THE GLOBAL NATURE OF PERIODONTAL DISEASE: FACT*OID*

THE ANTIQUITY OF DENTAL DISEASE–SEEN THROUGH SKULLS, JAWBONES & TEETH

A 300,000 year old Pliocene jaw with 3-teeth from a Java hominoid skull showed that dental disease was mostly due to excessive wear & attrition from a gritty diet (Osborn 1925). Skulls from the Neanderthal caves of *La Chappell aux Saints* circa 30,000 years ago were often found in caves & caverns—their jaws often showed the loss of teeth & alveolar bone, probably the result of trauma or pyorrhea—now called chronic periodontal disease (Boule 1921). Cro-Magnon humans whose jaws showed the same destructive attrition periodontal disease & bone loss replaced Neanderthal hominoids circa 25,000 years ago. Skulls discovered in Australian & Tasmanian countries had caries with periodontal disease & often-extreme loss of alveolar bone (Moodie 1930). Skulls of ancient Egyptian nobility show increased dental caries throughout all periods of Egyptian history along with tooth loss & alveolar bone abscesses, most likely due to their poor oral hygiene that eventually led to chronic supportive periodontitis (Ruffer 1921, Lufkin 1938).

Skulls from thousands of generations of ancient hominoids to our recent Homo-sapiens ancestors show that trauma & extreme wear was a universal problem with all ancient humans & some non-human primates. It has been speculated that dental disease was most likely a combination of powerful muscular chewing of their coarse & gritty diets (Hedlicka 1914). Thousands of ancient skulls with confirming X-ray analysis show that severe tooth & bone loss was a common occurrence, in which periodontal disease was known to have existed in every race of prehistoric man. However, their incidence of caries was much less than what humans are experiencing in today's worldwide populations (Wells 1931). Why has caries & periodontal disease become so prevalent since the 1100's? Is there one singular agent that has altered the general health of modern man? Read on for the obvious answer.

THE MODERNITY OF DENTAL DISEASE – IDENTIFICATION OF THE CULPRIT

Sugar was first introduced in England circa 1100-AD where its price in London was equal to about $100.^{00}$ per kg at today's prices—it was called "white gold." Sugar became part of the Caribbean Islands sugar-rum-slave trade in the 1300's with the first sugar refinery being established by the Dutch in Antwerp Belgium, the refined white sugar was then shipped to Germany, France, England & throughout the commercial world markets of that era. Sugar had not only become a daily commodity of most humans, it became a strategic political weapon, from which certain countries gained great financial wealth.

The impact of sugar consumption in the US—almost as a drug addiction—had became obvious by the late 1600's—as most all worldwide societies had created a high demand for refined sugar. It was routinely used in tea, coffee, chocolates, jams, candies & other sweets without any thought or concern of personal health issues. Sugar had shifted from a luxury to take its place as a daily necessity—having become commonly available throughout all levels of most social societies by 1700.

The following tables provide some serious food for thought

In 1700, the typical US person consumed about 4-lbs of sugar / year
In 1800, the typical US person consumed about 18-lbs of sugar / year
In 1900, the typical US person consumed about 90-lbs of sugar / year
In 2009, over 50% of Americans consumed about 180-lbs of sugar / year

In 1890, the obesity of US males aged 50 was about 3.4%
In 1975, the obesity of the US population was about 15%
In 2009, the obesity of the US population was about 45%
In 1890 there were only about 3 reported diabetes cases / 100,000
Today, there are over 9,000 US reported diabetes cases / 100,000

Besides dental & periodontal diseases, other worldwide health issues such as obesity, diabetes, heart, kidney & liver diseases had become evident with the introduction of refined sugar into human diets.

In 1674, Thomas Willis of England reported to the Royal College of Physicians on

the 1st case of *diabetes mellitus* in the British *Pharmaceutical Rationalis* document. Deaths from tuberculosis (TB) had dramatically increased in England & other refined sugar consuming countries. In 1812 the death rates from TB had risen to 700 of 100,000 people. By 1892, America surpassed all other countries in worldwide sugar consumption & by 1920 the US sugar consumption had doubled again. In the 17th century, America had finally developed its "sweet tooth" & dentistry had finally emerged from tooth extraction to begin its efforts to solve the worldwide role of tooth restoration.

