

Wednesday, April 1, 2009

Reversing Tooth Decay

In the last post, I discussed the research of Drs. Edward and May Mellanby on the nutritional factors affecting tooth formation. Nutrition has a profound effect on tooth structure, and well-formed teeth are inherently resistant to decay. But is there anything you can do if your teeth are already formed?

Teeth are able to heal themselves. That's how traditional cultures such as the Inuit can wear their teeth down to the pulp due to chewing leather and sand-covered dried fish, yet still have an exceptionally low rate of tooth decay. It's also how the African Wakamba tribe can file their front teeth into sharp points without causing decay. Both cultures lost their resistance to tooth decay after adopting nutrient-poor Western foods such as white flour and sugar.

Teeth are made of four layers. Enamel is the hardest, most mineralized outer shell. Dentin is another protective mineralized layer that's below the enamel. Below the dentin is the pulp, which contains blood vessels and nerves. The roots are made of cementum, another mineralized tissue.

When enamel is poorly formed and the diet isn't adequate, enamel dissolves and decay sets in. Tooth decay is an opportunistic infection that takes advantage of poorly built or maintained teeth. If the diet remains inadequate, the tooth has to be filled or removed, or the person risks more serious complications.

Fortunately, a decaying or broken tooth has the ability to heal itself. Pulp contains cells called odontoblasts, which form new dentin if the diet is good. Here's what Dr. Edward Mellanby had to say about his wife's research on the subject. This is taken from *Nutrition and Disease*:

Since the days of John Hunter it has been known that when the enamel and dentine are injured by attrition or caries, teeth do not remain passive but respond to the injury by producing a reaction of the odontoblasts in the dental pulp in an area generally corresponding to the damaged tissue and resulting in a laying down of what is known as secondary dentine. In 1922 M. Mellanby proceeded to investigate this phenomenon under varying nutritional conditions and found that she could control the secondary dentine laid down in the teeth of animals as a reaction to attrition both in quality and quantity, independently of the original structure of the tooth. Thus, when a diet of high calcifying qualities, i.e., one rich in vitamin D, calcium and phosphorus was given to the dogs during the period of attrition, the new secondary dentine laid down was abundant and well formed whether the original structure of the teeth was good or bad. On the other hand, a diet rich in cereals and poor in vitamin D resulted in the production of secondary dentine either small in amount or poorly calcified, and this happened even if the primary dentine was well formed.

Thus, in dogs, the factors that affect tooth healing are the same factors that affect tooth development:

The mineral content of the diet, particularly calcium and phosphorus

The fat-soluble vitamin content of the diet, chiefly vitamin D

The availability of minerals for absorption, determined largely by the diet's phytic acid content (prevents mineral absorption)

What about humans? Drs. Mellanby set out to see if they could use their dietary principles to cure tooth decay that was already established. They divided 62 children with cavities into three different diet groups for 6 months. Group 1 ate their normal diet plus oatmeal (rich in phytic acid). Group 2 ate their normal diet plus vitamin D. Group 3 ate a grain-free diet and took vitamin D.

In group 1, oatmeal prevented healing and encouraged new cavities, presumably due to its ability to prevent mineral absorption. In group 2, simply adding vitamin D to the diet caused most cavities to heal and fewer to form. The most striking effect was in group 3, the group eating a grain-free diet plus vitamin D, in which nearly all cavities healed and very few new cavities developed. Grains are the main source of phytic acid in the modern diet, although we can't rule out the possibility that grains were promoting tooth decay through another mechanism as well.

Dr. Mellanby was quick to point out that diet 3 was not low in carbohydrate or even sugar: "Although [diet 3] contained no bread, porridge or other cereals, it included a moderate amount of carbohydrates, for plenty of milk, jam, sugar, potatoes and vegetables were eaten by this group of children." This study was published in the *British Medical Journal* (1924. 2:354) and the *British Dental Journal*. Here's Dr. Edward Mellanby again: The hardening of carious areas that takes place in the teeth of children fed on diets of high calcifying value indicates the arrest of the active process and may result in "healing" of the infected area. As might be surmised, this phenomenon is accompanied by a laying down of a thick barrier of well-formed secondary denture... Summing up these results it will be clear that the clinical deductions made on the basis of the animal experiments have been justified, and that it is now known how to diminish the spread of caries and even to stop the active carious process in many affected teeth. These data were first published in 1924. Why has such a major medical finding, published in high-impact peer-reviewed journals, faded into obscurity?

