2010 Symposium on Early Childhood Caries in American Indian and Alaska Native Children

Summary

Council on Access, Prevention and Interprofessional Relations
Acknowledgements

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The following individuals devoted numerous hours to planning the 2010 Symposium. Without their efforts, the Symposium would not have been possible.

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- Elimination of cariogenic bacteria greatly reduces or stops demineralization
- Targeted killing of cariogenic bacteria re-balance microbial ecology, achieving long term protective effects

  * Glycyrrizol A (derived from the licorice plant Glycyrrhiza uralensis)
    - Is approved by the FDA as a food flavoring under the generally recognized as safe designation.
    - This product does not contain the glycyrrhizic acid that is known to cause side effects when licorice is consumed in large quantities over an extended period of time.
    - Shows in vitro selective inhibition of S. mutans with minimal effect on most other species of the oral flora.
    - Limited small clinical studies have confirmed a decrease in S. mutans levels of adults and children.

  **Ming Tung, PhD**

**ACP technology: Amorphous calcium phosphate forming fluoride varnishes**
- Why use amorphous calcium phosphate (ACP)?
  - Fastest formation and dissolution
  - Solid solution: Incorporates other beneficial ions readily.
  - Therapeutic agents and also as the carrier for long term releases
  - Transform to apatite: Put back lost tooth mineral
  - Fill and obstruct dentin tubules (one ACP unit is 0.96 nanometer).
  - Easy to prepare and use

- Why use varnish as a carrier?
  - Long contact time with Enamel
  - Lasting effect with an annual application.
  - Easy to apply on the tooth
  - Only safe topical fluoride treatment for young children
  - Recommended by American Dental Association based on evidence.

- Other delivery methods of ACP
  - Solution, Gel, Toothpaste, Prophylaxis paste, Composite, Chewing gum, Mouth rinse, Floss

- Advantages
  - Remineralizes the tooth: Puts back the tooth mineral and increase the hardness.
  - Increases fluoride efficacy: more release and more uptake
  - Obstruct the dentin tubules: Decrease hypersensitivity

- Second generation ACP under development

- ACPF Varnish with Chlorhexidine provides an antimicrobial and remineralization agent in the same product.
- ACPF Varnish with Arginine & Chlorhexidine is Antiacidic, Antimicrobial and Remineralizing

- Conclusion:
  - ACP Technology is able to remineralize the tooth in clinical applications.
  - ACP can incorporate and deliver beneficial ions: F, Chlorhexidine, and Arginine.
  - Varnishes readily deposit ACPs which act as therapeutic agents and also as the carriers for long term releases.
  - Some products are ready for clinical study.

**Timothy Bromage, PhD**

**Coupled microbial and human systems: The importance of complexity and integrative thinking**
- Waddington's epigenetic landscape: At the early stages of the development of a complex entity, there are many paths that can be followed and are influenced by the environment. As development continues, there are progressively fewer and fewer options, and the energy required to move back to an earlier path not taken is progressively larger. ECC is an example of a health problem canalized by social and environmental factors that draw the disease further along its deleterious path.

- The science of complexity is about revealing the principles that govern the ways in which new properties appear. These principles include, self-organization, self-adaptation, rugged energy landscapes, and scaling (e.g. power-law dependence) of the parameters and the underlying network of connections. ECC is a complex problem.

- Complexity results in stable scale-free ecological relationships
  - Example: For the human economic production system and the role of microbes, the main elements are:
    - Energy, metabolism and growth
    - Microbes and metabolic adaptation
    - Economic stoichiometry
  - When comparing the health of countries, there is a clear direct relationship between the risk of having a major infectious disease and the birth rate: the higher the risk, the higher the birth rate, which diminishes the amount of energy available for national production and the demographic transition. This example demonstrates that the complexity of a problem must be understood in order to find a stable-state solution.
- Regarding severe, destructive caries in the primary dentition, despite the very substantial efforts to treat the disease, administer both preventive and curative programs well, and to conduct investigations into the problem, so far in many AI/AN communities these energies have not translated into improved health for the children. That is, the complexity of this problem has not been fully mapped.

- Wacantognaka, the Sioux word for generosity, means to contribute to the well-being of one’s people and all life by sharing and giving freely. This sharing is not just of objects and possessions, but of emotions like sympathy, compassion, kindness. It also means to be generous with one’s personal time. The Sioux must come to express this sentiment and to own their role in finding a solution to ECC.

- This suggests that it is likely that the missing part of all the ECC-prevention prevention efforts has been to incorporate the social networks that will provide the cultural support needed for parents to be more effective in their health promoting behaviors. The task is to define who are the individual’s real ‘neighbors’ and how they can help influence positive health behavior.

Dee Robertson, MD, MPH

Barriers to ECC control in AI/AN children

Collectively we have made little if any progress over the last three decades in controlling rampant caries in the primary dentition of AI/AN children. I believe the primary barrier to progress has been, and continues to be, attitudes that are based in perception rather than fact:

- Barriers to ECC Control: Myth #1: We already know what needs to be done to control ECC among AI/AN children—we just need to do a better job with the products and strategies we currently have.
- Barriers to ECC Control: Myth #2: If there are enough dentists, we can resolve this problem
- Barriers to ECC Control: Myth #3: We can’t control ECC until we eliminate poverty
- Barriers to ECC Control: Myth #4: We can’t do anything to control ECC because of the parents won’t change their behavior
- Barriers to ECC Control: Myth 5: If the mom said she followed our recommendations and her child still got ECC, the mom was probably lying
- Barriers to ECC Control: Myth 6: ECC is self-limiting disease of the primary dentition
- Barriers to ECC Control: Myth #7: Indian parents don’t care

Leaving the world of mythology and coming back to the world of reality, we have eliminated polio, measles, mumps, rubella, whooping cough, Hib meningitis among AI/AN children. We did this by a combination of technology and public health infrastructure. We have the public health infrastructure to control ECC, but we don’t have the technology. The reason we don’t have the technology is that unlike the other infectious diseases referenced above, rampant caries in the primary dentition is not an equal opportunity disease: it usually affects only the most disadvantaged children.

Conclusion: If a child:

- Is born with a substantial amount of enamel hypoplasia, and
- Has early and heavy exposure to Streptococcus mutans, and
- Has a moderate exposure to simple sugars in the diet, you would expect a Perfect Storm of caries in the primary dentition. This is exactly what AI/AN children have experienced for decades, and what we continue to see at very high rates in many AI/AN communities.

Workgroups

Based on the recommendations of the Symposium planning group, five key topical areas were specified for extended discussion and recommendations by small workgroups on the morning of day #2 of the Symposium:

1. The Epidemiology of caries in the primary dentition among AI/AN, including issues of definition, nomenclature, prevalence and severity, adequacy of existing data sources.
2. The Microbiology of caries in the primary dentition among AI/AN, including the primary pathogens of importance, accuracy and validity of different methods of assessment of cariogenic bacteria, and correlation between assessment of cariogenic bacteria and clinical outcomes.
3. The role of Enamel Hypoplasia in rampant caries in the primary dentition, including evidence on the etiologic role in rampant caries in the primary dentition, methods of diagnosis, classification of severity, and correlation with morbidity.
4. New Prevention Products And Strategies, including those available but not being utilized, those expected to be available in the foreseeable future, expected efficacy in controlling rampant caries in the primary dentition, and feasibility for use in public health practice settings as opposed to research.
5. Planning the Next Steps, including building coalitions and funding support.

The following guidelines were given to the workgroups to help structure their discussion and their reports that were presented in the subsequent plenary session to conclude the technical aspects of the Symposium: