

Clinical Nutrition Online Learning Video Activity Script

International Academy of Oral Medicine and Toxicology (IAOMT); www.iaomt.org
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PREFACE TO IAOMT’S CLINICAL NUTRITION ONLINE LEARNING VIDEO ACTIVITY

Text on screen:

Welcome to IAOMT’s Clinical Nutrition Online Learning Video Activity. The “Materials” tab above this video, as well as the text box below this video, contain links to references and resources cited in this activity, scientific literature related to the topics presented, and a script for this entire video. The successful completion of a quiz at the end of this activity is required for individuals participating in an IAOMT course.

In offering this activity, the IAOMT’s intention is to present as much scientific information as possible on different dental materials, treatments, patient and dental staff safety, and other aspects of dentistry.

The objective of the Clinical Nutrition Online Learning Video is that at the conclusion of this activity, participants will be able to recognize the impact of nutrition on oral health and the history of nutritional concepts in dentistry.

The IAOMT emphasizes that health care practitioners must make their own professional judgments for the benefit of themselves and their patients and staffs. You are responsible for exercising your own judgment concerning the specific treatment options to utilize in your practice; for complying with applicable laws and regulations including local dental practice acts and informed consent requirements; and for abiding by insurance requirements including written declarations of coverage.

Only proceed if you understand and agree with these statements.

If you are ready to proceed, the activity will begin with Steve Koral, DMD, MIAOMT, and Robin Warwick Ermel, DDS, providing you with the coursework for this Clinical Nutrition Online Learning Video Activity.

INTRODUCTION

Clinical Nutrition is a legitimate profession in its own right. It's usually not necessary for the dentist to assume the responsibilities of the nutritional doctor or therapist, although many of our colleagues have found nutritional counseling to be a rewarding part of their practice.

It is necessary, though, for all of us to appreciate how important nutritional status is for the ability of our patients to heal from their dental diseases and treatments. For many people, inadequate nutrition is the underlying reason for their dental diseases in the first place. Once

we start considering this proposition, we are led inevitably into the whole nexus between dental health and overall, systemic health.

In this course, we will explore the pioneers. We will see how many exciting discoveries were originally accomplished by dentists and discover the importance of the links between dentistry and systemic health.

Dentistry has a long and storied history of pioneering nutritional consciousness. Many of the concepts used today in nutritional therapy and functional medicine were originally discovered by a dentist. Unfortunately, much of this history is all but forgotten in our time, with our current emphasis on the mechanical side of dentistry.

DR. W. D. MILLER

It all began with the search for the cause of tooth decay.

Dr. W. D. Miller lived and studied in Germany during the exciting years following the initial breakthrough discoveries in medical microbiology made by Louis Pasteur and others. The discovery of acid fermentation by oral bacteria gave rise to the first cognitive theory of dental caries. This was Miller's theory of bacterial acid attack on the surface of the tooth.

Still, many leading dentists of the time, such as Fish and Bodecker, held to the notion that the tooth itself had to be rendered susceptible in some way for caries to take hold.

Screen to the right:

The search for a systemic
theory of tooth decay



DR. WESTON PRICE

Any mention of nutritional pioneers in dentistry must start with Dr. Weston Price. He is regarded as the premier dental researcher of his time. Dr. Price traveled the world to document the health of people living in their native, aboriginal conditions in order to compare them to genetically related groups living in “modern conditions near trading posts.”

Bottom of the screen:

Weston Price's book *Nutrition and Physical Degeneration* was first published in 1939 and is still regarded as essential literature on the topic of nutrition.

Price's masterwork, *Nutrition and Physical Degeneration*, is still in print today. Examining 14 different ethnicities all around the world, he was able to document how those groups were living in native conditions, eating their aboriginal diets, had no caries, full facial and dental arch development, along with other favorable measures of skeletal development. At the same time, genetically related groups with access to trade, eating the trade diet of sugar, refined flour, and canned goods, had dental caries, stunted growth of the mandible and mid-face, and crowded dental arches, along with other signs of poor skeletal development.

Quoted from *Nutrition and Physical Degeneration*, 6th edition: "It should now be clear why isolated primitive people in the Swiss Alps and then the islands off the coast of Scotland maintained a high degree of health and a freedom from tooth decay. It should also be clear, why the modernized people in those areas lost their immunity to tooth decay. The isolated diets contained several times the amount of water-soluble vitamins, and particularly, ten times more the amount of fat-soluble vitamins."