In 1910, refined sugar was introduced into the Japanese food culture, where it acquired an abundant economical source of sugar from the Island of Taiwan. Shortly afterwards, the incidence of TB increased dramatically throughout the Japanese society. Dr Robert Boesler—a NJ dentist—stated that sugar had brought about an entirely new disease to the human society. The *Coca Cola* soft drink company in Ashtabula, Ohio was the 1st cola plant to add ~20-grams of refined sugar to each bottle of "Coke"—in addition they also added the low pH agent of H_3PO_4 to keep it in solution —*Imagine what impact sugar & acid has on the oral health—caries, bacterial flora, calculus formation, periodontal disease & ultimately tooth loss*! In 1923, Dr. Banting of Toronto received the Nobel Prize for extracting the insulin hormone from the pancreas of dogs, which he found was able to control "sugar" in people with diabetes. In 1924, Dr. Seale Harris from the Univ of Alabama discovered that refined sugar addiction would cause hypertension—sadly his work was suppressed by the strong lobbying interests in the medical profession who had commercial ties & interests with the BIG sugar companies & the medical-lobbying consortium rapidly came down on Dr. Harris to suppress his research observations & data. As scientific truth always comes out—the American Medical Association finally awarded a gold medal to Dr. Harris in 1950 for his research on refined sugar, which he had published several decades earlier.

SUGAR FOR OUR MODERN LIVING

With the introduction of sugar into the human diet dental caries & periodontal disease became the most common dental diseases of humans in the US as well as affluent countries throughout Europe & Asia.

On today's worldwide scene, 75% to 90% of all school children & nearly 100% of all adults have at least 1-tooth with dental caries. Whereas tooth loss resulting from the transition from mild gingivitis to severe periodontitis is the main cause of oral diseases leaving 30% of people aged 65 to 74 with no natural teeth.

Periodontal Disease (PD) is a general term amongst clinicians that refers to a spectrum of oral diseases of gingival & alveolar tissues surrounding & supporting the teeth. PD is regularly divided into: **Gingivitis** & **Periodontitis**.

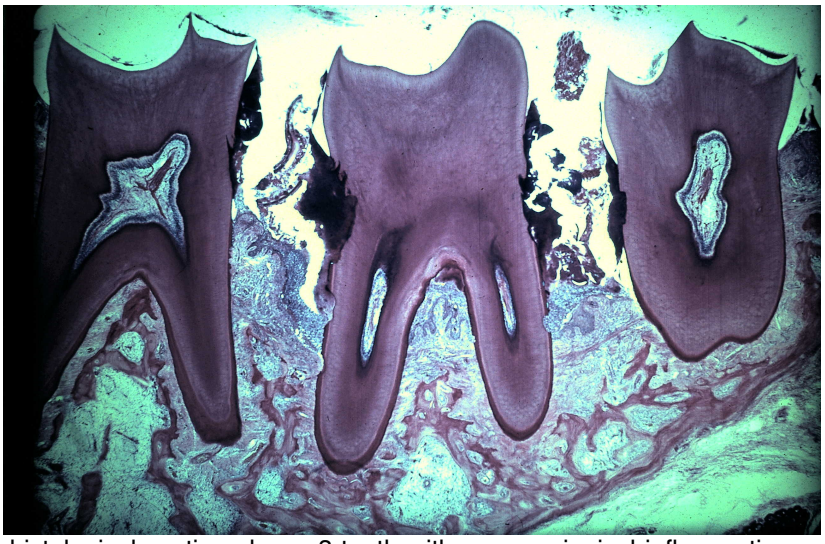
Gingivitis was an acute inflammatory disease & common in many children during the 1960's. By 15-years of age, 4 of 5-humans generally have some degree of acute gingivitis throughout their dentitions & in diverse populations who have access to foods with sugar, the more chronic form of periodontitis is already present in young to aged adults. However, the presence of gingivitis in early life does not necessarily lead to periodontitis, but without exception, the more simple form of PD that destroys adult dentitions most often starts as acute gingivitis. Of the many millions of people in the US today—at least 90% of people over 65-years have some periodontal disorder in at least 1-permanent tooth (Scherp 1964).

With the exception of tooth trauma or failed restorations, tooth decay is responsible for causing most tooth extractions up to the age of 35-years, but after that, PD became the major cause of tooth loss (Allen 1944). Approximately 60% to 70% of all teeth lost in the US after 40-years of age were due to PD (Goldman 1955) & in India tooth loss exceeded 80% (Russell 1967).

