (2009). The amygdala is a chemosensor that detects carbon dioxide and acidosis to elicit fear behavior. *Cell*, 139(5), 1012-1021.

ORAL HEALTH IN OLDER POPULATIONS

Background:

Elderly populations experience greater challenges with oral health for a variety of reasons including; increased years of wear, bruxism, autoimmune conditions, dysphagia and chew/bolus management and iatrogenic complaints such as excessive or reduced salivary flow.

These issues present elderly people, their carers and health practitioners with increased challenges for managing oral health through routine, medication and both preventative and restorative dentistry.

Munchee is actively engaged in researching this field and is sponsoring PhD level research on the impact of chewable devices on oral health and dysphagia.

Professions:

Dental, Occupational Therapy, Speech

Why use Munchee:

- Munchee can assist maintenance of teeth and bone health via jaw exercise.
- For older patients suffering xerostomia, Munchee can improve and stimulate salivary production.
- Munchee can act as a therapeutic device assisting programs targeted on dysphagia, food management and chewing efficacy.
- Munchee can play a role in maintenance of gum tissue stimulation and oxygenation particularly in cases of edentulism.

Suggested Protocols:

- As with most therapies in this age bracket, beginning slowly and increasing over time is essential.
- Starting with 30-60 seconds can be adequate in the beginning. A goal of building towards a range of 3-5 minutes active chewing should be achievable.
- The U-Trim can be a useful tool if the patient has relatively weak jaws or limited functional output.
- The success of the Munchee will depend on how well the jaws are able to close and hold the Munchee in place.

Other Exercises:

- Specific exercises for the lips can be simple to perform and assist correct chewing and swallowing by improving lip seal capability.

What the research says:

Many articles have been written about the aging population and the requirement for increased dental care. The articles referenced below present a thorough overview of the conditions, impacts and costs globally.

Lamster, I. B. (2004). Oral health care services for older adults: a looming crisis.

Petersen, P. E., Kandelman, D., Arpin, S., & Ogawa, H. (2010). Global oral health of older people-call for public health action. *Community dental health*, 27(4), 257-67.

APPENDIX ONE

Munchee Questions



DEFINITION OF TERMS

Defining Professions:

The design of the Munchee enables a wide range of practitioners to use the device for different clinical outcomes. This manual caters for all professions wishing to use the Munchee we have made every effort to acknowledge the scope of different professional practices..

For clarity in this manual, the professions are defined as follows:

- **Dental** – professionals working in dental practice including Dentists, Oral health Therapists and Registered Dental Hygienists
- **Medical** – Those working within the scope of medical practice and working with the airways and mouth, namely doctors in General Practice and ENT
- **Speech Pathology** – Registered Speech and Language practitioners working in speech, feeding, swallowing and language.
- **Manual Therapists** – Registered Chiropractors, Osteopaths and Physiotherapists.
- **Occupational Therapists** – Registered Occupational Therapists particularly those working with children and special needs

Active Use:

Active Use simply refers to the action of chewing the Munchee. Within this manual there are specific protocols for correctly using the Munchee for active use relative to specific conditions.

Passive use:

Passive Use refers to having the Munchee correctly in place without chewing on the appliance. There are specific outcomes where passive use is indicated described in this manual.

Nocturnal Use::

Nocturnal use refers to wearing the Munchee passively while asleep. This kind of use is typically recommended by those working within dentistry.

MYO MUNCHEE

The Munchee is the flagship original appliance created by Dr Bourke. The Munchee comes in three sizes; small, medium and large. A special needs variation with a handle is also available in the medium size.



Mini Munchee

The Mini Munchees are the smaller of the Munchee family and come in size small and extra small. The Mini Munchee sizes both have handles and are suggested for use with children up until the age of 6.



U-Trim:

The U-Trim is a practitioner only model intended for use as a nocturnal appliance, mandibular advancement (MAS) appliance and specialist appliance for TMD. The U-Trim can be gently chewed but is mainly intended for passive use. In addition, dental practitioners can modify the appliance to create forces on teeth as required by trimming and/or cutting parts of the appliance out.



Myofunctional Disorders

These refer specifically to oro-facial myofunctional disorders of the lips, tongue and facial muscles. Including but not limited to, tongue thrust, open mouth posture, low tongue posture, venous pooling, tight mentalis, reverse suck swallow and tongue/jaw disassociation difficulties.

FREQUENTLY ASKED QUESTIONS ABOUT MUNCHEE IN PRACTICE

Who can use the Munchee in Practice?

The Munchee is a generic oral orthotic and active myofunctional appliance. Chewing a Munchee is a generic exercise that can be utilised by many professions. There exists however, differentiation and nuance of use and intentions between professions.

Some clinical applications for the Munchee include:

- Enhance dental treatments such as hygiene programs and orthodontics
- Be used as an adjunct tool for speech therapy programs
- Integrate muscle function and improve breathing within myofunctional therapy programs
- Used as a replacement for pacifiers and non-nutritive suck habits
- Support cranial and other body work
- Improve outcomes of ENT interventions and tongue tie procedures
- Provide proprioceptive and sensory stimulation to the orofacial area
- And many more

What patient types are suited to Munchee?

A large part of the vision of Munchee is focused on the oral health and hygiene of children aged 18 months to 6 years. Our product range of Mini Munchees are available to the general public and are targeted to this age group.

Additionally, our practitioner ranges include the original Munchee and U-Trim appliances designed for children over six years, teenagers and adults.

Will the Munchee straighten teeth?

Not specifically. The intention of the Munchee outside dental use is not tooth movement. The Munchee is generally used for oral exercise. Long-term use can influence the growth of jaws via muscular tension on bone and therefore appear to influence tooth position.

Dentists can use appliances such as the U-Trim or Munchee to influence tooth movement by trimming away portions of the appliance. This should however be limited exclusively to dentists who fully understand how the appliance can achieve tooth movement in this way.

Can people use toothpaste with the Munchee?

Many people ask this as a method of easily cleaning teeth of young children. Toothpaste can be used in a Mini Munchee, particularly some of the modern probiotic toothpastes. However, Dr Kevin Bourke discouraged this practice. His reasoning was based on saliva pH. His clinical experience and study developed his theory that increased production of saliva increases oral pH which protects the teeth and gums. He believed this pH shift coupled with a decrease in mouth breathing contributes to a better oral environment than regular brushing, particularly for young children under 6.

Can the Munchee replace myofunctional therapy (MFT)?

The Munchee fits the MFT paradigm in two main ways:

1. As an additional therapy or exercise:

Within musculoskeletal rehabilitation there is a principle "isolate then integrate". This means that dysfunctional muscles must first be retrained in their correct resting length-tension, independent range of motion and localised function. This must occur in sequence before these motor patterns are integrated into full multi-joint, integrated exercises. Put simply, a potential model could be MFT serves the isolation component of rehabilitation and the Munchee can be a perfect tool for achieving integration.

As a working example; isolated tongue movement during swallow training maybe part of an MFT approach. Beginning by improving strength and motor control of the tongue then chewing a Munchee to incorporate chewing with salivary management and swallow.

2. Patients who are non-compliant or are financially unable to commit to MFT programs

For these patients the Munchee is a perfect tool. A full MFT program is not for everyone for various reasons and requires commitment and dedication. The Munchee is not a replacement for a full MFT program, but does provide far more of a benefit than could be achieved by a simple "watch and wait" approach. In addition, the Munchee is quick and easy to use and requires minimal intervention time from a practitioner.

When is it best to bring the Munchee into an MFT program?

This varies based on your clinical reasoning for using the Munchee. Our field tests have shown it is usually best to bring the Munchee in around half way through or towards the end of an MFT program.

Using a Munchee too soon in a program can be sensory and motor overload initially. This variable varies case by case basis and requires clinical skill and judgement depending on the outcome a practitioner is looking to achieve.

Is there any research on the Munchee?

This is a commonly asked question. The answer is yes! However, the research done on the Munchee that currently exists is now somewhat dated as it was published in the late 1980's and 90's.

At Munchee we are working on research projects within the framework of a modern evidence base. These do take time, effort and resources to bring to fruition and we have a schedule of starting small and growing the evidence from pilot to multi-site, multi-geographical studies and trials.

How is the Munchee Sterilised?

Muncchees should be well rinsed before and after use in running water. They can then be sprinkled with bi-carb of soda after use and should be sterilised in boiling water for 60 seconds once a week.

Muncchees can also be sterilised in a dental office/lab like other orthodontic and dental equipment.

How long will the Munchee last?

With regular twice daily use the Munchee should last between 6-12 months. The longevity of the product is subject to the care of the appliance (washing, storage etc), the way it is chewed and the jaws that are chewing it. For example, a Mini Munchee that is chewed correctly twice daily by a small girl will likely last much longer than an appliance used actively and nocturnally by a large teenage male.

How does the Munchee compliment Manual and Speech Therapies?

Manual Therapists use the Munchee for different clinical reasons to dentists and not generally specifically for dentition unless working under supervision of a dental professional. The following uses are commonly applicable, but not limited to allied health professions:

Manual Therapists:

- Oral motor exercise to support intra-oral and TMJ interventions
- Encouraging breathing retraining and lip seal
- Support cranial work/treatments
- Facial and TMJ re-patterning in chronic pain patients (passive use)
- Support and improve descending postural and higher neurological drivers
- Assist correct skeletal muscle growth and function of the facial muscles
- Stimulate proprioception and sensory activation patterns in young children

Speech Pathologists:

- Adjunct to swallow training
- Non-speech related oral motor exercises
- Encourage lip seal, especially during eating
- Improve tongue coordination
- Sensory/motor inputs and therapy aid

SIZE GUIDE



Sizing for the Munchee is quite simple working by age or arch width. We have two tables that should help find the exact size match. It is worth remembering the following key points:

- **Trim problem areas** – Any areas that cause gum pressure or irritation after 1-2 weeks of use can be trimmed down for comfort. Side edges can be trimmed down slightly if needed.
- **Sore Gums** – Often kids in particular can have some irritation around the gums as they get used to the sensation of the prongs massaging gums. This will generally resolve after a week, if not the appliance may need to be trimmed.
- **Gagging** – Occasionally, the Munchee can trigger the gag reflex, particularly in children

with any kind of sensory issue or restrictions in oral tissue. These patients can still use the Munchee, they just need to start slower, with passive use, and build to active use, starting with 30 seconds chewing and slowly building to 3-5 mins over a period of one to two weeks. If gagging persists help from a manual therapist skilled in cranial nerve function can be useful or use the guide on inhibiting gag reflex in (see Appendix 2).

To use the canine width size guide, measure canine to canine distance on the upper arch and compare the measurement to the Easy Size Guide on the following page. The Easy Size chart provides the widths of each appliance thus how they can be matched to the patient's arch width.

MUNCHEE

SIZE CHART

MUNCHEE	AGE	BODY TYPE
Mini Munchee XS	18 months to 4 years	Not Applicable
Myo Munchee Small	6 to 8 years	Small to medium build
Myo Munchee Medium	9 years to adult	Youth with 12 year molars up to adult Female
Myo Munchee Large	14 years to adult	Large teen males, adult males and females with broad skeletal structure

MUNCHEE

WIDTH SIZE CHART

CANINE WIDTH	MYO WIDTH	RIGHT MYO
25 - 30 mm	35 mm	Mini Munchee XS
30 - 35 mm	40 mm	Myo Munchee Small
35 - 40 mm	45 mm	Myo Munchee Medium
40 - 45 mm	50mm	Myo Munchee Large Myo U-Trim Medium
> 45 mm	45 mm	Myo U-Trim Medium

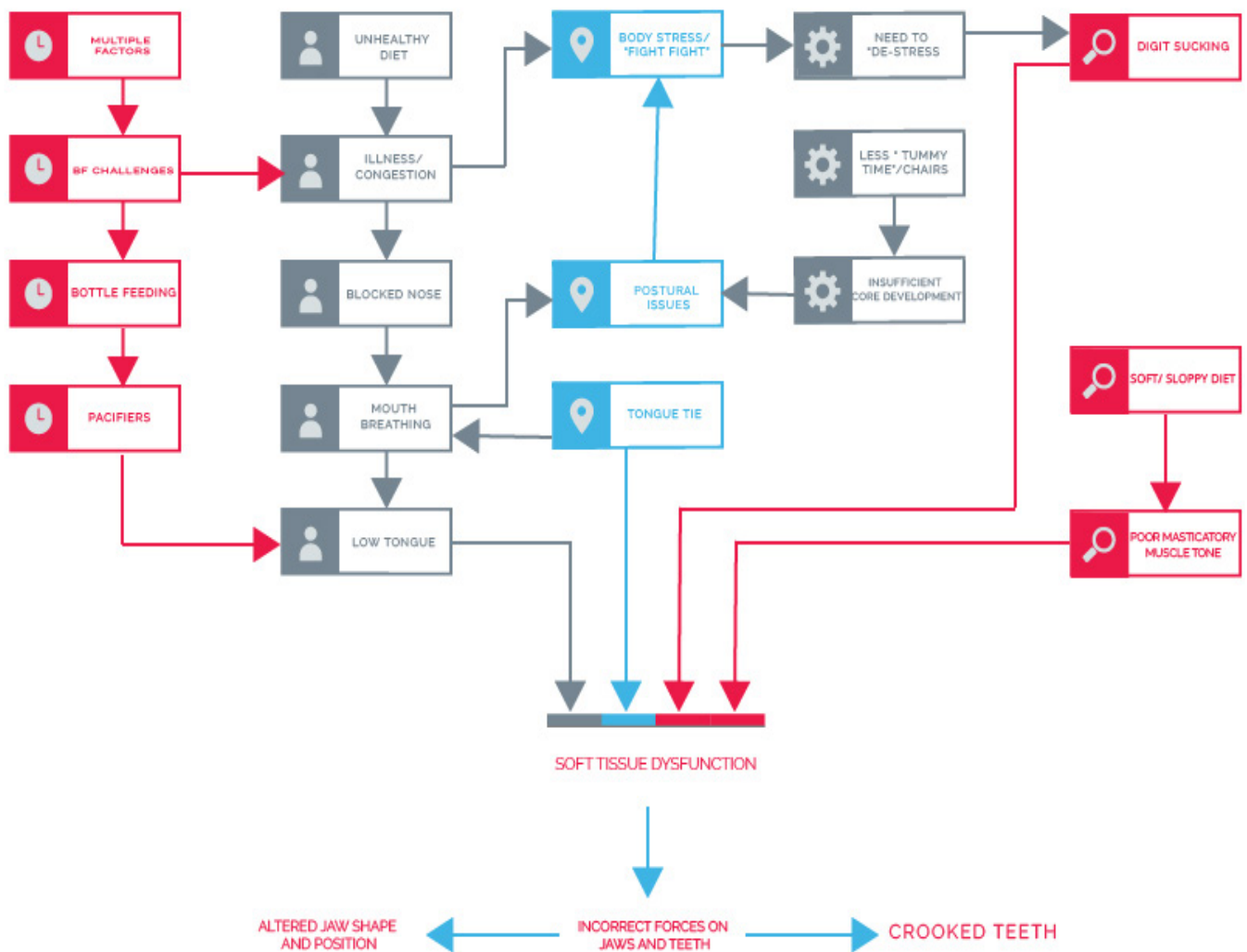
APPENDIX TWO

Practical Extras



AETIOLOGY OF MALOCCLUSION

WHAT CAUSES FACES & JAWS TO NOT GROW PROPERLY



Aetiology of Malocclusion

Courtesy of Dr Dan Hanson of Myo Focus

SIMPLE LIP EXERCISES

(Courtesy of happykidsclinic.com)

1. Surprise Granny!



How to:

The lips wrap over the teeth and mouth opens up - like Granny getting a surprise! At the same time raise your eyes and eyebrows to make Granny even more surprised!!

How many:

20 - 30 second hold - no movement

What is it doing:

This is an active stretch/strengthen exercise for the lip and face muscles. In particular, it's stretching the top lip downwards to help it lengthen and raising the face muscles up to help bring tone back into them. Many kids who have open mouths the majority of the time develop "short" upper lips and this exercise is the starting point to address this.

Parents Tips:

Ensure the lips remain rolled over the teeth and the mouth open as wide as possible. Try and hold the position for the whole 20 - 30 seconds with mouth open and eyebrows up, especially the upper lip which will be quite a stretch for some.

2. Lip Pop



How to:

The lips are pressed together firmly as shown. From here they "pop" open making as loud a sound as possible. The firmer they're pressed and the quicker they're "popped" the louder the sound will be!

How many:

15 - 20 LOUD ones!

What is it doing:

This exercise is about lip strength and also perception and integration of a new way of moving and strengthening the lips. For many kids who have their mouths open at rest the lips can change shape and become weaker, resulting in a "bigger" looking lower lip and a shorter upper lip.

Parents Tips:

Pressing down fairly firmly to start helps really pop the lips. Make sure their pop is pretty quick too. Go big on encouraging a loud POP throughout all of the 15-20 repetitions to maximise recruitment of the muscles.

3. Air Trappers



How to:

Here we fill the top lip space with air and hold the air "trapped" in the upper cavity while keeping the lips sealed. Try to not puff the whole cheek but keep it focused on filling the upper lip only.

How many:

20-30s hold

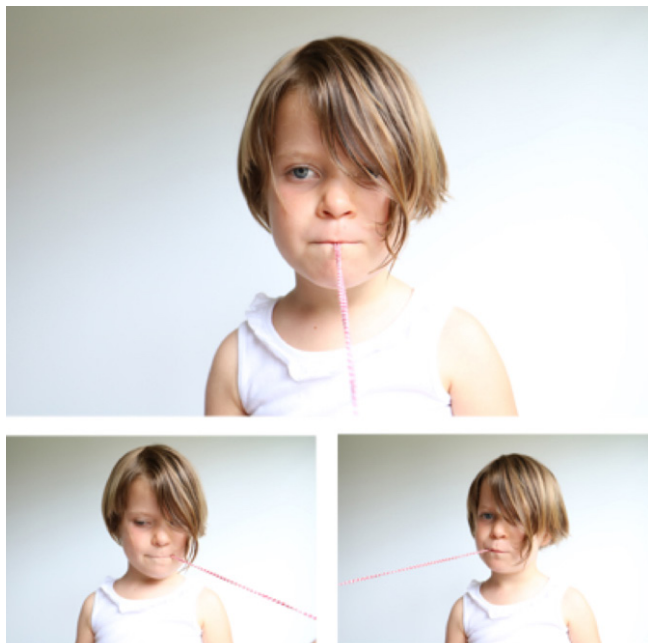
What is it doing:

This exercise stretches and strengthens the top lip simultaneously. The combination of stretch/strengthen works really well to strengthen and lengthen that upper lip.

