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VIRTUAL LAF CONFERENCE

Proceedings of 66th Session
August 13, 2009 –

SUBJECT: *Possible Role for Acid-Base Balance*

I'm a retired nurse, 64 years old, and I love this website. Bear with me as I give a lengthy explanation of why I ask the question: Is there a role for acid-base balance in AF?

In 2001 I had a 2 hour self-terminating AF episode, then again in 2007 while undergoing cancer treatments, and then in 2008-09 I began to have episodes every couple weeks, self-terminating, always evenings and nights, 2-4 hours each. I also had constant uneasiness in my chest and ectopics most evenings.

The 2008-09 episodes occurred while I was taking Aromasin as followup for breast cancer. This drug inhibits aromatase, the enzyme that turns androgens into estrogens and the only source of estrogen for post-menopausal women. I stopped the Aromasin early March 2009 because of the AF and also eliminated alcohol and most of my calcium and vitamin D supplements. I experienced a gradual but dramatic improvement in symptoms and have had only two AF episodes in the last four months.

I noted that while on Aromasin my AM saliva pH averaged 7.2-7.4 and my evening saliva pH was often 7.6-8.0, and I pondered the possibility that excessive alkalinity might contribute to the AF. I learned that estrogen depletion can cause a mild metabolic alkalosis by causing increased renal reabsorption of calcium and bicarbonate. When my symptoms began to improve, my AM saliva decreased to an average of 6.4-6.6 and rest of the day it was 6.6-7.0.

I also noted that the AF always occurred when saliva pH was trending higher and at the onset or in the middle of urine pH rising. I also noted that my sense of "something building up" prior to an AF episode coincided with the upward trend of saliva pH as well as a flattened pattern of urine pH (not higher than 6.2) After an episode, saliva pH would moderate, urine pH would rise then fluctuate, and I would feel good. Then the urine pH would flatten again, saliva pH trend higher, and I would have another episode, and the pattern would repeat itself over and over. (Note: urine pH is balanced at around 6. When below 6, kidneys are excreting net acid, and when above 6-6.2 kidneys are excreting net bicarbonate.)

Further research confirmed for me that metabolic alkalosis does lower the threshold for arrhythmias. Alkalosis has a direct impact on excitability of tissues and if there are ectopic foci present it seems reasonable they could be excited by the alkalosis. It also makes sense that since the CNS and nerves in general are excited by alkalosis, the vagus nerve would be vulnerable. It is also true that extracellular pH directly affects intracellular pH and influences ionic exchanges.

The body can become more alkaline for a number of reasons, but usually the kidneys respond immediately to serum bicarbonate levels above about 24 meq/L by excreting bicarbonate, thus preventing chronic metabolic alkalosis. In order for metabolic alkalosis to continue, there must be some defect or stimulus for the kidneys to continue to reabsorb bicarbonate. The most commonly mentioned causes are excess aldosterone, potassium depletion, chloride depletion, and volume depletion - all issues considered at one point or another on your website as possibly contributing to AF. In my case, estrogen depletion contributed to a probable preexisting, underlying imbalance, but there are so many sensors and receptors involved in acid-base balance that it seems there could be any number of minor defects that

could contribute. Calcium Sensing Receptors, for instance, can malfunction and cause increased reabsorption of calcium, which in turn affects the kidney's responses to aldosterone and Antidiuretic Hormone (ADH).

Many of the common triggers for AF involve disruption of acid-base and fluid balance. Stress causes inappropriate levels of ADH, resulting in fluid retention, which in turn affects acidification of urine. Stress also affects aldosterone, which can contribute to maintenance of metabolic alkalosis. Alcohol also affects aldosterone and ADH. Exercise causes increased acidity in the body which leads to hyperventilation which then causes increased alkalinity. In one study, men began excreting alkaline urine (above 6) 30 minutes after intense exercise and continued for 2 hours. If there were some inhibition of the excretion of alkaline urine, the alkalinity would build up in the body. In all of these triggers, the body is called upon to compensate for shifts in acid-base and fluid balance, and if the body is ineffective at doing so, couldn't that precipitate AF?

Finally, the description of chronic alkalosis strikes me as similar to my pattern of urine and saliva pH. Maintenance of metabolic alkalosis occurs when the kidneys continue to reabsorb bicarbonate rather than excreting it. At a certain point in the maintenance, the bicarbonate rises to a level beyond the capacity of the kidneys to reabsorb, and the bicarbonate is excreted. This is called "disequilibrium." The excretion of bicarbonate continues until the alkalosis goes back into maintenance mode, until the next time the bicarbonate is beyond the capacity of the kidneys to reabsorb, and the pattern is repeated over and over. I think the AF could occur during the "disequilibrium" phase. Please comment on my theory!