DR. MELVIN PAGE

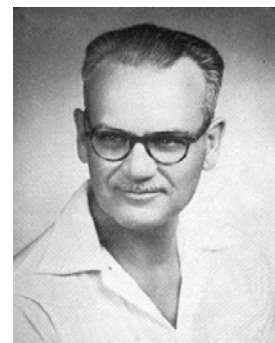
Dr. Melvin Page was highly influenced by Dr. Weston Price's work. Page began his research with the problem of bone resorption under dentures, as well as dental caries. His great innovation was to study the blood chemistry of his patients.

Page discovered that his healthiest patients with the least caries or the least denture-related ridge resorption, had blood calcium and phosphorus in a ratio of exactly 10 mg percent to 4 mg percent. He found that less calcium was related to bone loss and tooth decay, while excess calcium was related to deposition of calcium deposits in arteries, joints, and on teeth, as calculus. He experimented with nutritional and endocrine methods to help his patients keep in chemical balance.

Screen to the right:

Melvin Page, DDS; 1894-1983

- Introduced body chemistry analysis to nutritional practice in dentistry
- Established concept of the calcium/phosphorus ratio
- Developed concept of excess free calcium
- Demonstrated harmful effects of white sugar, flour, refined foods, and chemical additives on body chemistry



DR. ROYAL LEE

Dr. Royal Lee, dentist and engineer, was a contemporary of Price and Page. Dr. Lee was responsible for developing many nutritional supplement formulas, and glandular extracts, to support the work of nutritional therapy. His formulas are still in use today by the company he founded, Standard Process Labs.

Lee stated that, "Candy, all white sugar or its products, and white flour including its product such as macaroni, spaghetti, crackers, etc., should be absolutely barred from the diet of the child. All these are energy-producing foods that contain no building materials for the body. The consequences of their toleration or susceptibility to infections, enlarged tonsils, carious teeth, unruly dispositions, stunted growth, rickets, maldevelopment and very often permanent damage to many organs of the body (especially the endocrine glands) that depend upon the vitamin supply for their normal function and development."

Screen to the right:



Source of quote: Lee R. *Vitamin News: Part of the Royal Lee Library Series*. Milwaukee, WI: The International Foundation for Nutrition and Health. 2006.

Photo courtesy of the International Foundation for Nutrition and Health (www.ifnh.org)

DR. HAROLD KRISTAL

Dr. Harold Kristal and his collaborators discovered that Page's calcium/phosphorus ratio was most directly under the control of the acid/alkaline balance of the body's fluids. Blood pH is tightly regulated at 7.40-7.45, but such small variations, such as a drop below 7.40, would reflect large changes in health status. As Kristal sought nutritional methods for helping his patients maintain proper blood pH, he discovered that there was no one diet suited for all people.

Kristal found that the individual variation in response to different diets could be accounted for by the understanding of the relative dominance of the oxidative (or energy producing) system, versus the atomic (or energy regulating) system, and in which direction those systems functioned. He developed measurable criteria that would allow him to predict which type of work would normalize a given person's blood pH, and thereby normalize all the other metabolic functions controlled by the acid/alkaline balance.

Screen to the right:

Harold Kristal, DDS, 1925-2005

- Related Page's calcium/phosphorus ratio to blood pH
- Noted blood pH of individual people responds differently to different diets
- Developed methods for "metabolic typing" to determine which type of diet is best for a given person

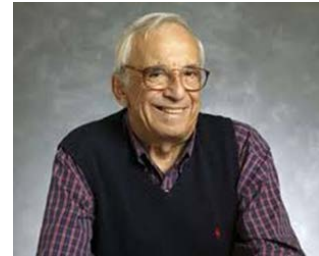


Photo Courtesy of Vernon Philpott of Metabolic Nutrition;
<http://bloodph.com/about-typing.html>

DR. RALPH STEINMAN

The influences of nutrition and endocrine function on tooth decay were finally explained by the theory of fluid transport through dentinal tubules. This concept was proposed by several earlier dental researchers but was finally proven by Dr. Ralph Steinman of Loma Linda University. Steinman published a series of papers in the 1960s depicting his experiments where he would inject rats with fluorescent dye. He tracked the progress of the dye from the circulating blood into the pulp, and then the tubules, and ultimately through the enamel of the teeth.