Parents Tips:

Try to ensure they don't puff the whole face by keeping the lower lip relatively free of air compared to the upper. See who can make the funniest face by making it a game to get the widest possible cheeks!

4. Button Pulls



How to:

This exercise is focussed on building lip strength. First start by holding the button between your lips and teeth. Pull forward on the string, just enough that you have to work to keep the button in your mouth but not so much it pops out. Repeat pulling on both sides as well as front.

How many:

20s hold in each direction

What is it doing:

Pulling with resistance against the lips helps to strengthen the muscle that surrounds the mouth called orbicularis oris! Look at this as a weights program for the lip muscles.

Parents Tips:

Make sure they don't stick the button behind their teeth! That's cheating but also if they pull hard and pop the button out there's potential to damage teeth. Make sure resistance is strong enough but not so strong they can't hold 20s.

SIMPLE TONGUE EXERCISES

1. Teeth Cleaners



How to:

The idea of this one is to roll your tongue around the inside of your lips and across all of your teeth while keeping the mouth shut ALL the time. Try and roll the tongue around in a big circle, making sure that tongue doesn't poke through at any point!

How many:

10 circles clockwise, 10 circles anti-clockwise

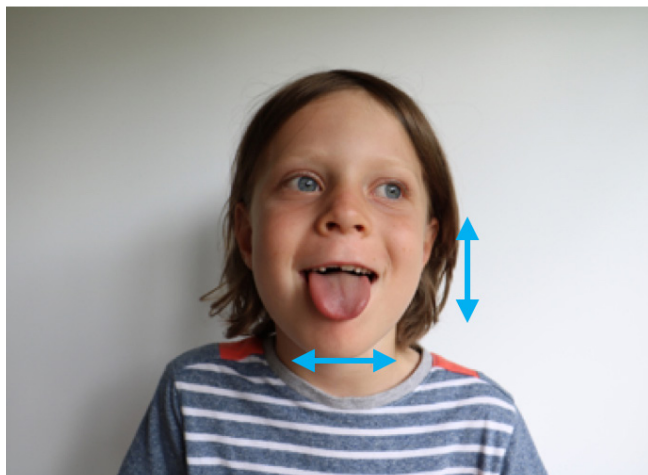
What is it doing:

This is a great exercise to begin feeling the tongue muscles working. There's a few muscles under the jaw and in the top of the neck that make the tongue move like this and after 10 each side you'll really feel them.

Parents Tips:

Kids do get tired with this one so don't force out the 10 reps/side if it's too much - there's a point at which the muscles will just totally fatigue! Also ensure that the tongue does a full circuit of the teeth. Sometimes there'll be an area or quadrant that your child finds either hard to reach with the tongue or the lips pop open, sometimes both. Try and encourage the tongue to really "sweep" around and those lips to stay shut.

2. Tongue Holds



How to:

The tongue needs to stick straight out like a surfboard. Holding the mouth open and the tongue sticking straight out, move the tongue slowly up and down top to bottom and side to side.

How many:

10- for each position

What is it doing:

Having the tongue out helps stretch the muscles controlling it but holding it straight and moving is also strengthening them. This combination of stretch/strengthen is extremely useful in retraining and controlling the tongue.

Parents Tips:

Make sure they keep their mouth wide open. It's easy to close the mouth off and have the lips shut over the mouth. For this exercise to work well, the tongue must start out straight between the open mouth and move from there. Focus on moving from the tip not the base.

3. Circle Blows



How to:

The tongue needs to be curled first. This can be a challenge in itself! If you have problems, use a paddle pop stick to push down on the tongue and have the child push up - this naturally curls the tongue. Once curling is learnt have them stick the tongue out as far as possible and blow air in and out through the tongue "straw".

How many:

10 - 20 big breaths

What is it doing:

This exercises strengthens the tongue while simultaneously stretching it. It forces the tongue forward and this strengthens the muscles underneath the tongue. This exercise also is a precursor for a main exercise used for the rest of the program.

Parents Tips:

Persevere with getting the tongue curl. There's a myth that the ability to do this is "genetic" - not true. Using the push down while they lift up will in time, teach them (and you) how to do curl the tongue!

4. Suction Holds



How to:

Here the whole tongue is suctioned up to the roof of the mouth and the mouth is then opened as wide as possible. Keep the suction as long as possible until it breaks. Ensure the total time under suction is at least 20 seconds. Ensure the floor of mouth is not being pulled up with the tongue.

How many:

20-30s hold

What is it doing:

This is an essential exercise that does many things at once; strengthening and lifting the tongue muscle and bone they attach to, stretching the frenulum (under tongue) and control of the tongue in its rest position.

Parents Tips:

This one can be tricky to keep held in suction. Be patient and build up to the twenty seconds in time. Also ensure that the mouth remains as wide open as possible during the hold, it's common to let it drop open and or protrude the mandible.

GAG REFLEXES

Background:

On initial use, some children find they may gag or feel that they can't breathe, swallow or chew. A hyper-active gag reflex is often found in these children (and adults). To understand this and how to effectively reduce the gag response an understanding of the normal response is required.

Gag Reflexes Developmentally:

When a baby is born the gag reflex is active on the front part of the tongue as well as the posterior aspect. It is the action of breastfeeding that will start to integrate the gag reflex back to the posterior aspect of the pharyngeal wall and posterior quarter of the tongue.

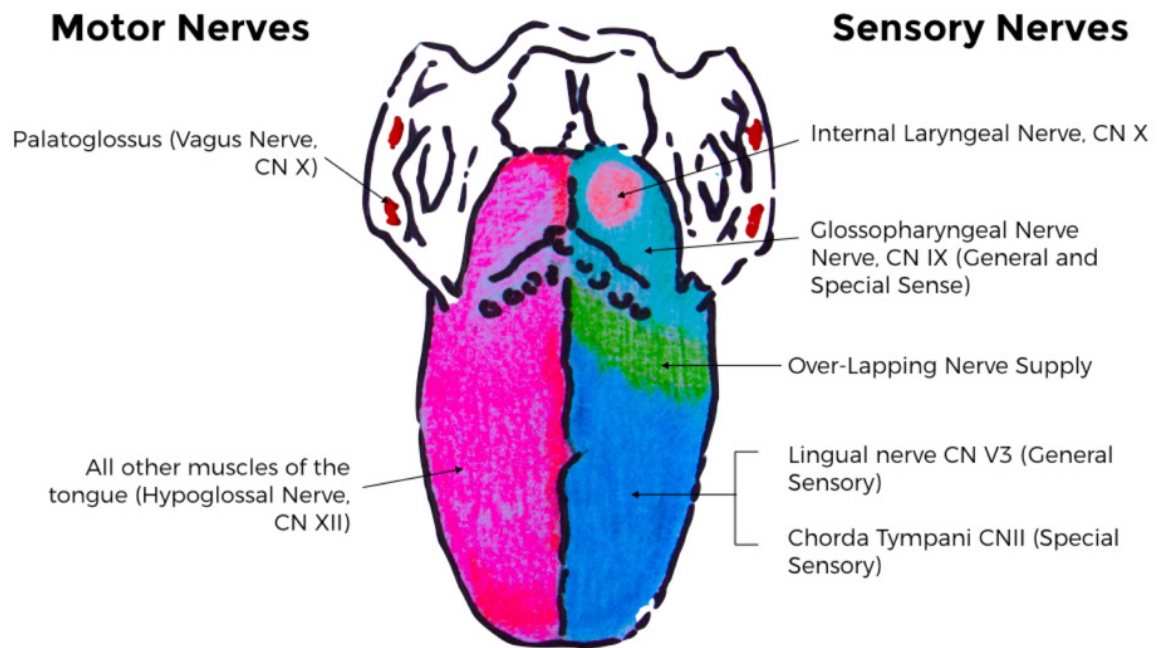
Babies often put things into their mouths and will often set this gag reflex off, this is a normal developmental activity and serves to integrate the gag reflex. Over time the gag reflex is only active at the posterior pharyngeal walls and posterior quarter of tongue.

If a patient is gagging on contact with the anterior aspect of the mouth and tongue it can be indicative of aberrant reflexes. With simple techniques the patient can improve and integrate these aberrant responses to make it possible for them to tolerate the Munchee and improve function and coordination of all cranial nerves.