Lynn

Welcome.

Wow! Interesting theory.....how do we avoid the disequilibrium phase?

My diet tends to be on the alkaline side because I eat many vegetables and fruits....but I also eat lots of protein.

Here is my take on afib: One of the symptoms of iron overload is afib....but this is overlooked by most people including medical personnel.

I have tried to share a lot on the subject because I realize how it can contribute to disease. I have one gene for Hemochromatosis.....I am not supposed to have symptoms, but I do....malaise, fatigue, depression and wanting to sleep all the time. Apparently, the penetrance is high, in my case.

So do you at your annual physical get a CBC, Serum Iron, TIBC/UIBC, Serum Ferritin and Serum Transferrin Saturation Percentage done while fasting?

One in seven Americans has one gene for Hemochromatosis and one in two hundred has two Hfe genes. Someone with 2 Hfe genes may live their entire life and never have any symptoms while someone with 1 Hfe gene may have symptoms. Yet, in both cases the tendency to load iron may suddenly appear and cause much havoc.

We do not need to do a genetic test....we can rule out iron overload if only we would test for it. Iron overload contributes to the severity of all the major diseases including age related macular degeneration and breast cancer.....

Maintenance of Serum Ferritin between 25 and 75 is advised and for the TS% maintain it at around 25 to 35%.....A TS% of above 45% indicates the person is storing iron in all the major organs. Cirrhosis, Diabetes, Cancer, Arthritis and Alzheimer's may ensue.

Isabelle

My doctor is a holistic MD and he does check serum ferritin annually. My last serum ferritin was 88. As for CBC, having had cancer, I get checked every few months and as of June it was normal.

Have you ever checked your saliva or urine pH?

Lynn

Lynn, I also spent some time doing the ph urine strips daily and concur that when the strip was too acidic I just didn't feel well. I now try to eat a balance between the two and avoid too many acidic type foods.

I think I am pretty balanced now and haven't done any strips in awhile. I also haven't had afib in 7 months. Of course I don't give all the credit to that because I also do a lot of other things to avoid afib. However, I do believe this is another piece of the overall puzzle and believe that the balance of alkaline and acidic is good for your overall health and may actually be a clue to avoiding afib. Again, this is a lot of consistent work to get the full picture, Lynn can probably confirm that.

Thanks for sharing this thought provoking information with us.

Sharon

Lynn,

This is a very interesting theory. My guess is that it is part of the puzzle. I know first hand how stress changes the chemistry of the body.

I'm wondering if the success of magnesium has something to do with the acid balance.

I'm also wondering if the increased urine output during afib is explained by your theory.

Keep up the great research.

Debbie

Hi Lynn

Thank you for this post!

I also started having afib after breast cancer treatments. I had a 2nd ablation in Aug. 2005 followed by a hysterectomy. My heart has stayed pretty calm until this past January, but I have been careful what I eat and I take my supplements and Verapamil and Toprol. Starting in January, I have had five, 2 to 5 hour episodes, including one this morning! I am bummed. They always start in bed when I am laying down. I am getting very frustrated and now have decided to see a new EP. The last one spent the first part of my appt., that he was late for, lecturing me on taking Nattokinase. So, I'm not going back to him!

When I read your post, I did one of my PH-Strips and it turned dark blue. 7.5 on my scale and it is a urine test. I guess it isn't reliable right now because I took a bunch of supplements and ate after I went into afib, hoping to convert. I also took an Epsom Salt bath and an old lorazepam from the afib days. My episode lasted from 4:30am to 8:50am. In reading your post, are you saying that it is better for us to have our test result read about 6.5 to prevent afib? Also, you mentioned that you stopped taking vitamin D supplements. I started taking them about 2 months before the longer afib episode in January. I thought it was just because I was grieving for the loss of my dog and had cried a lot! But, could vitamin D cause afib? My Internist put me on a large dose prescription form of it but it really bothered my heart. My Pharmacist told me I was taking too much. So I stopped the prescription and started taking 1000-2000IU of an over the counter form of D3. What do you do to balance your pH?

Thanks a lot for this post. It came at a good time for me! I didn't start the morning out too well!