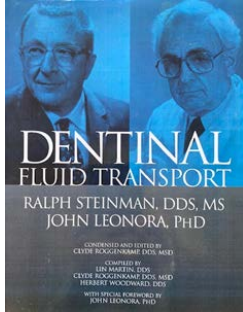
Steinman and his collaborator, endocrinologist John Leonora, demonstrated how the fluid transport system of dentin is under endocrine control. They documented the existence of a hypothalamic releasing hormone, and a parotid gland hormone that controls the proper functioning of dentinal fluid transport. These hormones, and the mechanism of dentinal fluid flow, underline the systemic resistance or susceptibility of a tooth to decay.

And the nutrition connection? Known cariogenic influences, such as high sucrose diets, even if fed through a gastric tube to bypass the mouth, would have the effect of slowing or even reversing the fluid transport system, while a healthy diet would increase the fluid flow. Diminished fluid flow leads to depletion of minerals and reduction of metabolic activity in the dentin, rendering it susceptible to the acid assault from bacteria on the surface of the tooth.

Topics to the right:

Ralph Steinman, DDS, 1943-2011

- Proved the existence of dentinal fluid transport
- Demonstrated the systemic control of dentinal fluid flow by a hypothalamus parotid hormonal mechanism
- Isolated and characterized the parotid hormone
- Demonstrated reversal of fluid flow by systemic effect of a cariogenic diet on the hypothalamus
- Synthesized the effects of nutritional deficiencies and other stresses on teeth into a unified theory of systemic susceptibility or resistance to tooth decay



Ralph Steinman and John Leonora. *Dentinal Fluid Transport*. Loma Linda, CA: Loma Linda University School of Dentistry, 2004.

CURRENT RESEARCH



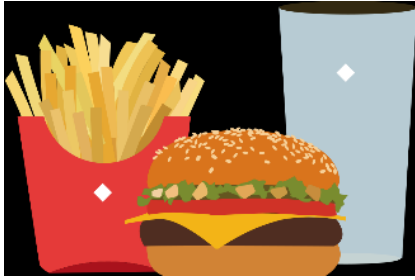
As scientific literature continues to accumulate on the connections between nutrition, oral health, and systemic health, the growing body of research opens a door to new opportunities in the practice of dentistry and medicine. Moreover, some more recent publications help to establish that the threshold of nutrition must be crossed in order to prevent disease and to achieve more optimal levels of health. Following are just a few examples of innovative new research articles addressing these concepts.

“Respectively, there are two major fields concentrated on the interrelation between genome and diet: nutrigenetics and nutrigenomics. Nutrigenetics studies the effects of nutrition at the gene level, whereas nutrigenomics studies the effect of nutrients on genome and transcriptome patterns. By precisely evaluating the interaction between the genomic profile of patients and their nutrient intake, it is possible to envision a concept of personalized medicine encompassing nutrition and health care.”

Irimie AI, Braicu C, Pasca S, Magdo L, Gulei D, Cojocneanu R, Ciocan C, Olariu A, Coza O, Berindan-Neagoe I. Role of key micronutrients from nutrigenetic and nutrigenomic perspectives in cancer prevention. *Medicina*. 2019 Jun;55(6):283.

“During the last decades, the importance of micronutrients has been extensively reviewed, and it was concluded that the prevention and treatment of periodontitis should include correct daily nutrition and a correct balance between antioxidants, probiotics, natural agents, vitamin D, and calcium.”

Isola G. Current evidence of natural agents in oral and periodontal health. *Nutrients*. 2020 Feb 24;12(2):585.



“Among middle-aged adults, poor-quality diet appears to be associated with the development of periodontal disease.”

Jauhiainen LM, Ylöstalo PV, Knuuttila M, Männistö S, Kanerva N, Suominen AL. Poor diet predicts periodontal disease development in 11-year follow-up study. *Community Dentistry and Oral Epidemiology*. 2020 Apr;48(2):143-51.