Reducing the Gag Reflex:

- Use a tongue depressor to stimulate along the lateral aspect of the tongue and along the middle. Repeat this process twice every day.
- The reflex should take 3-7 days to improve.
- If there are significant tongue restrictions it may take longer and may be more challenging.
- A useful exercise before chewing the Munchee is to place a tongue depressor horizontally between the jaws and then swallow. This assists coordination and integration of Cranial Nerves V, VII, IX, X and XII.
- Once the Gag Reflex has been integrated it will be easier to introduce the Munchee and the associated chewing and swallow functions.
- Humming at the same time can be a great way to increase Vagal tone and down-regulate the system, particularly when introducing the appliance and during passive use.
- If the feeling of the Munchee in the mouth becomes overwhelming and the patient feels the need to remove the appliance, have the patient breathe slowly through the nose, again to down regulate the system. Use a nasal inhaler (such as boomboomenergy.com) to stimulate the olfactory nerve. Multiple use and integration of other cranial nerves in this way can assist down-regulation of over active reflexes.
- Engaging the sensory system of the tongue by placing a tiny amount of salt on the anterior part of the tongue can also assist.

MAP OF THE INNERVATION OF THE TONGUE



CRANIAL NERVE SCREEN

Due to the integrated nature of the Gag Reflex Response and Cranial Nerve function, a Cranial Nerve Screen can be useful in assessing function and responsiveness.

In addition to the Cranial Nerve screen the following activities are easily integrated into a program to assist smooth use of the Munchee:

- Humming, breathing slowly and swallowing with a tongue depressor horizontally between the teeth.
- Alternate Nostril Breathing using a small amount of essential oil on each wrist to stimulate olfactory sensation.
- Tongue exercises as suggested in above



Holding a tongue depressor between the teeth while humming, breathing slowly and swallowing can be used as an additional training tool to dampen the gag reflex in those who gag when using the Munchee.

THE CRANIAL NERVE SCREEN

Test	Directions	Nerves
Olfactory Sense	Use a familiar smell such as a lemon essential oil, have the patient smell with each nostril and note any discrepancies between sides or sensation	CN I
Visual Fields	Have the patient follow the end of a pen/pencil or penlight to all corners of the "Union Jack" watch for symmetry and nystagmus	CN III, CN IV and VI
Light Reactivity	Shine a penlight into the pupil and watch retraction, check symmetry and contralateral reactivity by blocking the light to one side and observing the non-illuminated side	CN II
Light Touch	Patient closes eyes. Use a light cotton roll or tissue to trace the lines of the sensory patterns of the trigeminal nerve (V1, V2 and V3); forehead, side of eye, maxilla and mandible. Check for sense and symmetry	CN V (sensory) CN VII (sensory)
Jaw Strength	Have the patient open their mouth and resist you closing their jaw	CN V (motor)
Faces: Scrunch, Extend, Puff Cheeks	Have the patient mimic your facial expressions; scrunching face up, puffing cheeks and raising eyebrows. Watch for asymmetry and inability to mimic	CN VII (motor)
Ear Rub	Patient closes eyes. Holding you thumb and forefinger 2cm from the ear, rub the fingers together lightly. Patient should hear sound, check for symmetry.	CN VIII
Swallow/Uvula Symmetry	Mouth wide open, check for uvula symmetry. Have the patient swallow and observe. Optional check gag reflex with tongue depressor.	CN IX CN X
Shoulder Shrug/ Resisted Head Turn	Have the patient shrug and actively turn head side-to-side. Repeat with passive resistance and palpate for asymmetries and aberrant firing.	CN XI
Tongue Poke	Patient pokes tongue straight out and holds. Tongue should be able to clear teeth and lips and remain held out straight.	CN XII

APPENDIX THREE

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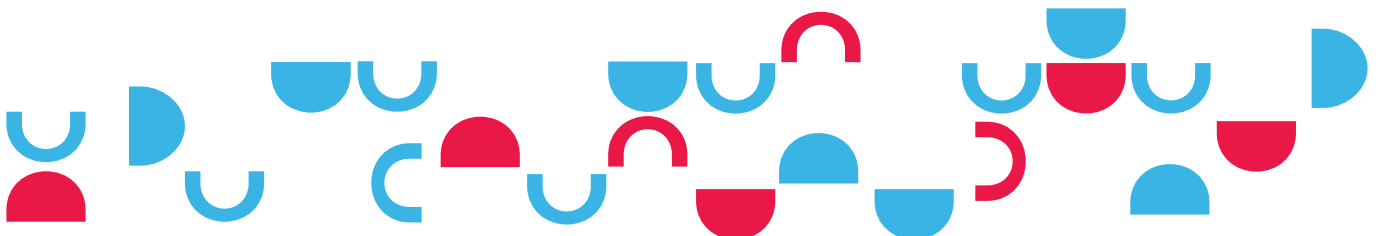
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DR BOURKE'S ARTICLES

We have kept the written work of Dr Kevin Bourke unedited, as he published it.



The effects of the MYO Appliance in children with malocclusions of the primary dentition

By Dr Kevin Bourke

The myofunctional device variously called: "Munchee," "Chewer" MYO or O.P. device has been extensively researched for the past 30 years both in Australia and Japan.

In Australia, clinical research has shown the "MYO" to be an excellent therapeutic modality in the treatment of open bites and anterior protrusions of the mandible. In Japan research was done at Osaka Dental University, under the chairmanship of the Dean Professor Toyoda Heida, involving faculty members Dr. Masihiko Mine, and Masihiko Yoshihara. Their results, involving plaque control, cranio-facial muscle competence, changes in gnathic relationships, salivary gland secretions, were all positive, suggesting that myofunctional therapy with the "MYO" should be routine therapy for all children, particularly those between the ages of 3 and 6 years, when the stomatognathic system is at its most important state of development. Many members of the Australian Academy of Orthopaedic Orthognathics have found the "MYO" to be a superb adjunct in the field of functional appliance therapy, where it not only gives authority to the cranio-facial musculature, but by therapeutic massage of the oral tissues, it maintains them in states of health through extensive treatment periods.

This exciting information has been researched at Osaka University for some time, with detailed findings to be published by Dr. Yoshihara in 1991. Speech therapists are now very interested in the myofunctional device, noting that many speech defects in young children are directly related to faulty occlusion. In cases of severe skeletal or dental malocclusion, the infant should be encouraged to exercise the stomatognathic system for about 30 minutes daily. In such cases improvement may be expected in the occlusion and appearance of the infant in periods sometimes as short as 3 months. As with functional appliance therapy, compliance can be a real problem, and so the dentist needs the help of a "Motivating Kit" which consists of a small album, showing the excellent before and after results, which have been obtained in other infants, after constant daily use.

Where no gross orthodontic problem exists, regular daily use of the myofunctional device (MYO) for about 4 minutes, helps improve the alignment of the anterior teeth and gives authority to all musculature of the stomatognathic system. The appliance if used as directed has excellent preventive potential.

Practitioners involved in treating open bites, and tongue posture problems, have in the past, made use of myofunctional therapists and custom made appliances to discourage abnormal tongue habits. These appliances were constructed with spikes or guards to discourage aberrant tongue posture. Many practitioners found the above methods inconvenient for the parent or the child with unpredictable results. The use of the MYO suits well the philosophy of the functional orthodontist.

When the MYO appliance is placed in the mouth for a sustained period, such as when an infant is watching television, then that infant is trained to breathe through the nose. Most functional orthodontists emphasize the importance of nasal breathing for proper facial development.

Dr. R.M. Ricketts found that if the nasal cavity is not developing properly then the palate will frequently be elevated in front. The diet in the modern world is insufficient in fibre content to activate sufficiently the facial and pericranial musculature. There is much truth in the saying that "stasis is the basis of disease." The MYO provides the necessary exercise to oxygenate and empower the muscles of the stomatognathic system. Just

as modern man needs a combination of aerobic and strengthening exercises to keep his body fit so also does one need a non-traumatic exercise for the pericranial, facial and neck musculature.

When MYO therapy is used the blood supply to the musculature has been shown to increase between 6 and 20 minutes. Dr. R.M. Ricketts has stated that the need for early treatment, mentioning that he frequently commenced treatment on 4 and 5 year old children. Now with the availability of the "MYO," treatment may be commenced as early as 3 years. The young bone is very susceptible to environmental influences both good and bad, and many habits such as thumb sucking and mouth breathing can be countered and often completely nullified with MYO therapy.

Osaka Dental University has research work to show that the competence of the orbicularis oris can be doubled in most 3 to 6 year old children in a 3 month period.

TABLE 1 - Development of myodynamic lip force observed in the children who had used OP device for 20 minutes a day continuously for 9 months (Normal occlusion)

Sample	Age	Before Op	3m later	6m later	9m later
1	3	350	450	600	700
2	3	400	525	700	750
3	3	300	425	550	600
4	3	350	300	425	600
5	3	325	400	650	700
4	3	375	400	450	500
7	3	450	450	500	550
8	3	525	550	700	700
9	4	600	750	850	900
10	4	400	400	550	750
11	4	650	700	850	900
12	4	350	425	470	495
13	4	375	400	475	600
14	4	375	400	600	650
15	5	550	650	650	800
16	5	600	800	1000	1000
17	5	400	500	700	1000
18	5	500	650	725	800
19	5	550	660	800	800
20	5	300	350	500	600
21	5	550	650	700	900
22	5	650	700	850	850
23	5	700	750	900	925
24	5	500	600	60	650
25	6	500	575	625	700
26	6	450	650	650	700
27	6	575	650	1000	1000
28	6	375	450	800	850
29	6	475	550	750	900
30	6	700	650	900	1000

(unit:gram)

Table 2 - Development of myodynamic lip force observed in the children who had used OP device for 20 minutes a day continuously for 9 months (Abnormal Occlusion).

