

THE AFIB REPORT

www.afibbers.org • Editor: Hans R. Larsen, MScChE

CONFERENCE ROOM Session 74

June 4, 2011 – October 15, 2012

Potassium level monitoring with Cardy meter

Several afibbers have now purchased the Horiba C-131 Cardy meter in order to monitor their potassium levels. The meter only requires a small sample of blood or saliva and is very accurate. There has been a great deal of discussion regarding the meter in the LAF Forum and in Conference Room session 72. This conference room session (#74) puts the relevant postings in one place.

Links (courtesy of Erling and GeorgeN)

Cardy potassium meter

<http://www.envcoglobal.com/catalog/product/water-quality-pocket-meters/cardy-potassium-ion-meter.html>

Cardy sodium meter

<http://www.envcoglobal.com/catalog/product/water-quality-pocket-meters/cardy-sodium-ion-meter.html>

Horiba Cardy sodium meter

<http://www.horiba.com/application/material-property-characterization/water-analysis/water-quality-electrochemistry-instrumentation/compact/details/c-122-compact-sodium-ion-meter-428/>

Cardy meter calibration video: http://www.youtube.com/watch?v=_S-roOpSTCO

Cardy meter potassium blood test video

<http://www.youtube.com/watch?v=jB3pJCFRiI8&feature=related>

Self-Testing in the Periodic Paralysis Using the Cardy Potassium Ion Meter

<http://www.hkpp.org/general/cardyKmeter.html>

Correlation of Saliva and Human Blood Serum Potassium Results

http://hkpp.org/general/saliva_serum_chart.html

Horiba Manual for Cardymeters

http://www.horiba.com/fileadmin/uploads/Scientific/Documents/WQ/C-122_131Literature.pdf

<http://www.horiba.com/application/material-property-characterization/water-analysis/water-quality-electrochemistry-instrumentation/compact/details/c-122-compact-sodium-ion-meter-428/>

For a handy calculator for converting saliva meter readings to serum potassium concentration in mmol/l (mEq/L) click here:

<http://hkpp.org/saliva-k-calculator>

Suppliers

<http://www.qasupplies.com/compotionmet.html>

<http://www.instrumart.com/products/32914/horiba-cardy-series-compact-ion-meters>

<http://www.envirosupply.net/cgi-bin/index.cgi?productId=357>

<http://www.amazon.com/Horiba-Cardy-Potassium-Meter-C-131/dp/B006012HS2>

<http://www.agriculturesolutions.com/Potassium-Meters/View-all-products.html>

I purchased the Horiba C-131 potassium and C122 sodium instruments. I was scheduled to have a basic metabolic blood test last week. I got up at 0600. At 0700 I obtained saliva readings of 5.3 mMol/L for potassium, and 200 ppm for sodium, from the Horiba instruments. (I've not been able to find a correlation table to convert saliva sodium ppm to sodium blood plasma mMol/L) The blood sample was taken at 0800. The results were 4.1 MEQ/L for potassium and 136 MEQ/L for sodium. At 0900 I obtained saliva readings of 4.5 mMol/L for potassium and 93 ppm for sodium from the Horiba instruments. Assuming the Horiba readings are meaningful, and the Horiba saliva potassium measurement changed linearly between 0700 and 0900; that would give a potassium value of 4.9 mMol/L from the Horiba, compared to 4.1 from the blood test.

Will Schuemann

Wil, the test is more accurate if you use blood instead of saliva, just use a diabetic lancing device. You then take the first reading you get when the measurement stabilizes, I wait about 8 seconds after the number stays the same. I noticed that it will continue to climb slowly but the initial level is the correct one. There are a couple of very informative videos on Youtube (Cardymeter) about how to calibrate and use the tester, it takes a few times to do it correctly. If you repeat the test and get close to the same result, that is most likely the correct reading. You could keep going back to the lab for tests to compare readings but that would defeat the purpose of why I bought the meter in the first place. I have noticed a direct correlation between the readings and adding more Potassium, or less Sodium to my diet. I have also noticed less ectopics now that I have increased my Potassium and decreased the salt. I was

going to purchase the Sodium meter, but as you said there is no conversion chart at this time that I have been able to locate, I am sure that a good biochemist could put one together or come up with the math formula in short order. I also thought that those people who have Periodic Paralysis Syndrome who initially used the Cardy meter because Potassium levels are very important to control episodes, would be interested in our latest Conference Room topic on the correlation between Sodium and Potassium, but their forums aren't quite as accessible as this one. I again thank GeorgeN for informing us about the Cardy meter.

TomC

Tom and Wil, I'm glad you two took my bait and purchased the Cardy meter(s). I concur with Tom that direct blood testing is preferred over saliva. From what I've read, saliva concentrations can have an additional variable of flow rate. This can cause sodium concentrations to change.

I have posted about the Cardy meter in Conference Room Session 72: Potassium/Sodium Ratio in Atrial Fibrillation (February 7 - February 28, 2011)
www.afibbers.org/conference/session72.pdf

My approach would be to a) test blood for potassium (and sodium if I had both meters), b) correlate with intake of both potassium and sodium, c) correlate with afib and/or ectopic count outcomes. I look forward to more reports!

