

# Caries

## THE CHALLENGES OF RAMPANT CARIES

**For most patients who experience some degree of dental caries activity the disease progresses slowly. For the average patient it may take years for caries to progress from the outer to the inner surface of enamel (Lawrence et al, 1997, Pitts 1983).**

### What is rampant caries?

Results from some studies also point to the fact that there is a difference in rate of caries progression between fluoridated (3-4 years) and fluoride deficient areas (2.5 years) (Lawrence et al, 1997). However, occasionally a patient may present with caries that progresses much faster. The term "rampant caries" has been used

since the early part of last century to describe an aggressive and rapidly progressing type of disease (Silverstone et al, 1981). Rampant caries is defined as a rapid carious attack involving several teeth, including teeth and tooth surfaces that are usually at low risk of caries (Mitchell and Mitchell, 1991). Examples given for rampant caries include nursing bottle caries, nursing caries, and radiation caries. However, these are terms that speak more of the aetiology than the severity of the disease. While these are perhaps the most familiar and the easiest types of cases to detect, there are other cases where the term might also apply, eg. patients with bulimia. It is particularly important to identify and correctly manage cases of rampant caries because oral health can deteriorate quickly. Detection and management of rampant caries requires a clear understanding of the nature and cause of this problem, and of the most effective methods of achieving its control.

### Features of rampant caries?

The patient with rampant caries who is likely to be seen in dental practice may present with the following signs and symptoms:

- The patient may present with a history of frequent replacement and/or new fillings or a recent change in social or medical history or medication use;
- Multiple lesions at different stages of progression, from early enamel decalcification to larger lesions and frank cavitation;
- The dentinal base of cavities is usually soft and a yellowish brown colour. These characteristics differentiate rampant caries from arrested or slowly progressing caries where the dentinal base is firmer and usually dark in colour;
- Lesions can develop anywhere often including surfaces that are usually at low risk of caries;
- Dentinal sensitivity from untreated carious lesions.

### How significant is the problem?

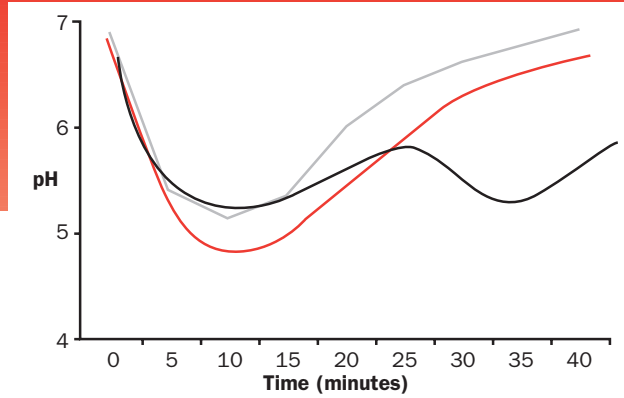
There is strong evidence of a decline in dental caries occurrence within the Australian population, especially for school-aged children, suggesting that an increasingly smaller percentage of children account for a greater proportion of total disease experience (Davies et al, 1997). For most dental practitioners, this is old news. Most children today have beautiful teeth. For other age groups, there is less information, but there is some evidence to suggest that caries rates are increasing for older adults (Edelstein and Douglass, 1995). So, while many consider the problem of dental caries to be diminishing, there are some people in our community that are at increased risk for developing this disease. These people pose great challenges because of the severity of their disease. Traditional methods of individual and community level prevention have not been sufficient to stop them from developing decay. In this module we will look at these special people in an attempt to better understand the severity of their dental problems and to highlight some management issues.

*Dental practitioners have an effective and relatively inexpensive preventive armamentarium to fight rampant caries.*

The patient's history may not suggest high caries risk, depending on the specific aetiology of the problem. However, in most cases, if the clinician is able to overcome the patient's guilt barrier and discuss sensitive/embarrassing dietary, social or family issues, the histories will confirm high caries risk status.

# The Stephan Curve...

**Red:** Active Caries  
**Black:** Repeated Ingestion  
**Grey:** Caries Free



**Figure 1 (Stephan Curve) provides a hypothetical representation of the pH change at the tooth surface as a result of different types of carbohydrates ingestion (Thysithrup and Fejerskov, 1994). Given 'normal' levels of salivary buffer and calcium/phosphate at the outer tooth surface, demineralisation commences once the pH drops below 5.5. However, between pH 5.5 and 4.5, demineralisation is partly inhibited by fluoride, calcium and phosphate. These ions both inhibit demineralisation and enhance remineralisation (ten Cate, 1990). If the pH continues to drop, remineralisation is progressively reduced and demineralisation is favoured. Over time, this prolonged challenge can result in demineralisation of enamel and dentine, eventual cavitation, and pulpal involvement.**