Sample	Age	Before Op	3m later	6m later	9m later
1	3	200	225	225	350
2	3	250	300	350	375
3	3	200	200	350	400
4	3	100	150	250	300
5	3	400	450	500	500
6	3	250	400	700	750
7	3	100	325	400	500
8	3	150	400	650	675
9	4	175	200	525	650
10	4	250	300	400	525
11	4	300	350	500	700
12	4	200	150	300	350
13	4	500	550	700	700
14	4	150	250	700	725
15	4	250	400	700	750
16	4	150	350	1000	1000
17	4	450	500	700	850
18	5	250	400	700	750
19	5	175	200	525	550
20	5	300	350	500	500
21	5	150	250	700	725
22	5	200	450	800	950
23	5	250	450	60	750
24	5	250	450	800	800
25	5	300	450	600	950
26	5	350	500	800	825
27	5	400	500	800	800
28	5	375	400	550	550
29	5	325	400	600	625
30	5	500	700	750	750
31	6	400	550	700	950
32	6	400	600	600	700
33	6	500	500	550	700
34	6	500	750	750	900
35	6	425	500	650	700
36	6	475	500	600	600
37	6	375	400	550	900
38	6	350	400	600	600
39	6	325	450	600	625
40	6	300	350	400	400

(unit:gram)

Note that the figures for children suffering abnormal occlusion are, after nine months' use of the MYO, generally better than those for children with normal occlusion.

They have scientifically shown that which we have always intuitively known that young children with developing malocclusions, always have impaired competence of the orbicularis oris. (See tables one and two)

Chewing on the device produces a copious salivary flow up to 30 times the resting flow rate, and certainly many times greater than any chewing gum which is currently being advertised as important in the remineralisation of interproximal enamel during the 20 minutes following food intake.

The MYO was originally called the "Chewing Brush" and the O.P. (Oral Prophylactic) device because of its capacity to physically remove plaque. As used by a child as a cleaning device only, it was shown to be about 20% more effective than a toothbrush, being exceptionally efficient on the lingual surface of the teeth.

As a therapeutic modality in the field of the physical therapist the myofunctional device may have an important part to play, both as a diagnostic device, and as an aid to treatment, when the occlusion is causing pathology in the cervical spine.

There are many instances in daily dental practice where a patient may gain help from the myofunctional device.

Case Reports

Case number 1: A.G. is a female aged 3 years and 4 months with a severe open bite and speech impairment related to the dental problem. (Fig 1) The child and mother were motivated for about 15 minutes on how to use the MYO. A.G. began chewing on the appliance twice daily for 2 minutes. This time was gradually increased to 4 minutes in a month. The open bite closed at the rate of 1 mm a month. (Fig 2)

Currently, it is recommended in cases of this type that the child exercise with the appliance for 10 minutes daily after the first month and to leave it in the mouth for another 30 minutes. This results in faster improvement.

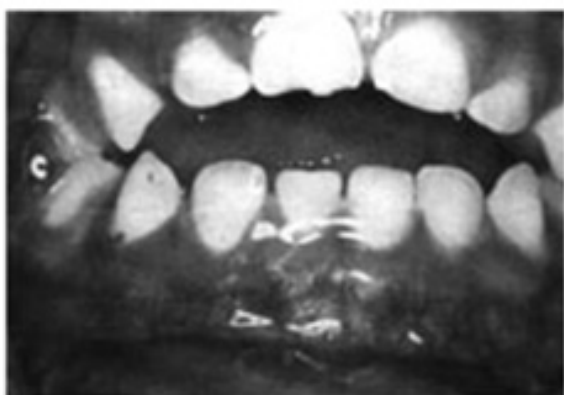


Fig. 1 A.G. is 3 years, 4 months old with a severe open bite and speech impairment.

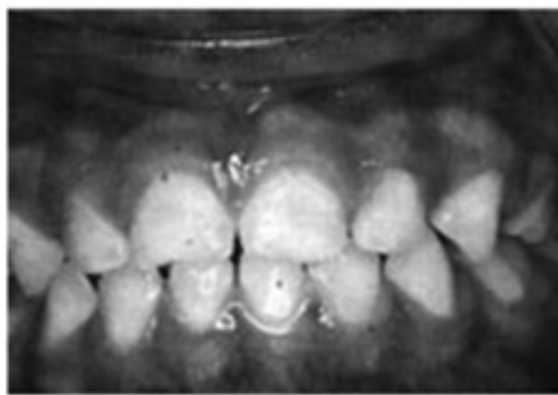


Fig. 2 A.G. is shown posttreatment with an excellent occlusal relationship.

Case number 2: J.F. is a 2 1/2 year old female with severe Class III malocclusion (Fig 3) that was observed at age 2 years. Treatment was postponed until now and consisted of a Sim-type upper sagittal appliance with bands on the second primary molars. This appliance was activated for 3 months. The cross bite was corrected at this time, but it took another 3 months for the posterior to contact. (Fig 4)



Fig. 3 J.F. is 2.5 - years-old with a severe Class III Malocclusion

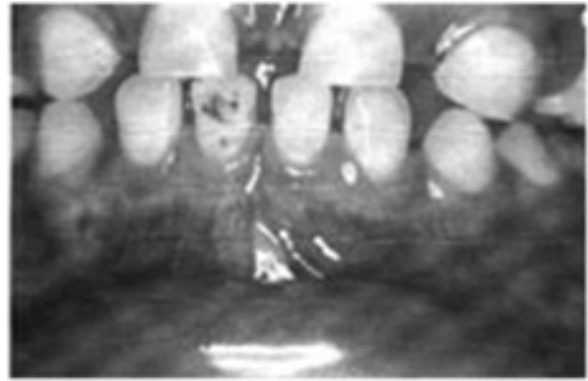


Fig. 4 J.F. is 3 - years - old with a Class I occlusion

All the time J.F. was chewing the MYO twice daily for 4 minutes.

Case number 3: A.E. is a 4 year 11 months old boy (Fig 5) who used the MYO appliance for a total of 18 months. The action of the MYO is thought to improve functionally of the musculature and esthetically the teeth and face. Perhaps all infants need aerobics for the face to keep the stomatognathic system developing to its full genetic potential.

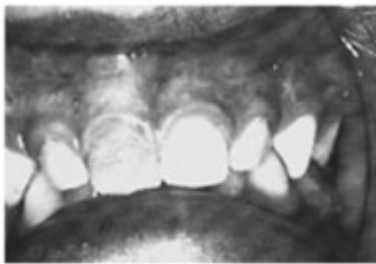


Fig. 5 A.E. begins to use the appliance.

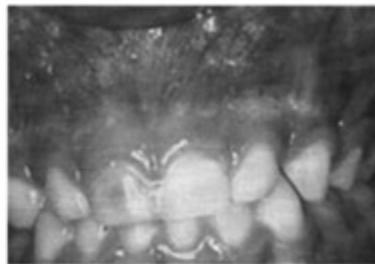


Fig. 6 A.E. is half way through the treatment

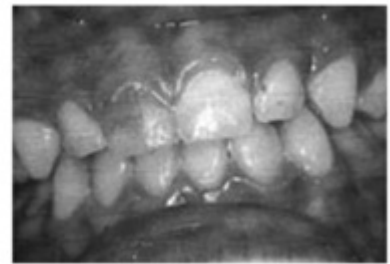


Fig. 7 A.E. is completed after 18 months of using the MYO.

Case number 4: S.B. shows a 48 hour plaque accumulation that has been stained. (Fig 8) After 3 minutes of chewing with the MYO most of the stained plaque has been removed (Fig 9). After 6 months of using the MYO, the open bite has been reduced and a normal occlusion is the result.



Fig. 8 S.B. shows stained 48 hour plaque accumulation

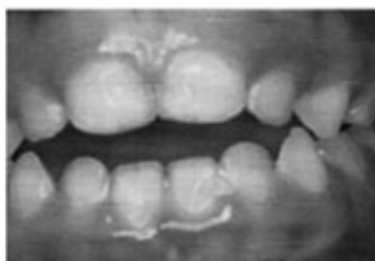


Fig. 9 S.B. uses the MYO for 3 minutes to clean her teeth.

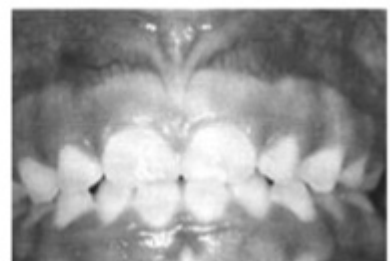


Fig. 10 S.B.: after 6 months of using the MYO excellent occlusion is achieved

The Chewing Brush - Oral Physiotherapy

By Dr Kevin Bourke

Prevention of Caries and Periodontal Disease is the chief value of the chewing brush. In the following pages I wish to examine some of the more recent insights into oral pathology and to correlate them with oral physiotherapy by chewing brush usage.