GeorgeN

My experience with a diabetic lancing device is you don't need to lance the pad of your finger. Along the side of the finger works just fine. Also wonder if magnesium intake will have an effect on serum potassium, I suppose I should get a meter and find out.

I wonder if the Periodic Paralysis Syndrome people are aware of the need to have magnesium at a sufficient level for the potassium to be effective?

GeorgeN

It took 5 months for my ablation to kick in and no more afib, and after finally getting off the meds I felt good about my progress but I was still dealing with ectopics (occasional missed beats). I have been supplementing with the Mag., Potassium and Taurine and a few other vitamins and have been working out again to reduce blood pressure and post ablation heart rate. But right about the time the first threads were started in the latest conference room about the Sodium, Pot. connection I started to really look at my Sodium intake. To have total control I stopped all eating at restaurants and started preparing every meal myself. I scrutinized every label and started to see that you did not have to give up on your favorite foods, you just had to prepare them yourself with the reduced salt alternative, for example: there is regular canned corn with 250 mg. of Sodium and there is "natural" corn in a national brand for a few cents more with 15 mg. the taste was about the same, you have to understand that a lot of products have added salt for a longer shelf life and the general population is so salted up that it takes more Sodium to make it noticeable. When you reduce your salt for a period of time you will really notice the salt content of foods simply by taste, you will be much more sensitive to its flavor. There are low salt breads, tomato based products are loaded with salt, even your basic ones, however you can find low salt alternatives if you look at labels, initially this takes a lot of time standing around the aisles in a grocery store just staring at labels, you will be shocked at the amount of salt listed, going to

a store with a good selection is the key here. Then you have to learn how to cook in low salt mode. After awhile it really wasn't that hard when you know what products to buy and get used to the recipes. After a few weeks of this diet I noticed my missed beats reducing and now they are gone. I also bought a CardyMeter to test my own blood for Potassium and that has been a real help as well. I recently left the country for a week of vacation and had to eat restaurant food for a short time, I took extra Potassium to counteract the salt however I did notice a few missed beats and when I got home my Pot. reading was lower. It took a week or so to get back on my usual diet and the ectopics are gone again. I tested my blood levels for Pot., Sodium etc. when I stopped my post ablation meds. and they were all normal in the mid range of the scale but I was still having ectopics, that is why when you are prone to afib you have to test on the higher range of normal for Potassium and the lower range of Sodium to stay out of trouble.

This past Tuesday I went to my local hospital lab for routine blood tests following a physical exam, before I went I took a reading of my Potassium level using saliva, the reading was 860, using the conversion chart it translates to a 4.4 reading. The next day I was called by the lab and they proceeded to call off the various tests, the Potassium blood test was 4.4. I had not expected the number to be an exact match but that's what it was, not even off by a couple of tenths (which is what I would have expected). The meter is very accurate, you clean and calibrate it prior to each test, and now I know without question I can trust the readings.

TomC

Every one of my immediate direct calibration tests (a total of five that I done) with my CardyMeter doing the saliva potassium test with the meter at the blood labs and finishing it just moments before the needle stick for the lab serum potassium test has in every case been +/- 0.1 variation between the lab blood potassium and the CardyMeter when using the conversion chart for deriving the equivalent serum level from the saliva testing! It is a very accurate and handy little machine when you make sure and calibrate it properly each time.

Shannon

Thank you Tom and Shannon, for that information, I thought my unit may have been faulty as I needed to calibrate each time I used it. Since using it, I have found something unexpected and that is a high reading when I have an afib event. Without taking potassium supplements I register 4.5 to 5, mostly on the higher side (4.8). I would normally be under 4.5.

Any ideas why?

Colin

I too have found the CardyMeter accurate and useful. And yes, Hans, "Extra Solutions" is certainly useful - any kind of regular use will eliminate the small original supply quickly, but the "Extra" bottle is large and will last for ages. The sampling sheets I have found totally superfluous - preferring to place a few drops (carefully covering both electrodes), (whether calibration solution, wife's de-ionised ironing water, or saliva), directly onto the "test pit" and sopping away with folded, ordinary, household tissues.

Detailed discussion and confirmation of usefulness of this K meter leads me to raise something I broached once before: Are there any other useful ion-selective meters out there for Afibbers?

Sodium meter is available from same firm, but Na, unlike K, is held in a very tight range by the body (135-145, so max 7% total range). All evidence points to an Na/K interaction, with strong evidence for a K effect on Afib. "Normal" K variation is 3.5-5.5, a whopping max 44% variation around the midpoint, unlike 7% for Na, so it's no surprise that there's something to be gained by monitoring K. Na I doubt.

Magnesium is another possibility, but it doesn't seem to have much effect on me, so I haven't investigated availability of a meter. Also, everyone says serum Mg is no guide to intracellular Mg. But maybe someone should see if there's an Mg meter, and, given the usefulness of the K meter, experiment.