Photo Credit: Motisances at

https://upload.wikimedia.org/wikipedia/commons/thumb/c/c7/Junk_food_portail.svg/1024px-Junk_food_portail.svg.png

“A pediatric dentist performed an oral exploration of the participants according to the criteria of the World Health Organization (WHO). Food rejection and limited food variety were associated to an increased prevalence of malocclusion and altered Community Periodontal Index scores in children with ASD [autism spectrum disorder].”

Leiva-García B, Planells E, del Pozo PP, Molina-López J. Association between feeding problems and oral health status in children with autism spectrum disorder. *Journal of Autism and Developmental Disorders*. 2019 Dec 1;49(12):4997-5008.

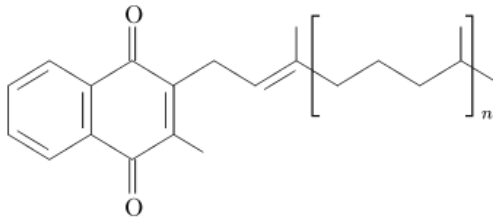
“In patients with stable [coronary artery disease] CAD, the presence of periodontitis and tooth loss were associated with a poor dietary intake of nutrients and healthy foods, which are important for cardiovascular prevention.”

Mendonça DD, Furtado MV, Sarmiento RA, Nicoletto BB, Souza GC, Wagner TP, Christofoli BR, Polanczyk CA, Haas AN. Periodontitis and tooth loss have negative impact on dietary intake: A cross-sectional study with stable coronary artery disease patients. *Journal of Periodontology*. 2019 Oct;90(10):1096-105.

"Saccharolytic bacteria-including *Streptococcus*, *Actinomyces*, and *Lactobacillus* species-degrade carbohydrates into organic acids via the Embden-Meyerhof-Parnas pathway and several of its branch pathways, resulting in dental caries, while alkalization and acid neutralization via the arginine deiminase system, urease, and so on, counteract acidification. Proteolytic/amino acid-degrading bacteria, including *Prevotella* and *Porphyromonas* species, break down proteins and peptides into amino acids and degrade them further via specific pathways to produce short-chain fatty acids, ammonia, sulfur compounds, and indole/skatole, which act as virulent and modifying factors in periodontitis and oral malodor. Furthermore, it is suggested that ethanol-derived acetaldehyde can cause oral cancer, while nitrate-derived nitrite can aid caries prevention and systemic health."

Takahashi N. Oral microbiome metabolism: from “who are they?” to “what are they doing?” *Journal of Dental Research*. 2015 Dec;94(12):1628-37.

“High sugar intake creates an increase in reactive oxygen species and oxidative stress in the hypothalamus. When this signaling mechanism halts or reverses the dentinal fluid flow, it renders the tooth vulnerable to oral bacteria, which can now attach to the tooth’s surface...Vitamin K2 (K2) has been shown to have an antioxidant potential in the brain and may prove to be a potent way to preserve the endocrine controlled centrifugal dentinal fluid flow.”



Graphic of Vitamin K2

Southward K. A hypothetical role for vitamin K2 in the endocrine and exocrine aspects of dental caries. *Medical Hypotheses*. 2015 Mar 1;84(3):276-80.

DENTISTRY AND NUTRITION IN EVERYDAY PRACTICE

It is a real mystery why foundational concepts linking dentistry with systemic health and nutrition could be abandoned within a dental practice. It seems they are not taught in dental schools and not used by dentists in everyday practice. Nevertheless, these ideas are still alive and well. The connections between nutrition and physical degeneration, the calcium/phosphorus ratio, blood PH, and the dentin transport system are all concepts that are embedded in modern nutritional therapy and functional medicine.

We know that good nutritional status is essential for our patients to heal and resist disease. The more compromised a given patient's health is, the more important it is for us to think of the systemic relationships between their overall health and their dental health. We can study these relationships and apply these concepts to everyday practice and health care to help our patients to heal and resist disease.

From the nutritional and functional point of view, it is worth distinguishing between two approaches: “holistic” or whole-body nutrition and “allopathic” or problem-oriented nutrition. Dentists don't usually take on the responsibility of counseling whole body nutrition, and that's why the IAOMT encourages its members to develop good working relationships with medical and other professionals who can provide those services.

A patient’s nutritional status should always be one of our considerations when assessing their dental condition. This is especially so when they had trouble recovering from their dental diseases. For example, when they continue to have new tooth decay, or continued to lose ground to periodontal disease, we can often find that there is something about their diet, their certain sugar exposure, or some specific nutritional deficiency that keeps our normal therapies from working.