Once oral disease is established, I believe that use of the chewing brush, will greatly retard progress of both Caries and Periodontitis by raising the host resistance of the patient. In the case of Periodontal Disease, by improving the metabolic status of the alveolus and surrounding musculature as well as containing the microbial environment. In regard to Caries, by physical cleansing of the mouth and better flow of parotid saliva which is by far the most hypotonic of all body exudates.

Prevention of oral disease can be stated as the ability of the host to resist the undermining of his status by microbial and traumatic factors.

Periodontosis, which occurs mainly in children and young adults appears to have a different etiology to Periodontitis. Some bone loss takes place within the framework of a less virulent microbial attack. It has recently (1978 Phoenix) been suggested by R. Parr (University California) that in cases of Periodontitis perhaps two or even three distinct diseases may be present. So it can be seen that the simplistic illusion that bacteria was the initial and all prevailing cause of Periodontitis has finally lost its lustre and more realistic approaches involving Parafunctional Forces (Walter Drum) Faulty Bone Metabolism (Mathews 1978), Genetic Factors (Steward 1978), Orthodontic Considerations (Vanarsdall 1978), Sex Hormone Variance (Allen) and many other considerations involving occlusion, stress and Prostaglandins have assumed their rightful role in being very meaningful factors in a multifactorial disease.

It has been demonstrated that the MYO Munchie markedly tips the balance in the host's favour because of the following:

1. By improving the quality and quantity of alveolar bone
2. By improving the quality and quantity of the attached gingivae
3. By generating more competent oral musculature (proven University Osaka 1978), particularly the orbicularis oris, the muscles that facilitate nose breathing
4. Protective properties of saliva
5. Minimizing microbial attack by physical cleansing
6. Aiding diffusion of Nutrients to oral epithelium

Alveolar Bone

It is a factual statement that the humerus is 20% larger in the hitting arm of a good tennis player than the non-hitting arm. Bone is a much more Dynamic tissue, as shown by recent studies than we ever conceived in past years. Numerous laboratories all over the United States and elsewhere, have belatedly realised its importance in Periodontal Pathosis and a wealth of literature is now appearing, clarifying the methodology of calcium deposition under specific laboratory conditions. For instance, it has been shown, that within seconds after Vit D has been administered in large doses into the blood stream, the osteocytes at the bone interface, become activated by a bone activating factor switched on by the Vit D.

Mathews has shown, that when substances such as P.T.H. (Parathyroid Hormone) or Vit. D are administered, the bone always follows a pattern of A.R.F. - activation, resorption then formation. Mathews says that so many new things are being discovered about bone that it is difficult to keep up with them.

Bone serves as a store for several different minerals. It serves as a support and attachment for muscles. - It houses the Lymphocytes and Neutrophils, so important in the hosts cellular and humoral response mechanisms. It responds to pressure and stress like any other tissue - it can enlarge if the need arises, and it is always in a state of remodelling.

In people over 30 years of age - A.R.F. is taking place, but the formation or remodelling is not generally keeping pace with the resorption - this discrepancy is accentuated Klinkhamer believes, as a result of lack of oxygenation of the tissues. James Klinkhamer is the professor of Clinical Medicine at the University of Texas. For 20 years he has investigated the Orogranular Leucocyte and has recently shown it to be an accurate gauge of oral pathology, he stressed that two factors were of ultimate importance in the maintenance of a healthy Periodontium.

1. Oxygenation of the body tissues - cardiovascular exercise
2. Oxygenation of the Alveolus - by Function

Obviously, the chewing brush must be of great importance for Klinkhamers second prerequisite. It seems reasonable to suggest, that if the alveolar process is stimulated by oral physiotherapy, particularly during those periods when it is undergoing maximum development (4-6 years - and 11-16 years) than one would expect, that the developing alveolar process would closely approximate its maximum growth potential as determined by the genetic material on the D.N.A molecule.

I discussed the idea of stimulation of mandibular and maxillary bone by means of the chewing brush with Professor Barker - Professor of Anatomy at Sydney University - He completely agreed, that such functional stimulation would have a powerful effect on the development of the facial bones and would be beneficial to all age groups - Professor B. Barker has examined the skulls of numerous aborigines and is an authority in this field - He contributed an all important article to the American Academy of Periodontology Journal, pertaining to bone apposition to the alveolar crest in aborigines, which clearly demonstrated that under ideal functional conditions, the gingival attachment can remain at the cemento-enamel junction during life.

Not only do I believe that more bone would be laid down as a result of oral physiotherapy, but I believe that the quality of the bone would be improved. What is good quality bone? It is that bone, which is laid down primarily or at a remodelling stage in an ideal environment. Let us look at some factors which contribute to such an environment.

1. Thyroid and Parathyroid hormone normalcy
2. Vit. C. sufficiency
3. Calcium Phosphate balance
4. Nutritional Factors - influencing such factors as Lipoid Glyco Protein which is always present whenever bone is being laid down, and good oxygenation
5. Bone stimulated by function - Mathews claims that when bone is bent by stress, an electrical discharge of up to 80 millivolts takes place - this discharge seems to be a necessary part of healthy bone metabolism
6. Psychological factors - E.G. Klinkhamer has shown that the migratory rate of the Orogranular Leucocyte in the mobile Mucous Phase is affected by the auto nervous system
7. Occlusal Balance - Walter Drum (Berlin University) has demonstrated the adverse effect of Parafunctional Forces on the Periodontium
8. and necessarily, a large number of yet undiscovered factors, inter-connected with this very complex mechanism.

Whenever a platlet hits a vessel wall (and this is happening all over the body) Prostaglandin like compounds are formed. The first step is an Endoperoxidase formation. This is the result of action by the Prostaglandin Enzyme Cyclooxygenase (this latter Enzyme is inhibited by Endomethazone) and compounds like P.G.E.1 and P.G.E.2 are formed, also some very complex substances which have a half life of 5 seconds, substances are very much involved in platlet aggregation and very rapid responses from the blood vessels - we know also, the P.G.E.2 has an effect on calcium absorption rates in bone and latest (1978) findings that the Osteocyte and Lymphocyte of the Alveolus are blood borne derivatives - probably coming from the spleen and that they appear at the bone surface interface only seconds after the administration of P.T.H. All of this exemplifying the dynamic nature of Alveolar Bone.

The relationship of Prostaglandins to inflamed tissue, fits neatly into the theory of bone pathology being the primary mediator in Periodontitis and Periodontosis. Whenever, Alveolar Pathology exists, whether it be in the bone or gingivae, Prostaglandins are present. They are present in badly inflamed gingivae in amounts six times greater than mildly inflamed gingivae, to the extent of 100MG/GM. They have been shown to be present in quantity of 400MG/GM in purulent exudate from Periapical Abscesses. We know now, why Eugenol is such an excellent treatment for inflamed pulp - it is an excellent Prostaglandin inhibitor. Also, it now seems certain, that Prostaglandins play a key role in Rheumatoid Arthritis - the Arthritic condition is not one of inflammation, yet Prostaglandins are present - this I believe is a very important point in Alveolar Pathology Etiology. It suggests for instance, that Walter Drums theory of bone resorption under parafunctional stress can take place with the support of Prostaglandins without pain or inflammation. Intuitively I feel, that the Prostaglandins affect the hosts autoimmune response in the sub-sulcular epithelium layers. The presence of Prostaglandins in small numbers in the alveolar process, would not be detected by X-rays. It is only when they are present in large numbers, that areas of radiolucency are seen.

As a clinician of 30 years experience, I have noticed that Trabecular spaces are more definitive in the healthy alveolus, that bone trabeculae are of better quality, i.e. thin and crisp - the blood colour less venous static in appearance and the bone is architecturally more predictable. Having penetrated alveolar bone with a Beutalrock Drill on more than 150,000 occasions to produce intraosseous anaesthesia, I am confident about this observation.

A Japanese study within the last four years showed that 90% of nocturnal tooth grinding was inaudible - now we know, that Bruxism is much more widespread than was previously thought. This study has really significant ramifications because it harmonises with Walter Drums thoughts about Parafunctional Forces and Periodontal Pathosis - it also explains the catholicity of Periodontitis. Any clinician of several years standing who has been seeing and perceiving, is very much aware of occlusal Trauma. The tensions in our environment, not only

are one of the basic factors related to cardiovascular disease but they have detrimental effects on alveolar processes not kept "fit" by oral physiotherapy. It seems that the poorly formed alveolar bone in 20th Century man is no match for Parafunctional Forces. The widespread problem of temporomandibular disturbance, increased alcoholic intake, increased use of drugs, sleeping tablets etc. is testimony to man's internal pain. It has recently been stated by Haddad (Phoenix 78) that the T.M.J. Syndrome and associated pain from muscle spasm, is the result of psychological problems, and that relief comes temporarily by altering the occlusion e.g. with a bite plate - because it shatters the psycho-musculatory spasm reflex which had been established.

It has been demonstrated by Ayer and Levin (A.U.D. 1975) that Parafunctional Grinding habits can be successfully treated by massed practised exercises of daytime tooth clenching - i.e. clenching hard for five seconds and repeating this procedure six times in a session and repeating each session six times daily. The findings of Rugh and Solberg have provided additional support for the efficacy of this therapeutic modality. It seems reasonable to suggest that clenching with a chewing brush in place would be a more comfortable experience than clenching without this appliance (causing better lymph drainage).