Christy

I do think the diuresis that accompanies AF episodes has to do with the acid-base/fluid balance issues I have been researching - ANP may be the direct cause of the diuresis, but the diuresis after an AF episode is always an alkaline

urine for me, which suggests the diuresis clears out the buildup of alkalinity in the body, at least that is how I see it right now. This is so complex but it just seems there has to be something to it. I appreciate any further ideas.

Christy - urine pH is always reliable despite what you have just eaten, unlike saliva pH which should be checked before eating and supplements or two hours after. Your urine pH being 7.5 suggests to me that following the AF episode you just had you are excreting alkaline urine, which means you are clearing out what might have been an alkaline buildup in the body. As for the vitamin D - it is definitely a good cancer fighter and you should keep your serum D3 level high to help your body avoid a recurrence, but it also has a role in acid-base balance and can add to alkaline buildup in the body, so it's a fine balance. My doctor checks my serum D3 from time to time and I do get sunshine, but for right now I am only taking 400 iu of vitamin D3. I was taking over 2000 iu. I think it was contributing to making me too alkaline.

AS for ideal saliva and urine pH, there is a great deal of craziness on various websites and other sources about the importance of being alkaline -and certainly we don't want to be too acidic - that can cause disease, too, and make you feel bad. But I have figured out that too alkaline is not good, either. So I believe ideal saliva pH is around 6.4-6.8 first thing in the AM, upon arising, before drinking water or cleaning teeth - and the rest of the day in the range of 6.6-7.2. Occasionally a couple hours after a meal or just before you eat, when you are hungry, you will get a higher reading and that is OK too - the thought of eating activates salivation and when you salivate more, the pH of the saliva goes up. I have read that if you check both saliva pH and urine pH at the same time, take your saliva pH x 2 plus your urine pH x1 and it should come out to between 6 and 7. That has proved to be a reliable guide for me.

Ideal urine pH will average out to somewhere around 6 - with dips when you have eaten a more acidic diet and rises when you eat a more alkaline diet. Some experts say a vegan diet will produce more alkaline urine than that, but others say that isn't true since grains are acid producing. In general, whatever your diet, your body should be able to compensate, so I have come from a place of trying really hard to stay alkaline to a place of simply allowing my body to balance itself. If your urine pH is above about 6.2, you are excreting a net amount of alkaline. This may seem confusing because neutral pH is 7, but with the urine pH the balance point is 6 in terms of net excretion of acid or alkaline. For me, I have found that if I daily excrete some urine above 6.2 for a brief time, I don't have an AF episode, but if I flatten out my urine pH at around 6 for a number of days, my ectopics increase and I am more vulnerable to an episode. During those times, my saliva pH builds higher. When I have an episode, my urine excretes much higher pH - at times in the past it reached 8. But now when I have an episode, the urine pH tends to only reach about 6.8. Recently, my urine pH flattened for a few days and then I had a day when it peaked at 6.8 and I thought I had compensated without an episode but then the episode came during the night.

Christy - I am interested that your AF began after breast cancer - what kind of treatments? Do you take an aromatase inhibitor?

Lynn

Another note - Christy asked what I do to balance my pH. I have found that drinking a lot of water - enough to keep myself urinating frequently - helps my kidneys to excrete the alkaline buildup. Diet, of course, can affect pH, but I think the key here is the renal handling of acid-base balance. I also have found that including all the salt my body wants seems to help. I wonder if these two things - water and salt - signal the body not to secrete as much aldosterone, and aldosterone, I believe, can cause alkaline buildup by its effects on the kidneys. Also, when I see my saliva pH starting to trend higher, I eat more acidic foods like nuts and chicken in an attempt to increase acidity. That usually works short term, but stress is a big trigger for me and when I get stressed my saliva pH goes all over the place, up and down wildly, and I have not figured out how to handle that.

Higher potassium levels also signal the body to secrete more aldosterone. For that reason, I have stopped supplementing with potassium and depend on V8 type juice I buy at Trader Joe's. However, the potassium issue is very complicated and I certainly don't have the answer.

I think magnesium adds to the alkaline load, and at one point when I was on the Aromasin and my body was so very alkaline I did reduce it for a time, but I am adding it back slowly (I had been on more than 1500 mg but I now take only about 500 mg) and I certainly think it is important - calcium, however, is like poison to me in terms of AF.

Lynn

I'm still a little confused about the pH but I am going to reread both of your posts. I have frequent urination, does that contribute to pH balance and possible a trigger for afib?