We can provide nutritional support for all aspects of dentistry, periodontal disease, dental caries, and amalgam replacement.

All Aspects of Dentistry

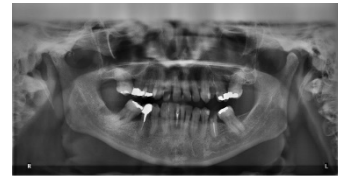
All aspects of preventing and reversing dental disease require our patients to have good nutritional status. This includes:

- Caries control
- Resistance to periodontal breakdown
- Bone healing and wound healing
- Bone remodeling under orthodontic force
- Resistance to infection
- Excretion of toxins, such as mercury



Dental Caries

Good general health and good general nutrition for the prevention of dental caries includes:



- Recognizing the systemic effect of cariogenic diets that are high in sugar and refined flour
- Controlling topical exposure to fermentable carbohydrates by curbing prolonged sipping, snacking, and grazing habits (e.g., exercising the “twenty-minute rule” of bacterial fermentation)
- Maintaining an acid-base balance to control proper mineral deposition
- Optimizing adequate mineral consumption
- Providing proper amounts of trace elements such as iodine, strontium, and selenium
- Incorporating proper amounts of vitamins D3 and K2 especially during pregnancy and early childhood

A few words about sugar...



In 1728, Pierre Fauchard, who is considered to be the father of modern dentistry, discredited the theory that a tooth worm caused dental caries, and he also made an association of dental caries with sugar. In the decades and centuries that followed, Berdmore, Miller, Stephan, Gustafsson, Scheinin & Makinen, and other dental researchers all strengthened our knowledge of the link between sugar and dental caries.

Source for more history of dental caries and sugar: Anderson CA, Curzon ME, Van Loveren C, Tatsi C, Duggal MS. Sucrose and dental caries: a review of the evidence. *Obesity Reviews*. 2009 Mar;10:41-54.



In summary of dental caries and sugar, researchers wrote in 2010: "Today's science has demonstrated that caries is caused by indigenous oral microorganisms becoming a dynamic biofilm, that in the presence of fermentable sugars produce organic acids capable of dissolving inorganic enamel and dentin followed by the proteolytic destruction of collagen leaving soft infected dentin. As bacteria enter the pulp, infection follows."

The author of a 2013 review supported this fact: "The evidence that dietary sugars are the main cause of dental caries is extensive, and comes from six types of study. Without sugar, caries would be negligible."

Source for 1st quote and history of dental caries and sugar: Ruby JD, Cox CF, Akimoto N, Meada N, Momoi Y. The caries phenomenon: a timeline from witchcraft and superstition to opinions of the 1500s to today's science. *International Journal of Dentistry*. 2010 Jan 1;2010.

Source of 2nd quote: Rugg-Gunn A. Dental caries: strategies to control this preventable disease. *Acta Medica Academica*. 2013 Nov 15;42(2):117.

"These sugar metabolic pathways are also shared by periodontal disease— and oral malodor—associated saccharolytic bacteria, such as *Fusobacterium* and *Prevotella*, which can sometimes cause acidification, similar to caries-associated bacteria (Takahashi et al. 1997)."



Takahashi N. Oral microbiome metabolism: from "who are they?" to "what are they doing?" *Journal of Dental Research*. 2015 Dec;94(12):1628-37.

Takahashi N, Saito K, Schachtele CF, Yamada T. Acid tolerance and acid-neutralizing activity of *Porphyromonas gingivalis*, *Prevotella intermedia* and *Fusobacterium nucleatum*. *Oral Microbiology and Immunology*. 1997 Dec;12(6):323-8.



Researchers, including Stanton Glantz, PhD, who is widely known for his work using science to dismantle the lies of the tobacco industry, are now examining the sugar industry's relationship to dental research on caries. In 2015, Glantz and his fellow researchers wrote of the sugar industry: "They therefore adopted a strategy to deflect attention to public health interventions that would reduce the harms of sugar consumption rather than restricting intake. Industry tactics included the following: funding research in

collaboration with allied food industries on enzymes to break up dental plaque and a vaccine against tooth decay with questionable potential for widespread application...”