All our endeavours until now in the prevention of Periodontal Disease have been associated with plaque removal and I believe such hygiene is commendable for 20th century man because of his close relationship with his fellow humans - no person would understand this point better than a clinician who is in ultra close contact daily with his patients. However, we Australian Dentists have turned a blind eye to the generally disease free alveoli of our own Australian natives. Who, having lived off the bush have chewed their way to Periodontal health. All who have had occasion to examine a tribal aborigine's masticatory apparatus must have been impressed by the bone quantity, the lack of bone loss and the extent of occlusal wear on the molars - all this painting a picture of "Dental Health Through Function".

In the aborigine we observe host resistance at its best without the necessity for plaque control. A moment's reflection is sufficient to recall the soft food that passes through our oral cavities to the Oesophagus - scarcely a good chew for more than a few seconds daily. Would our muscles function properly with lack of usage? Then why should our alveolar processes! What study in recent years has been completed to negate this theory? - I have read every article in the A.J.P. and attended their annual meetings over the last 3 years in America and am amazed, that so much talk can take place about Periodontal Disease without a word being spoken about the benefit of function on the cells of the area. Wolff's Law is a well known principle stating in general, that the morphology of a bone becomes progressively adapted to the sum of all the changing mechanical forces exerted upon it during growth and development. When these forces obtain functional equilibrium with the physical properties of the bone, growth ceases, and the morphology of the bone is then in balance with the mechanical needs of its various functions - Once more a reason to stimulate bone growth with the chewing brush particularly during the periods of maximum development.

A further study by Squire and Costley (A.P.J. Feb. 76) on dieting patients is of much interest. They found that as the fasting period lengthened, there was a decrease in plaque index scores, but the gingival index scores increased considerably - this study contradicts the theory that plaque is the basic causative agent, but supports the theory of insufficient alveolar bone stimulation as being the central issue.

Finally Packman, Shorer and Stein (A.J.P. 1977) have demonstrated by fibreoptic techniques that

1. Autoregulation of blood vessels,
2. Transmural pressure in a tissue,
3. Oxygen tension,
4. Bone Metabolism,
5. Areas of Tension in Periodontal Tissues,
6. Areas of stress in Periodontal Tissues are all interrelated and emphasise the importance of chewing (especially with forces in excess of 180 GMS) to bone development, health and remodelling

The Attached Gingivae

Maynard and Ochsenbein reported that 10 of 100 children examined had muco gingival problems on the facial aspects of the mandibular incisor region - It has been my experience that over 50% of children between the ages of 9 - 12 have gingival conditions showing signs of pathology which does eventuate by the time the patient reaches 18 years.

This thickened margin and in particular the Bulbous Col result from weakened host resistance followed by bacterial antigen invasion of the sulcular epithelium.

The weakened host resistance is due to -

A. Insufficient usage of the Masticatory apparatus (Question such a child and it will be found that he has a soft diet for nearly every meal sandwiches (no crust) etc. Hardly a decent chew the whole day through.

B. Muscular incompetence causing -

1. Mouth Breathing
2. Insufficient flow of saliva and stagnation of the mobile mucous phase of the oral secretions, which comes from the mucous and Sero Mucous Glands.
3. Eating excess carbohydrate and sticky food which find a well prepared "Perch" over the whole of the oral mucosa because of mucous stagnation. High Dietary sugar causes dysglycemis which contributes to oral pathosis.

The Respiratory System moves its secretions by ciliary activity. The digestive system moves its secretions by muscular activity and the problem with children is that they are generally lazy in an ORO-musculature sense.

Now the chewing brush stirs up the settled mucous secretions, which covers all surfaces both epithelial and mucous and washes this material out of the mouth with parotid saliva - anyone who has used a chewing brush will attest to the voluminous amount of saliva which is secreted. Now, in any mouth the number of Leucocytes secreted through the sulcular epithelium into the mobile mucous phase of the oral secretions is constant, and is dependent upon the alveolar pathology in that particular mouth. - The figure is around 1/2 million Leucocytes secreted every thirty seconds in a healthy mouth. It has been suggested by Klinkhamer that the Orogranular Leucocyte count could be used by the clinician as a Barometer for oral disease occurring in any particular mouth.

The Orogranular Leucocyte, Phagocytoses Bacteria in the oral cavity and in particular in the gingival crevice. The crevicular area, having been recognised as vital to the maintenance of gingival health, is kept viable in its bacterial environment by gentle massage. The prongs are not meant to clean between the teeth - their purpose is to rub the epithelium on the oral surface of the col causing.

A. Keratinization of the Col Epithelium

B. Expressing from the cervix any stagnant exudate - such as Rods and Spirochetes which may or may not be coated with immunoglobulins 1gA 1gM 1gE 1gG or complement and leaving the sulcular epithelium less susceptible to proteolysis from crevicular lysosomal enzymes like collagenase.

It should be noted that toothbrush bristles do not clean beneath the crevicular epithelium, but merely express exudate from the crevice, similar to the chewing brush, but frequently with greater trauma to the gingival margins. The gentle rubbing of a rubber prong with copious saliva as lubricant is more conducive to gingival health than the traumatic action of a hard bristled brush.

In young children 3-7 years the only oral hygiene required is daily chewing for 4 minutes with the chewing brush resulting in 400-500 chews.

The attached gingivae benefits:-

1. By cleaning the epithelial surface of epithelial and cellular debris thus lowering the nutritional element for oral microbia.
2. Stimulation of the underlying collagen and connective tissue producing 1. Better Tissue Fluid Circulation. 2. Less Obstruction for the host cellular defence mechanism passing into crevicular area
3. Producing knife edge margins and rapid nutrient diffusion
4. Keratinization of the attached epithelium

Pocket depth is not now considered to be a true Barometer of the disease state. The attachment may be of an epithelial or connective tissue nature and may on occasions exceed 6mm in depth and remain healthy. - In such a case, the hosts resistance as expressed in the crevice, overcomes the attack by the antigen and so molecular toxins do not penetrate the junctional epithelium and the underlying basement membrane setting the alarm for the hosts autoimmune response and plasma cell infiltrate coming from the Tlymphocyte. When the coronal part of the attached gingivae becomes thick, it is possible to have histopathology taking place beneath the sulcular epithelium with connective tissue infiltrate into the junctional epithelium and plasma cell infiltration into the connective tissue, without the pathosis being observed macroscopically. The advantage of daily oral physiotherapy, is keeping the gingival margin thin and keratinized.

The chewing brush must be seen as a preventive appliance giving better metabolic status to the tissues of the masticatory mechanism - it will not heal attachment breakdown in deep pockets, but will certainly impede the progress of the disease, except in those instances where gross pathology is present, vigorous chewing may do more harm than good.

Until now, all Periodontal health modalities have worked by tipping the balance in favour of the host, by lessening the bacterial attack. - The chewing brush, using oral physiotherapy, not only reduces the attack but also improves local Host resistance.

COMPETENT ORAL MUSCULATURE

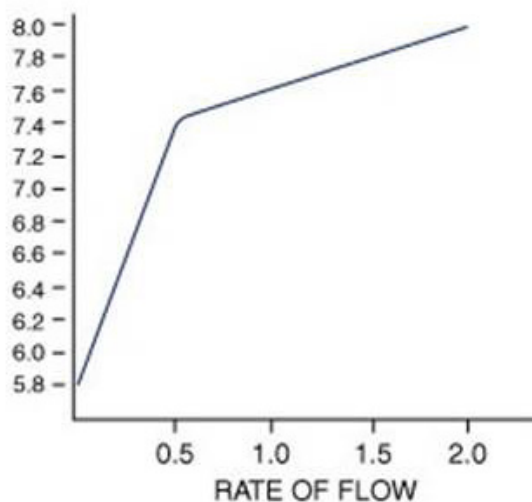
Drs. Heida, Yoshihara and Mine have recently demonstrated at the Osaka University dental school that young children (4-8 years) after four weeks use of the chewing brush, increased their Oro Musculature competence from around 150gms to 600gms. The method used, was to place a small rubber ball between the teeth of a child, with string attached, then to apply force to the string in an effort to dislodge the ball.

Utilising the results of this experiment the chewing brush was used on those children with developing orthodontic problems, due to facial musculature incompetence with excellent results. So far, this field of preventive orthodontics is still in its early stage and much more study is required to discover its potential.

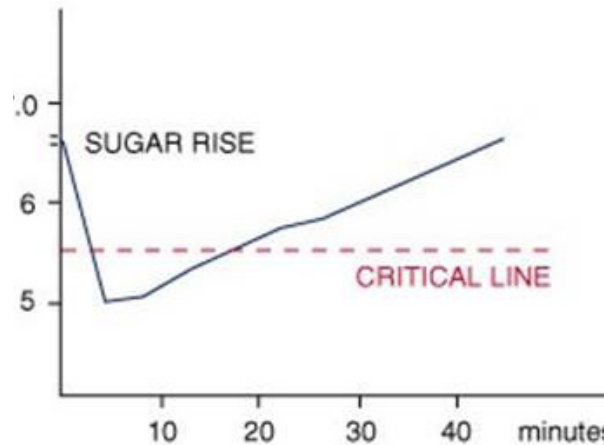
PROTECTIVE PROPERTIES OF SALIVA

Because saliva is affected both quantitatively and qualitatively by the chewing brush, it is important to look closely at its properties to ascertain its potential to maintain oral health.