## What are the causes of rampant caries?

Referring back to Module I in this series, caries usually results from a prolonged imbalance between those oral factors producing demineralisation and factors promoting remineralisation. A high concentration of carbohydrates in plaque for prolonged periods of time is the cause of demineralisation. In the presence of a consistent exposure to fluoride, together with normal levels of saliva, most patients are able to maintain the remineralisation balance. However, when the frequency of carbohydrate ingestion results in a prolonged high concentration of acid at the tooth surface, the ability of saliva and fluoride ion to maintain a balance can be lost. Caries is the result. For patients who have infrequent exposure to fluorides, sometimes complicated by diminished salivary protection, rampant caries may still result despite consumption of a low risk diet. The demineralisation may result from an extreme excess of only one factor, eg. high consumption of refined carbohydrates. However, more frequently it is the result of multiple interacting factors often complicated by psycho-social or family factors.

Dental clinicians promote good oral hygiene for all patients believing that

oral hygiene is an important influence on the progression of dental caries. While this statement is correct, its truth largely comes from the fact that good oral hygiene includes the use of a fluoridated toothpaste. Surprisingly, if a fluoride dentifrice is not used, research does not show any effect of oral hygiene on caries development.

Few patients perform mechanical cleaning well and frequently enough to significantly influence (reduce) their risk to dental caries. **For many patients at high risk of rampant caries, oral hygiene is often a neglected part of their personal hygiene.** Dental clinicians spend lots of time discussing with patients a brushing method, but probably not enough time explaining how to use fluoridated toothpaste according to the individual's needs and how important fluoridated toothpaste use is for everyone.

## Factors that may increase caries risk

Rampant caries may result from prolonged periods of high ingestion of carbohydrates, and it may take from six months to a year before cavities begin to appear. In other cases, caries which was progressing slowly may suddenly become rampant. This may result from an increase in

refined carbohydrate consumption, or from frequent exposure of the teeth to erosive acids adding to the degree and frequency of pH drop at the tooth surface (McIntyre, 1992). This concentration of acid can rapidly demineralise even the remineralised surface of a 'white spot' subsurface lesion (Larsen, 1973). Exposure to erosive acids may result in a pH of around 3 at the tooth surface. The most frequent source of such acids is carbonated beverages. The pH of most of these products, whether sweetened with sugars or sugar substitutes, is around 3 (Table 1).

Rampant caries can also be seen when the protective role of saliva is diminished or lost (Edgar and O'Mullane, 1990) as often occurs when a patient is placed on medications that have a xerostomic side effect or when a patient receives radiotherapy to the head and neck region. The medications causing the most severe xerostomic side effects are the older types of anti-depressants, e.g. tri-cyclic antidepressants, anti-tremor medications, and anti-psychotic medications. Clinical signs and symptoms of xerostomia may be associated with the use of illegal drugs. Use of these substances is often associated with marked deterioration in eating and oral hygiene patterns.

**Table 1:**

**pH of commonly used drinks (Taji et al, 1999)**

<b>Drink</b>	<b>pH</b>
<b>Cola drinks:</b>	
•Sugared	2.4
•Diet	3.2
<b>Sports drinks</b>	2.8 - 3.1
<b>Citrus based soft drinks</b>	2.8
<b>Raspberry/Lime cordial</b>	2.8
<b>Apple juice</b>	3.3
<b>Rose-Hip syrup drink</b>	2.9
<b>Orange-Mango fruit juice</b>	3.2
<b>Natural Orange juice</b>	3.6

# Management of rampant caries

## steps and issues to consider:

1. The first step in management is to **diagnose** rampant caries. It is not possible to treat any disease if the problem is not correctly diagnosed. Also recognition and immediate response to the early signs that may lead to rampant caries may prevent its full onset.
2. The next important and often difficult step is to **find the causes** of the disease. Dental professionals need to know their patients and to understand their disease. Without this information, it will not be possible to help patients help themselves. The clinician's role in the relationship is pivotal, but only the patient can do what is needed to alter risk factors for the disease. Dental professionals are the coaches on the sidelines.

### **Dental clinicians' responsibilities are to assess, focus, teach, assist, demonstrate, encourage and reinforce.**

To be effective coaches, clinicians need to be able to assess patients' willingness or readiness for change. Depending on where they are on a readiness continuum, the interventions will differ. As an example, consider a mother/carer who is unaware that it might cause problems if she puts a baby to bed with a bottle filled with juice. Simple awareness might be enough to induce significant and permanent change. In another example, a mother who feeds her 1-year-old baby on demand may be aware of the problem of feeding on demand, but may not be prepared to change, or the smoker who prepares and plans to quit tomorrow, but tomorrow may never come.

*It is essential to monitor the outcome of the caries control programs both in the short and long term.*

Also consider the smoker who has quit a hundred times. What can be done to help the mother reduce the frequency of feeding (on demand), help the smoker find tomorrow, or assist the smoker to really quit?