Source: Kearns CE, Glantz SA, Schmidt LA. Sugar industry influence on the scientific agenda of the National Institute of Dental Research’s 1971 National Caries Program: a historical analysis of internal documents. *PLoS Med.* 2015 Mar 10;12(3):e1001798.



These same researchers also found evidence suggesting that the sugar industry “sponsored a research program in the 1960s and 1970s that successfully cast doubt about the hazards of sucrose while promoting fat as the dietary culprit in CHD [coronary heart disease].”

Source of quote: Kearns CE, Schmidt LA, Glantz SA. Sugar industry and coronary heart disease research: a historical analysis of internal industry documents. *JAMA Internal Medicine.* 2016 Nov 1;176(11):1680-5.

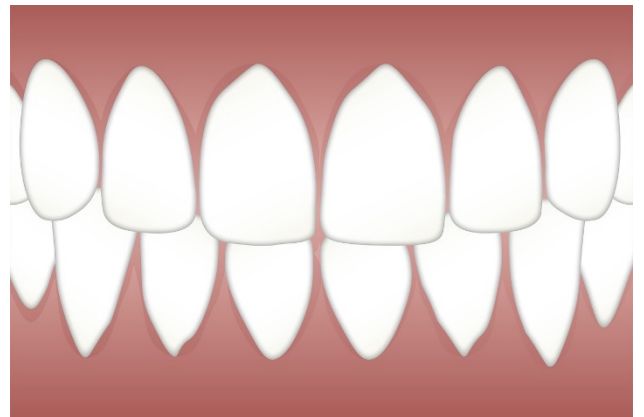
The photo on this screen shows pollution from sugar mill smoke in Hawaii and was taken by Forest and Kim Starr of Starr Environmental.

Source of photo: Forest and Kim Starr. *Saccharum officinarum* (Ko, sugarcane); Sugar mill smoke stacks last harvest season at Puunene, Maui, Hawaii. March 24, 2016; #160324-0638; starr-160324-0638-Saccharum_officinarum-sugar_mill_smoke_stacks_last_harvest_season-Puunene-Maui.

Periodontal Disease

Good general health and good general nutrition, including smoking cessation, are all important aspects of fighting periodontal disease. Specific nutrients that tend to be lacking in diseased tissue include:

- Vitamin C
- Vitamin D
- Coenzyme Q-10
- Folic acid
- Mineral cofactors, trace elements
- Acid-base balance, which controls proper mineral deposition
- Nitric oxide precursors, which also influence proper mineral deposition



Amalgam Replacement

Many practitioners recommend nutritional preparation prior to amalgam replacement. This becomes even more important for patients fighting illnesses, although some patients are sick because mercury toxicity prevents them from achieving metabolic homeostasis.

Goals for pre-replacement preparation:

- Improve gut health by managing food intolerance and introducing intestinal cleansers such as charcoal, clay, or specific mercury scavengers to begin to bring down intestinal inflammation
- Up-regulate detox systems such as introducing vitamin C and glutathione



Other Dental Procedures

Nutritional preparation is especially important before performing dental surgery procedures such as extractions, implant placement and cavitation or NICO surgery. Attention to nutrients that are important for generating new bone are essential and so are lifestyle changes and supplements that improve and maximize immune system function to help prevent and eliminate infection.

CONCLUSION

Congratulations! You have finished clinical nutrition for dentistry. If you would like to learn more about these subjects, you will find more information and also a link to sources for further nutrition education. There are also several websites and organizations to support your goals in advancing your ability to provide good nutritional counseling for your patients.

Screen to the right:

Use the “References and Resources” and “Selected Literature” files on the links under this video to access additional literature and to learn more.



POSTFACE TO IAOMT'S CLINICAL NUTRITION ONLINE LEARNING VIDEO ACTIVITY

Text on screen:

You have finished viewing the video component of this activity. If you are participating in this activity as part of an IAOMT course, you must successfully complete a quiz to obtain credit. Access to the quiz is provided in the “Activity Content” below this video, as well as on the menu to the left. Additionally, the “Materials” tab above this video contains links to references and resources cited in this activity, scientific literature related to the topics presented, and a script for this entire video. Thank you for learning with the IAOMT, as we work together to achieve safer dentistry and a healthier world.