We know that if a sugar solution is rinsed around a mouth containing an average amount of plaque, that the pH inside the plaque may fall to about pH5-5 and surface of the enamel tends to dissolve. However, saliva has the ability to wash the sugars from plaque and restore a higher pH above the critical line pH5-5. (Jenkins Indent 1973).



Not only does the chewing brush produce copious amounts of saliva to nullify any acid production in plaque but it also produces a very alkaline saliva because of the rate of flow. That rate is 30 times the normal rate for parotid saliva. The increase in pH is demonstrated in the following graph.



[Work done by G. Neil Jenkins Professor Oral Physiology University of Newcastle, United Kingdom].

This ability of the chewing brush to raise the pH of saliva from PH 5.8 to pH 7.4 in 30 seconds must have a resounding effect on acid production in plaque and on the oral microbia in general. Not all microbia cause pathosis - indeed some micro-organisms particularly gram positive occi, lessen the virulence of pathogenic organisms and act as a positive force for the oral health of the host.

Below is a list of endogenous factors - which influence oral microbial ecology and therefore oral health. Factors indicated by a are influenced by the chewing brush.

Humidity	✗
Surface Morphology of Tongue	✓
Temperature	✓
P.H.	✓
Oxidation Reduction Potential	✓
Saliva	✓
Crevicular Fluid	✓
Immune Mechanism	✓
B Teeth	✗
C Gingival Sulcus	✓

Alfano speaking on Periodontal Pathology made two conclusions relevant to chewing brush usage.

1. That effective host resistance is dependent upon the composition and flow rate of the saliva.
2. That the permeability of epithelial surfaces is governed by -
 - a. The pH of the penetrating molecule
 - b. The presence of bacterial enzymes their temperature and concentration

It is of much interest to note that the PH of saliva, bacterial concentration in saliva, rate of flow and temperature of saliva, are all affected by the chewing brush. After several weeks use of oral physiotherapy, salivary flow is produced more rapidly and in greater abundance. This is probably due to a physiological hyperplasia of the acini cells of the parotid and increased activity of its secretory granules.

In 20th Century man, oral odours constitute a significant segment of his personality. So much of our uniqueness is expressed via our speech, our smile, our facial expressions, as is our breath of much importance in interpersonal relationships. Joseph Tonzetich PH.D Professor Oral Biology at University of British Columbia has this to write (Jan. 77 A.P.D.).

The most objectionable odour in all individuals, regardless of the health status of the oral tissues is evidenced after prolonged periods of decreased salivary flow as exemplified by early morning air samples. During sleep, the salivary flow is essentially zero, and there is more than adequate time for uninterrupted putrefaction to occur. |

So the chewing brush, by keeping the salivary mechanisms in good condition, plays a beneficial role in countering oral malodor. Those who use a chewing brush agree about the oral cleanliness experienced.

SALIVA AND THE IMMUNOGLOBULINS

The presence of immunoglobulins in external body fluids is well established - 1gA is the major antibody component in saliva while 1gA is one of the dominating immunoglobulins in the gingival legion. 1gA occurs in parotid saliva in concentrations of 6.5MG% and where gingival pathosis is present, in concentrations of 189.9MG% in crevicular fluid. The immunoglobulins and complement are both part of the hosts response to antigen.

R.J. Nisengard D.D.S. Ph.D (A.J.P. 1977) says that gingivitis and periodontitis is almost universal therefore most of us are daily utilizing our 1gA in saliva to cope with bacterial products in our mouths. It is therefore reasonably to assume that our salivary processes should be exercised thus nullifying bacterial activity and preventing an over load on the hosts defense mechanisms in the gingival crevice.

We now know that it is the CA salts present in saliva which are the key to increasing enamel density after fluoride therapy. Teeth treated with fluoride in vitro do not produce a more dense enamel surface, unless of course CA ions are present in the in vitro medium.

It is known that agents such as 8-hydroxyquinoline (8 HQ HcL) and chlorohexidine gluconate when applied to the teeth will suppress the adherence of strep mutans to the tooth surface. It has also been demonstrated that ferrous sulphate and copper chloride if applied to the teeth as primers prior to the use of hydroxyquinoline will prolong the Anti-Bacterial property of the tooth surface at least 500%. So the surface tension energy of the

tooth is of much importance. Dreisen and Spies in 1952 found that all 48 specimens of saliva taken from patients contained copper in values from 10-47 MG/100cc. Nature no doubt uses these minerals to good purpose but exactly how oral physiotherapy would affect the surface tension energy of the enamel surface can as yet be only speculative.

Broadly speaking, we have known for many years that saliva being the medium which bathes the hard and soft tissues of the mouth must of necessity play a key role in oral health, what we have been unable to do until the advent of the chewing brush was to increase parotid salivary flow by natural methods.

As Fungi and Bacteria Proliferate best under static conditions - the chewing brush by altering PH, flow rate and temperature of saliva disturbs the equilibrium of bacterial plaques and nullifies their toxicity.

Saliva has been known to possess a bacterial aggregating factor, a mucoprotein, coming probably from the mobile mucous phase of saliva. Hay isolated this high molecular weight component, which promoted the aggregation of a number of plaque forming organisms. The chewing brush besides producing immunoglobulins and proteins from parotid saliva which inhibit bacterial attachment, would also help to dislodge any bacterial aggregating factor.

MINIMISING MICROBIAL ATTACH BY PHYSICAL CLEANSING

Tooth Brush usage is directed towards plaque removal from teeth and attached gingivae. - The chewing brush also removes stale mucous from all mucous membrane surfaces - Parents frequently cause traumatic ulcers on young children when brushing their teeth - the bristles occasionally penetrate the mucous surface with resulting ulceration.

People with active oral musculature utilize their tongue to clean the oral mucous surfaces. Children tend to be lazy in an oral musculature sense and leave an accumulation of the mobile mucous phase and salivary debris consisting of epithelial cells, orogranulocytes, orogranular cell remnants, epithelial remnants, bacterial rods, miscellaneous particles covering the attached and unattached gingivae.

As Klinkhamer has pointed out, it is the musculature of the body both voluntary and involuntary which moves the mucous secretions of the alimentary tract. So as adults, we have learnt to call upon our facial musculature, tongue and cheeks and by sucking saliva from Stensen's duct to help clear our mouths of debris after eating. - This process, removes a large percentage of stale mucous secretion all over the mouth - the chewing brush cleans away these secretions very effectively. When we consider that the stale mucous secretions are the precursors of plaque the value to oral health in removing them can be readily understood.

The epithelial cells on the labial surface of the attached epithelium have a life span of 7 days - those on the lingual surface 11 days. And so it is important for the dead cell covering to be continuously removed to encourage a more vital life cycle in the underlying epithelial cells, keeping in mind that all oral epithelial surfaces are absorbers of circulating salivary products. The capacity of the oral epithelium to absorb, can effectively be demonstrated clinically by topical anaesthesia. The chewing brush helps remove the old epithelial cells and stale mucous, ensuring the new epithelial cells are bathed in fresh parotid saliva. The growth of pathogenic bacteria in the mouth is very much dependant on an immobile environment - oral physiotherapy mobilizes all the tissues.

NUTRITION

It is not possible to speak of healthy gingivae, without paying due regard to nutrition. Sulcular epithelium not being vascularized, must receive its nutrition by diffusion from the underlying dermis.

The exact nature of nutrient materials such as amino acids, polypeptides, proteins, sugar amines, vitamins, which diffuse, are as yet unknown nor do we know whether gingival conditions blocking the diffusion of one nutrients would block the diffusion of all nutrients. But all clinicians are very much aware that any stimulation of the gingival tissues, whether by toothbrush or interdens or even the finger, causes better metabolism and more healthy gingival epithelia. The alveolar bone is the chief supplier of blood to the periodontium and so it is the chief supplier of nutrition and thus the closer the sulcular epithelium to the bony interface the less the distance that nutrients have to diffuse. We notice that bulky gingival margins are unhealthy margins because nutrients find it more difficult to diffuse from the microvasculature to the crevicular epithelium.

It has recently been demonstrated that in grafting procedures from the palate to say an area on the facial aspect of the lower anteriors that the graft works best when the recipient bed is denuded of all tissue, including the periosteum, demonstrating to my mind, that the underlying bone is the main supplier of nutrition and host defence cells.

The chewing brush is currently being evaluated by Professor Toyoda Hieda and his assistants, Dr. Masahiro Mine and Dr. Masahiko Yoshihara, at Osaka University Dental School.

Their work has been of a precise nature, dealing firstly with the ability of the chewing brush to remove plaque in young children. In this situation, they have found the plaque removing ability of the chewing brush is slightly better than the toothbrush. However, it is in the field of orthodontics which is currently being evaluated that the most excitement lies. Some very good results have been obtained in correcting premaxillary protrusion. I am sure more will be heard from these research workers in the future.

I am suggesting a change in attitudes towards oral health and - attitudes are hard to change. However, I think that a reasoned case has been put forward to persuade you that oral physiotherapy must, in future, play a significant role in promoting healthy development of the mouth.

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