Our beloved Dr. Weston Price also had success curing tooth decay using a similar diet. He fed underprivileged children one very nutritious meal a day and monitored their dental health. From *Nutrition and Physical Degeneration* (p. 290):

About four ounces of tomato juice or orange juice and a teaspoonful of a mixture of equal parts of a very high vitamin natural cod liver oil and an especially high vitamin butter was given at the beginning of the meal. They then received a bowl containing approximately a pint of a very rich vegetable and meat stew, made largely from bone marrow and fine cuts of tender meat: the meat was usually broiled separately to retain its juice and then chopped very fine and added to the bone marrow meat soup which always contained finely chopped vegetables and plenty of very yellow carrots; for the next course they had cooked fruit, with very little sweetening, and rolls made from freshly ground whole wheat, which were spread with the high-vitamin butter. The wheat for the rolls was ground fresh every day in a motor driven coffee mill. Each child was also given two glasses of fresh whole milk. The menu was varied from day to day by substituting for the meat stew, fish chowder or organs of animals.

Dr. Price provides before and after X-rays showing re-calcification of cavity-ridden teeth on this program. His intervention was not exactly the same as Drs. Mellanby, but it was similar in many ways. Both diets were high in minerals, rich in fat-soluble vitamins (including D), and low in phytic acid.

Price's diet was not grain-free, but used rolls made from freshly ground whole wheat. Freshly ground whole wheat has a high phytase (the enzyme that degrades phytic acid) activity, thus in conjunction with the long yeast rises common in Price's time, it would have broken down nearly all of its own phytic acid. This would have made it a source of minerals rather than a sink for them. He also used high-vitamin pastured butter in conjunction with cod liver oil. We now know that the vitamin K2 in pastured butter is important for bone and tooth development and maintenance. This was something that Dr. Mellanby did not understand at the time, but modern science has corroborated Price's finding that K2 is synergistic with vitamin D in promoting skeletal and dental health.

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If I were to design the ultimate dietary program to heal cavities that incorporates the successes of both doctors, it would look something like this:

Rich in animal foods such as meat, organs, fish, bone broths, full-fat pastured dairy (if tolerated) and eggs.

Fermented grains only; no unfermented grains such as oatmeal, breakfast cereal, crackers, etc. No breads except sourdough because they typically aren't made from fresh flour.

No nuts; beans in moderation, only if they're soaked overnight or longer in warm water (due to the phytic acid).

Starchy vegetables such as potatoes and sweet potatoes.

Moderate quantities of fruit, but no refined sweets.

Moderate quantities of well-cooked vegetables.

Sunlight, high-vitamin cod liver oil or vitamin D3 supplements.

Generous amounts of pastured butter.

No industrially processed food.

Come to think of it, I think that diet would be a good prescription for most nutrition-related disorders!

Posted by Stephan at 10:20 PM

Labels: dental health, diet, disease, fat-soluble vitamins, minerals

24 comments:

Martin said...

Once I changed my diet to one close to what is listed in this entry, and added a vitamin D3 supplement, my dental health greatly improved. No more cavities, and beyond that, no more rapid build-up of dental plaque. To prevent gum problems, I used to have to get my teeth cleaned four times a year, now, once a year is enough, and it seems to me, even that might not be necessary. The change is very welcome, and I'm glad to see a scientific explanation for it. I do have one question, though. Why do you say to eat no nuts? Phytic acid? Thanks for the work you put in on this blog.

April 2, 2009 4:23 AM

Gyan said...

Perhaps there exists differences in the phytase activity among various human populations?

People whose ancestors have been eating grains for the longest period (upto 10000 years) may be expected to have more phytase activity than people whose ancestors did not eat grains.

April 2, 2009 4:24 AM

Mark said...

So just to clarify:

-All kinds of nuts are to be avoided? What is the reasoning behind this?

-What is your opinion on Ezekial Bread?

-Also, white bread is bad because it still has phytic acid in it but probably less than a whole wheat bread? It's good to know that sourdough is ok.

Great stuff. Since adding fish oil and vitamin d3, I can feel myself starting to lean out despite eating higher carbs, some white bread and more calories overall.

April 2, 2009 4:44 AM

Andrew S said...

Sounds like a good prescription for hungry people!

April 2, 2009 5:30 AM

Joseph said...

I second the questions about nuts? Are they high in phytic acid? Is pastured butter only because, grain fed doesn't have the K2? I bought some pastured a couple days ago at Whole Foods much more expensive. It said it was only available for half the year. I wonder if I can find it year round or whether I'll need to buy it and freeze. If its the K2, can I just get that from hard cheese or does it have to be hard cheese from grass fed cows or any cheese from grass fed cows?

Great article, Stephan. Another one to save, thanks.

April 2, 2009 5:36 AM

Jenny Light said...

As phytic acid is bound into the hulls of seeds and nuts, I would think that foods such as blanched almonds, pepitas (hulled pumpkin seeds, and hulled sunflower seeds would be free of this substance?

April 2, 2009 5:40 AM

Health Expert said...

hey its a good post. thanks.

Please keep the below tips for good health..