Gingivitis that occurs in the early life of an individual does not necessarily develop into periodontitis, but with infrequent exceptions, the periodontitis that destroys dentitions generally starts as gingivitis. In addition, studies show that smoking is a major risk factor for adult PD as the cause of half of all periodontitis cases in young adults—but decreases when smokers quit the habit.

Periodontal disease is a worldwide condition of the human tissues that surround the tissues around the neck of the teeth & their supporting alveolar tissues. Published literature supports the view that poor oral hygiene permits the rapid formation of a bacterial biofilm & plaque formation due to a complex interaction of various oral conditions of certain indigenous oral microörganisms that may normally reside on the oral environment. These microörganisms rapidly multiply & accumulate on smooth tooth surfaces, which may then proceed to a progression of PD disease states that often result in tooth pulp infections as well as alveolar bone loss & more importantly often lead to systemic health problems. PD is perhaps the most widespread disease of all mankind; the greatest burden to achieve proper oral health is on those socially disadvantaged individuals who have little financial resources to gain proper preventive & oral health care treatment.

ADULT MARMOSET MANDIBLE SHOWING SEVERE PD DISEASE - DR. SOL BERNICK



The histological section shows 3-teeth with severe gingival inflammation as well as alveolar bone infection as well as loss of bone height. The enamel was demineralized for tissue processing, showing the areas of dentine inflammation & reparative dentine deposition in the pulp—opposite those infected dentine tubules resulting from the bacteria within the calculus (black stained tissues) of each tooth. The oral gingiva shows a complete loss of all free & attached epithelium at the cervical neck of each tooth. Severe gingival inflammation is seen throughout the free & attachment tissues that have extended apically—resulting in loss of all normal PDL morphology & areas of cementum with areas of osteoclastic resorption lacuna. There is complete loss of normal width of what would be considered as normal PDL. In addition, the outer alveolar bone surface of the 3-tooth sockets has been completely destroyed due to inflammation by mobilized osteclasts, which caused the bone loss. Gingival fiber groups (crestal, oblique, interradicular & apical) are lost—resulting in teeth that are mobile & most likely prone to simply fall out of their respective sockets. The outer lamina dura between the teeth is lost, with large spaces in the bone showing many chronic inflammatory cells.

As of this writing, the 4-most non-communicable diseases for humans are diabetes, cancer, cardiovascular diseases & chronic obstructive pulmonary disease—all sharing risk factors that are associated with sugar & Periodontal Disease causing tooth infections.

Etiology is the science or the **doctrine of cause**, in which researchers seek to discover the factors that contribute to disease(s). Professor Orban (1963) opined that "the dentist must keep up with and be capable of critically evaluating professional advances and must also expand those areas of knowledge in which schooling may have been incomplete."

Factors that influence the health of the periodontium are generally classified into *local extrinsic* & *systemic intrinsic* origin. Extrinsic factors are generally those issues that are simply due to patient neglect or improper hygiene, which is responsible for a large share of gingivitis & periodontitis pathology. Instigating factors such as formation of material alba—the sticky white biofilm of bacteria, calculus & remaining food debris, which collects along the gingival-tooth margin & may invade the gingival sulci to irritate the epithelial attachment collar around the neck of the tooth, which if left untreated will begin the following destructive changes of gingivitis. Bacteria & their toxins as well as cell wall components become irritational factors that upset the normal oral microörganism environment & begin the acute pathological process. A human diet that consists of soft & sticky foods such as candy bars will easily collect on tooth surfaces as well as between the teeth & gingival epithelium & can become sites for microörganism biofilm accumulation. While intrinsic factors generally contribute to the onset of periodontal disease, it is difficult to evaluate the exact role of local factors as specific causative factors that begin the onset of periodontal disease—but for sure—the combination of several of the above mentioned conditions **definitely** play a role in the beginnings of causal inflammatory factors that lead to periodontal disease & chronic periodontitis often lead to extraction if left untreated. The main answer is PREVENTION by providing proper information of diet & oral habits e.g. brushing & flossing while individuals are young so they may learn of the benefits of oral hygiene & diet awareness.

Intrinsic factors may be obvious endocrine conditions such as puberty, pregnancy, metabolic post-menopause or measurable diseases such as diabetes, hyperkeratosis, cyclic neutropenia or hypophosphatasia that may be evaluated by various biochemical

blood or hormone tests. Drugs like Dilantin, or hematological agents, allergy medications & heavy metal compilations may control these intrinsic factors.

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