Many patients, who might be classified as having rampant caries, also have numerous other health,

family and social problems. Dental caries is not the only health issue associated with social disadvantage. Unfortunately, poor oral health may be the least of our patients' problems. In some special cases, a dental professional may need to assume greater responsibility in helping to prevent and control disease. However, when patients are not interested or are unable to take responsibility for their health problem, there may be little success in pursuing change and temporary protection from dental pain may be the best course of action. However, in such cases it is vital to ensure that the patient understands the causes of the dental disease and is provided with encouragement to reconsider the health consequences.

### **Empathy from the practitioner is a vital part of the management.**

3. Dental practitioners have an effective and relatively inexpensive preventive armamentarium to fight rampant caries. It is the responsibility of the dental professional to put together an appropriate **preventive approach** that is tailored for the individual patient's needs. No two patients are the same and no two preventive treatment plans will look alike. For in-office procedures there are pit and fissure sealants, topical fluoride procedures, and counselling patients to change to preventive dental behaviours. However, practitioners stand little chance of managing disease if they cannot influence the patient to modify the harmful habits.
4. Where the patient is aware of and receptive to the control of caries, the following list of preventive **technologies** should be considered.

- Simultaneously, commence in-office and home preventive therapies.

The dental clinician's highest level of intervention would include: the daily at home use of a topical fluoride gel in a custom tray for four minutes, daily brushing with a high fluoride concentration dentifrice, periodic use of a chlorhexidine rinse/gel to control the levels of cariogenic flora and use of a fluoride varnish applied by a dental professional twice weekly for at least one month. However, this level of fluoride intervention will

depend on many factors such as age of a patient, the major identified risk factor, and the ability of a patient to comply and follow instructions. Consequently, this regimen will not be used frequently.

- Changing dental behaviours is a difficult and often a long-term process. Many habits die hard. The dental profession can learn a lot from other health promotion initiatives. Smoking cessation and obesity control programs are two areas where important research on changing health behaviours is readily available. There are several important points to remember when helping a patient to change behaviour.

### **First, patients rarely respond to an approach based on fear. Second, patients must establish their own goals for change - the clinician's role is to assess the preparedness of a patient to change and coach them through this process.**

- Dietary patterns may be difficult to alter. Clinicians need to be prepared to provide patients with achievable options for healthier foods and eating patterns.
- While plaque control performed at home may have limited impact on the control of patients' caries risk factors, clinicians need to ensure that patients understand the importance of a fluoride dentifrice use as a vital tool to control decay.

### **Frequent use of fluoridated toothpaste is one of the easiest and simplest ways to increase exposure to fluorides.**

- Preventive programs need to be individualised and based on the needs and the goals of the patient.

It is important not to overload a patient with too many changes to their lifestyle. Remember little steps are more likely to be remembered and followed. As use of fluoridated toothpaste and dietary control measures improve, it may be possible to reduce the concentration and frequency of topical fluoride use.

# Management of rampant caries cont...

- It is essential to monitor the outcome of a caries control program both in the short and long term. In the short term, the most important factor to monitor is compliance with preventive measures and recommendations for behaviour change. Some of the implemented changes can be easily assessed during a soft and hard tissue examination eg. improvement in gum condition, but other changes (eg. diet) may require more careful checking. Reinforcement and continuing encouragement are usually necessary.

- Even when control of disease has been achieved in the short term, it is essential to continue to monitor both compliance and clinical evidence of caries in the months ahead. Where rampant caries is concerned, it is recommended that, following frequent monitoring for the first three months, recall visits can be scheduled every three months depending on how well the patient progresses. This frequency of recall allows for further intervention if required. Subsequent appointments are made according to need.

- Permanent restorative treatment should ideally not commence until there is evidence of reduction in caries activity, which hopefully can be observed at the first three-month recall visit. However, if the patient insists on immediate permanent treatment without implementing necessary behavioural changes, he/she needs to be fully aware of the likelihood of treatment failure. Dental professionals are not doing patients or themselves a service if all that is done is filling a hole without treating the disease.

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## The realities of providing Preventive Care/Managing the high risk patient

- As management of rampant caries is time consuming it is beneficial not to proceed without advising the patient fully of what is involved. It is important for patients to state their goals and commitment and to confirm that they wish to proceed and work to control the problem.
- Apart from the attempt to influence behavioural change through providing encouragement and alternatives for diet or oral hygiene behaviours, deep cavitated lesions should be temporarily restored with a fluoride releasing restorative material. Carious lesion stabilisation protects teeth from further destruction, helps to remineralise already existing lesions and removes the urgency to place permanent restorations.
- When the long-term management of such cases results in failure, it is extremely frustrating for both dental staff and patients (the "coach" and all the players). On the other hand, successful management of rampant caries cases provides a high point of dental clinicians' achievement. Moreover, the patient's elation at the result, and their praise of the dental team's efforts can significantly enhance the reputation of the dental practice in the community and help to build a viable practice.

## Further information

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