I had mastectomy right breast, Adriamycin, Cytoxin and Methotrexate plus radiation treatments. After that, five years on Tamoxifen. I had my first strange heart problem a few months after treatment, but wasn't diagnosed with afib/flutter until a year later. If you want, we can talk or write about this off board, unless others are interested. My doctors insist the chemo had nothing to do with the afib, but nurses have told me otherwise, and my Integrative doctor told me otherwise. Also, going into chemo induced menopause may have contributed. They did a hysterectomy six months after the 2nd ablation because I kept bleeding whenever they gave me Coumadin. Since we didn't know if I would ever need Coumadin again, we decided on the hysterectomy. That, and the history of cancer. Now, the afib episodes are coming back so I don't know what to do. I don't want another 8 hour ablation. I only have one arm for needles and the surgeries have really done a number on my bladder and varicose veins. If I can get rid of these episodes on my own, I will be very happy! So, anyone who has any ideas, please share! I wonder how many who have had cancer treatment end up with afib? Between the chemo, the steroids and the radiation, I imagine there are lots of us out there.

thanks for your post!

Christy

correction to 8/14/09 8:54 - take your saliva pH x2 plus your urine pH x1 and divide by three - should be between 6 and 7.

Lynn

Lynn - thanks for your post. From a distant memory of a teleconference I heard a long time ago, I recall that saliva pH is a indicator of emotional state... anger, anxiety = acidity and urine pH is reflective to tissue status.

If you want to learn some of the science behing the acid/alkaline pH focus for health... these are good resources:

Understanding Acid-Base by Benjamin Abelow, MD

Alkalize or Die by Theodore A. Baroody M.A., D.C., N.D. Ph.D. Nutrition, Diplomate Acupuncture

Acid & Alkaline by Herman Aihara

BioBalance - Rudolph A Wiley, PhD

Cancer thrives in an acidic environment as do many other chronic disease conditions.

Be sure to have your adrenal function tested/evaluated as using too much sodium is going to compete for potassium and it's potassium that keeps your heart in normal sinus rhythm...along with an optimal intracellular magnesium base.

Jackie

Lynn and Christy, my Mom had post menopausal breast cancer about 10 years ago after taking hormone replacement therapy for several years - she is now 69 and was just diagnosed with afib several months ago. I believe that she has had minor palpitations over the years that she just ignored. We met a lady who works at Whole Foods Market who also had breast cancer several years ago and was just diagnosed with afib.

My Mom had the small lump removed and radiation - no chemo, and took the tamoxifen for less than a few months (after researching, we decided to use natural prevention). Wondering about the radiation and mammograms as well.

Sharon C.

Lynn:

A serum ferritin of 88 appears to be a bit high for someone recovering from breast cancer. Do you ever check your TS%?

Yes, I have checked my pH, I still have the strip in a roll.

Isabelle

Jackie - thanks for your response - I realize my theory goes against the popular science of acid-base balance, but I have spent the last six months researching this issue in depth, and I have come to a far different conclusion than I had believed for a long time - I had strived to be as alkaline as possible to avoid a cancer recurrence and was happy when all of my tests pointed to a highly alkaline body, but when I looked deeper, the popular theories about being so alkaline have some cracks in them. For one thing, popular science suggests that urine should be alkaline if you are maintaining proper alkalization of the body, yet the truth is that if your urine is consistently alkaline your body may actually be acidic! Also, if your urine is consistently alkaline, you are at risk for kidney stones. And yes, saliva pH can reflect emotional states, but it can also reflect general mineral reserves in the body as well as how activated your salivation is at a given time (the more salivation, the more alkaline it gets). Saliva pH is not a good monitor of overall body pH at a given time, but monitoring it carefully over an extended period can provide interesting trends. What prompted me to explore this issue further was the marked increase in saliva pH while I was on the aromatase inhibitor, which dramatically changed after going off the drug.

So I began to monitor my own saliva and urine pH in great detail, measuring urine pH at every urination and saliva pH at regular intervals. I carry pH paper in my pocket at all times! I recorded my intake of foods and supplements and how I felt. And I kept daily graphs, six days on each 8x11 page, which I taped together, giving me a running graphic picture of how my urine and saliva pH related to how I felt and what I ate. I did this for six months and am still doing it. I found the pattern I described earlier - flattened pH of urine and higher trending saliva pH for several days coincided with build up of ectopics, then an episode with alkaline urine diuresis, then I felt better, then a repeat of the buildup. This pattern was dramatic. There was no relationship between this pattern and my emotional state or diet, except that when I was under stress my saliva pH tended to be more erratic - but the trending higher prior to an AF episode did not reflect emotional state or diet.