- move more (get up and clean, organize, walk, exercise)
- drink lots of water (atleast 2 lts a day)
- sleep (well) at the same time every night
- eat more vegetables and fruit
- don't eat dessert after EVERY meal and make sure it's small

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Check <http://www.completehealthtips.com> for more health related tips and advise.

April 2, 2009 6:06 AM

Jenny Light said...

Stephan:

Have you also read this title by Dr Edward Mellanby:

A Story of Nutritional Research: The Effect of Some Dietary Factors on Bones and the Nervous System The Abraham Flexner Lectures Series Number Nine. Baltimore, MD: Williams & Wilkins, 1950

This one was published in the US vs UK and is a bit easier to find second hand (it is out of print).

April 2, 2009 6:30 AM

UofMWolverine81 said...

While my knowledge on the topic is somewhat limited, would sprouted nuts(or at least what many refer to as sprouting in this case) skirt any of the issues that had you make the "no nuts" suggestion in this instance? Or would any inherent issues still exist and such preparation wouldn't serve much purpose?

And as far as vegetable prep, I see a lot of back and forth between those touting cooked versus those saying raw is the way to go (and a few in between who advise a mix between the two) on account of anti-nutrients, bio-availability of nutrients, etc. Your recommendations in this post suggested cooking them well.....is there a specific preparation method you'd tend to favor in this case (outside of strictly personal preference)in order to sidestep as many negatives as possible while still preserving as many of the valuable components as possible?

Thank you for producing such an informative and fascinating blog. You certainly have a top flight production here.

April 2, 2009 6:34 AM

Dave said...

Our family has had similar experiences. In particular, my daughter had a poorly formed molar (she was a spring baby, before we started Vitamin D, hmmm). The tooth had quite a large crater in it. I put her on D3 and cod liver oil/butter oil. We finally got a dentist she'd cooperate with enough for X-rays. The result was exactly as described above: a thick layer of dentin had formed. The dentist was thoroughly puzzled, which I enjoyed immensely :-)

Different topic: I suspect the diet you describe would improve metabolic syndrome to some extent, but is not optimal for this case. There is certainly some evidence (e.g. in Daphne Miller's book "The Jungle Effect") that metabolic syndrome can be helped somewhat even when continuing to eat starchy vegetables. But the most rapid improvements are seen with drastic carbohydrate reduction across the board. That makes sense, as broken carbohydrate metabolism seems one of the core issues in metabolic syndrome. Volek and Feinman have an excellent paper discussing this:

<http://nutritionandmetabolism.com/content/2/1/31>

April 2, 2009 6:38 AM

Jeff said...

I was shocked by the graph. Another brilliant post. That is amazing.

I just had a dentist visit, first in almost 3 years. No cavities for the first time in a while. Your advice and a Paleo diet are the reason, in my mind.

I am so glad I found your blog a year ago. My only wish was I, and my parents, were aware of this years ago.

April 2, 2009 6:53 AM

arnoud said...

Stephan, thank you for this most informative and highly relevant post.

"These data were first published in 1924. Why has such a major medical finding, published in high-impact peer-reviewed journals, faded into obscurity?"

- Why do I feel like our doctors/dentists are living in the Middle Ages, even now. All they talk about is cleaning techniques and Fluoride. (Fluoride in fact does not seem to be relevant at all, and may be more damaging for overall health.)

About nuts - I enjoy almonds and macadamia. Should they be avoided altogether?

April 2, 2009 6:54 AM

Mee-Lise said...

What about coconut (meat)? Isn't that a staple of traditional diets as noted by Weston Price?

April 2, 2009 7:01 AM

Cheeseslave said...

Wonderful post! I love your blog.

I have also eliminated cavities since I changed the way I eat. I avoid all phytic acid (I try to only eat sprouted bread or naturally fermented sourdough) and I soak or sprout all my grains, legumes, nuts and seeds. I also take cod liver oil, and eat a nutrient-dense diet consisting of mostly meat and dairy.

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For those of you asking about nuts, you can eat nuts as long as they are soaked or sprouted. See Sally Fallon's book "Nourishing Traditions" to learn how to properly prepare nuts to reduce phytic acid.

April 2, 2009 7:42 AM

Jessica said...

This is a revelatory posting for me! I have bruxism which has gotten worse in recent years and I've tried everything to reduce it's affect on my teeth. While mouth guards and reduced caffeine have helped, I didn't know what to do, till now, about the damage already done. I have a new cavity every six months and am running out of non-effected teeth! Now I at least have a way to battle this. Thank you so much! I'm telling my whole family about this.

April 2, 2009 8:01 AM

Ed said...

Can you buy phytase?

It would be great if I could go to the supermarket and pickup a bottle of phytase, right next to the Beano.

Also, it must be noted in the graph that the largest change came from adding D3 supplement, not from reducing grains. Reducing grains had an incremental beneficial effect, but wasn't (apparently) responsible for the massive turnaround.

Critical thinkers might say "but all my milk today says it is supplemented with vitamin D3. Isn't that good enough? Why make any other changes?"

I think the problem with D3-supplemented milk is that it doesn't have enough. I seem to recall the recommendation being approximately 1000 IU of D3/day per 25 lbs of body weight. So at 150 lbs, I should get 6000 IU/day. (I get maybe 3 minutes of sun/day, on my hands and face only.) www.nutritiondata.com says that 1 cup of whole milk has 98 IU of D3. Clearly supplementation is required.

Does anyone have any salient comment on the 1000 IU D3/25 lb recommendation?

April 2, 2009 8:30 AM

n said...

Don't eat nuts? Quackery. Phytic acid is both anticancer and antioxidant - look up the research. As with everything, moderation is the key. A healthy diet that includes nuts will NOT leave you mineral deficient.

April 2, 2009 9:48 AM

Jenny Light said...

I recently eliminated grains from my diet (4 weeks ago), but until that time occasionally followed Sally Fallon's instructions for soaking grains in water and whey (especially oat porridge). This method was not always followed (laziness-lack of time) so I decided to eliminate them completely.

I just ran across a reference to a 1950 study by Mellanby (this could be in the 1950 book I referenced above) where he gives the phytic acid content of grains after soaking in acidified water (PH 4.5) at a SUSTAINED temperature of 45 degrees C /113 F.

Please read this online excerpt from the book "Rebuild from Depression" by Amanda Rose PHD:

<http://www.rebuild-from-depression.com/resources/book/Chapter13.pdf>

It doesn't sound like the method of heating water, pouring it on the oats (or any grain)adding whey and soaking this covered on the counter all night is doing much for the phytic acid content! Rather, perhaps we should be soaking our grains on the STOVE at low heat for a sustained period. Phytic acid was reduced to 0% in wheat and rye in just 2 hours time. Oats and corn still had 75% phytic acid content after 12 hours at 113 degrees (additonal procedures are needed for the oats and corn).

Anyone interested in phytic acid might want to definately check out this book excerpt. I have just secured copies of both of Mellanby's books, as I am most curious about the whole of his study.

April 2, 2009 9:49 AM

Harold Fowler said...

Wow what an amazing study. Very informative indeed!

RT

www.anonymity.us.tc

April 2, 2009 10:04 AM

StephenB said...

Stephan wrote: We now know that the vitamin K2 in pastured butter is important for bone and tooth development and maintenance.

Are there any references anywhere that hint about how much K2 is actually in high vitamin butter oil?

Ed wrote: Can you buy phytase?

Yes, you actually can. See Country Life, Maxi-Zyme Caps, 60 Veggie Caps

Country Life, Maxi-Zyme Caps, and for more money Enzymatic Therapy CompleteGest Mealtime Enzyme Formula

Stephen
April 2, 2009 11:01 AM
Anna said...

Ed,

The 1000iuD3/25 lbs of body weight guide line got our entire family's 25 (OH)D level up to optimal level (70-80 ng/mL) this year. Prior to that I tested after supplementing with lower amounts or trying to get more sun instead of supplements, with results in the lower 40s. Might back off on my son's D3 supplements in summer as he's young and more efficient at making his own D3, being outdoors a lot more, but not for myself and my husband. We need to supplement all year it seems, and we live in Southern California!

I've mentioned before that my 10 son has terribly lazy tooth brushing habits. Yet he hasn't a cavity yet, which I think is largely due to the amount of butter I put in and on his food, plus a minimal amount of sugary, starchy, or grain foods in the second half of his life. Some of friends have no dental enamel at all and are very cavity prone, some even have crowns already.

KerryGold butter (Irish) says on their website the that cows have access to pasture, though the label doesn't identify the butter as such. Ireland does have a lot of green grass... Trader Joe's sells Kerrygold butter at a much lower price than other stores, in salted and unsalted versions, 8 oz packages (easy to cut into a 4 oz stick if necessary). I noticed Costco had the salted KerryGold butter now in a three pack, but I prefer unsalted.

My local natural foods store also stocks Organic Pastures May-Sept Pasture Butter (for what seems like most of the year, so it must be produced and stored for later sale). Not knowing when it might not be available, I stocked up on some when it was on sale. I store it in the freezer in a freezer bag. But the KG at TJ is much less expensive than the OP Pasture butter.

Organic Pastures in California has raw grass fed butter that is great, but their out of state-mail-order options have been sharply curtailed by the nanny state opposition to raw dairy at the FDA, etc. I feel fortunate to still have raw dairy as an option in California. NYS and other states sometimes allow farms to sell their product direct from the farms. Farmers markets are options in some states. Try www.localharvest.org or eatwild.com as well as www.realmilk.com for more options in your neck of the woods.