Then I engaged in more research, learning more about the role of the three primary acid-base controls in the body - the buffer systems, the respiratory compensation, and the renal compensation. My conclusion is that at least for me, estrogen depletion led to a shift in renal handling of minerals and bicarbonate (specifically increased renal reabsorption of calcium and bicarbonate), leading to a mild metabolic alkalosis and causing the increase in AF episodes I experienced - leading me to ponder the possibility that renal handling of minerals and bicarbonate could contribute to AF in other people as well.

I totally agree that magnesium and potassium are crucial, but have you wondered why people with AF might need more of them? Could it be related to renal secretion, reabsorption, and excretion patterns? Could it be possible that for at least some people with AF, there are renal defects or stimuli that might cause acid-base or mineral imbalances that contribute to AF? That is the point I am trying to make. I have seen a few other hints from people that this could be true - one person with AF has high normal serum calcium, which I also had during the worst of my symptoms. A friend with AF has unusually high saliva pH. And several have noted alkaline urine diuresis during or following an Af episode. And there is no doubt that metabolic alkalosis lowers the threshold for arrhythmias - this is well documented.

I am very interested in your ideas about all this.

Lynn

Jackie
Thanks for the websites. I am going to check them out.

Isabelle
My last Ferritin test was done in 1996 and it was 129. Which I know is too high but I only have one arm for bloodwork

and it is pretty well shot from all the surgeries. So, how do I lower my Ferritin without having blood taken? My new Internist won't do extra bloodwork so she won't do this test for me so I don't know what it is now. Thanks for all your information. I do read it!

Sharon

I also wonder about the radiation treatments. There are so many of them and they are close to your heart. I guess we just do what we have to do to survive and I never thought to ask about atrial fibrillation! Probably the stress of cancer contributed as well as all the treatments and drugs. If stress can effect your pH, I guess just the thought of cancer can cause afib! Actually, I went to the doctor with my husband yesterday as his 2nd ear, and maybe that is what triggered the afib I had this morning!

Christy

If it is hormonal, what are we suppose to do? If you have estrogen based cancer, male or female, your doctor won't prescribe hormones. At least mine won't! Also, I have a book about breast cancer and hormones that has a paragraph about women who die from radiation-induced heart disease after having treatment for breast cancer. It doesn't go into any more details. I stopped reading these books once the heart issues started because I didn't want anything else to worry about and I couldn't undo what was done. It would be nice to know what is causing so many BC patients to develop afib, or for it to come to a head after treatments. If hormones are involved, what about men who go through Prostate cancer? Could that trigger afib for them?

Sorry, I had afib this morning and my mind is still unsettled! Excuse my rambling!

Christy

Christy - I just emailed you. Since I didn't have radiation, just mastectomy and chemo, it wasn't radiation in my case. What to do about the hormone thing is a really good question! I do know that men who undergo hormone treatment for prostate cancer do have increased risk for heart issues, but I don't know if specifically afib.

Lynn

I have recently discovered that taking a similar looking amount [about 1/2 teaspoonful] of grey celtic sea salt and potassium gluconate with my oatmeal and soy milk porridge plus teaspoonful of Manuka honey keeps my heart calm until lunchtime when I have my main meal.

I also take magnesium orotate in the morning and for the last couple of days sip a mug of warm water containing Natural Calm [dissolving magnesium citrate] through the day.

I'm not comfortable on a paleo plan and have gone back to eating more for my blood type A [genotype A1 warrior] as per www.dadamo.com

Sometimes I need more salt in the evening which usually comes from oatcakes.

I really must get some pH paper and test out Lynn's theory.

Joyce

Christy:

I am glad that you watch your Serum Ferritin and I am sorry you can't get tested for it at this time. I wish you well.

You must however try to get an annual Hemoglobin/Hematocrit and it would be great if you could get the other tests at the same time. Make sure you are fasting.....

Well without blood letting you can't really reduce your stores except by taking some aspirin (this is a slow process) daily. What you can do is reduce the amount of dietary iron that is absorbed by drinking or eating low fat dairy with your

meat or high heme meals....and drinking tea with meals.

Drink juices in between meals...eat fruit as a snack not at meals. Please do not take more than 200mg of vitamin C in pill form daily....because anything above that enhances absorption of dietary iron and will raise your SF...you may eat/get up to 500mg of vitamin C from fresh fruits and vegetables.

If you send me an email I can send you the Physicians Guide to Hemochromatosis.....There is a page at the end of the pamphlet full of hints.

If you cook pasta cook it in tea....Avoid foods that are fortified with iron above 4% (bakery bagels have 25% iron in them) and foods or liquids fortified with ascorbic acid/vitamin C.

I have hesitated to suggest all the above methods of reducing iron absorption without knowing your current hemoglobin level. You can get a hematocrit reading with a finger stick and pipette....Check your hematocrit often because that helps you to have good immunity....Your hematocrit level should be at about 42 but not above....(remember it is usually 3 times the hemoglobin and your hemoglobin should be slightly below 14).

Stay strong....and thank you for your interest and follow-up on iron issues.

Isabelle

Hi Lynn,

Do you have any of your pH data in graphical form? I'm sure Hans could turn it into a PDF for linking hear & ultimate inclusion with the PDF in the CR.

I'm thinking of urine & saliva pH on the same graph vs time with some notations as to when afib occurs & possibly diet or other changes noted that effect pH.

Thanks for your work!

George

George - I do have it in graphical form. It is on 8x11 pages taped together - in sections of about 5-6 pages at a time. To scan the entire thing would be too much, but I could scan sections that are pertinent, like I could take a section of 1-2 pages that shows the buildup and then the afib phase (maybe show one earlier one when my episodes were frequent and more severe, and one later one as they are less frequent and less severe), and I could take a section that shows what it looks like when I am more stable. I could scan it and then email it to you if you give me your email address. However, I am not terribly skilled at emailing files and I find it easier to email one file per email, so you might end up with a number of emails! If you want me to do this, let me know. If you would rather email me about it, my address is laplum@cox.net. If you need more info regarding how I felt during the various phases, I keep a journal and can go back and look up stuff. Thank you so much for your interest - I can't help but hope this information holds some clues for those of you who know so much more about afib.

Lynn

Lynn,

Also noticed that your pH paper had finer gradations than mine & in looking around came across this:
<http://answers.yahoo.com/question/index?qid=20071015120032AABqLQz>

Why do we use forceps to handle the pH paper?
What do forceps do to the pH paper that our fingers themselves can't?

Best Answer - Chosen by Voters

You are slightly acidic, your fingers when touching the PH paper would spoil the results of whatever you want to measure.

I'm sure this is right, but hadn't thought about it - I'll use tweezers from now on.

Also found these more accurate strips than mine:

<https://www.microessentiallab.com/ProductInfo/F01-SHTRG-055080-SRD.aspx>

Thanks!

George

Those are the same strips I use from microessentiallab - I buy them by the box and they are a little cheaper. I don't use tweezers; I just hold it on one end of the strip and moisten the other end.

Lynn

I just sent some pH graphs to Hans, and as I was working on getting them ready I identified another aspect of the pattern I described earlier - when my urine pH goes into the flattened pattern just prior to the afib episode, I gain a pound or two, which I lose after the afib episode with the rise in urine pH - the obvious explanation is fluid retention, which would coincide with the hypothesis that aldosterone and/or antidiuretic hormone is at work during the flattened part of the pattern. And when my urine pH is higher, I am more likely to have urinary urgency and frequency, suggesting diuresis.

Lynn

Graph 1 – Highest daily saliva and urine pH from March and early April. One can see the pattern of flattened urine pH accompanied by increased ectopics, then the rise in pH and an afib episode.

<http://www.afibbers.org/conference/afibpH1.pdf>

Graph 2 – “Close up” of 2 of the days on the first graph.

<http://www.afibbers.org/conference/afibpH2.pdf>

Graph 3 – Highest daily saliva and urine pH from late May to early June with another afib episode following a flattened urine pH pattern. One can see that the saliva pH values have moderated quite a bit from the March one, a result of my having been off the aromatase inhibitor longer. This afib episode was quite mild – only 1 hour and not as violent, which might correlate with the more moderate pH.

<http://www.afibbers.org/conference/afibpH3.pdf>

Graph 4 – Shows 2-3 weeks of highest saliva and urine pH when I am stable – one can see that the urine pH reflects minor rises each day with no flattening.

<http://www.afibbers.org/conference/afibpH4.pdf>

Graphs 5 and 6 – “Close ups” of some days on the “stable” chart.

<http://www.afibbers.org/conference/afibpH5.pdf>

<http://www.afibbers.org/conference/afibpH6.pdf>

Lynn

THE AFIB REPORT is published 10 times a year by:
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E-mail: editor@afibbers.org World Wide Web: <http://www.afibbers.org>

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