Like K's interaction with Na, Calcium interacts with Mg. In my case, Ca DEFINITELY has an effect on Afib, but in complex ways related to dose, time of day, previous lead-up dosing, attached anion (carbonate, hydroxyapatite, dairy food etc), etc, etc, which I still haven't unravelled. Accurate serum Ca levels would be very interesting. There is a selective-ion Ca aquarium meter on the market (no different concept from the K meter), at a similar price, the "American Marine Pinpoint" Calcium Monitor, eg:

http://www.marinedepot.com/controllers_american_marine_pinpoint_calcium_monitor_information-ap.html

<http://www.amazon.com/American-Marine-PinPoint-Calcium-Monitor/dp/B0057IFAVO>

I mention this in case anyone else has noticed an effect of Calcium. And perhaps a North American afibber might be able to get the meter more easily, cheaply, quickly, and determine it's usefulness.

Ian

The meter I ordered from QA came with three vials: Deionizing , Standard, and Slope and a roll of the paper used for cleaning/sampling, I later ordered the replacement kit that has a few items of each. Deionizing solution can be obtained in a larger, less expensive bottle from CQ Concepts. As the Youtube video about the Cardy meter shows, you can save the paper strips by using cotton swabs to clean the sensor. I would stick with the paper rolls of test strip and the Standard and Slope solutions from QA for quality control of the test. If the AG Solutions gives you more supplies for the initial order, it might be the better deal.

Colin, as Shannon stated, you have to clean and calibrate the meter with every use. Always bring the reading to 0 before testing by cleaning with the Deionizing solution, I clean the sensor when I am finished with the test as well. There is also a monthly calibration you should do with one of the solutions, all of this is explained in detail with the instructions.

TomC

Agree with All TomC's last post, except large Deionised H2O can be bought easily, cheaply at local supermarket (always reads 0 on meter), and I find roughly folded household tissues from a nearby box much easier than fiddling with the roll of paper or swabs.

Ian

Colindo,

One reason a high potassium might be associated with AFIB episode is when the underlying trigger is a drop in adrenal hormone output. A too low Cortisol and/or Aldosterone which both are pretty common in older folks over 55 or so, is often reflected by an elevated potassium and usually with a lower than optimal sodium level

This might only be periodically and temporary in which you wouldn't necessarily catch it on a random blood test. The Highish potassium especially if it spikes into the mid 5+ region, can itself be a direct trigger of arrhythmia and can certainly be a secondary indicator of a bit drop in cortisol/aldosterone in the moment which would then likely trigger a compensating surge in adrenaline output as the secondary fall-back adrenal 'stress' hormone to the primary front line stress hormone Cortisol, when your body cannot produce enough cortisol on demand.... either as a temporary issue or a more long term deficiency. Adrenaline is not the hormone you want your body to have to rely on to meet every day stress demands as it is very catabolic long term and is a direct and powerful trigger for AFIB!

Optimal Cortisol/ Aldosterone levels will help your body keep a decent balance of sodium and potassium with neither one dominating the other. Where as too much cortisol or aldosterone is often implied by too low Potassium.

Shannon

The Horiba Cardy Meter offered by Agriculture Solutions (AS) for \$259.99 + \$5.49 shipping at amazon.com is the best deal I found on the internet. I ordered one Oct. 8 and it arrived yesterday, Oct 12, which was earlier than amazon predicted because AS sent it USPS Priority (surprise).

Supplies included in AS Cardy Meter Bundle on amazon: It came with more supplies than I expected. Specifically, it came with the following, which appear to be packed by the manufacturer: C-131 meter and its potassium sensor (which the user has to install - appears to be a simple procedure but I haven't done it yet), a little plastic pipette, a little plastic tweezer that has a tiny screw driver on its handle, three tiny bottles of maintenance solutions (my guess is about 1.5 teaspoons each of the two calibration solutions and about 3 tablespoons of deionized water), a small roll of sampling sheets (6 meters long x 11 mm wide; directions are to use a 15mm length of the sampling sheet for each test), and instructions. In addition, for the \$259.99 price, AS bundles in one 125 ml bottle of each of the two calibration solutions and a matching empty bottle for deionized/distilled water.

I like that a large quantity of deionized/distilled water is not in the bundle. Think I can do much better locally, especially if I end up using ironing water, as suggested by Ian, or distilled water from the grocery store, although I've unsuccessfully checked around for pharmaceutical grade. Locating local sources of suitable water is a story in itself and it's not complete yet, but it includes an aquarium shop.

Case: One clarification: the AS amazon page may indicate AS includes a hard case, but I didn't get one. They may mean that the meter itself has a hard case, which it does. I plan to ask about this. A soft case is available at QA Supplies; it only holds the little bottles of solutions, which would be nice for travel, but won't help me for home use.

Sampling Sheets: AS does not sell sampling sheets, but their representative told me via email that I "can easily use ordinary toilet paper and it works just as well." In response to

more questions from me, he added: "All the sampling sheet does is soak up the sample and allows the liquid to form a bridge between the 2 electrodes. You certainly can sample directly onto the meter without it, its just that it takes more of the sample if you don't have the sample sheets / tissue."

I plan to test sampling paper vs. toilet paper vs. direct method; if anyone else does any of these comparisons, please post your results here as I'd love to see them. The really nice thing is that the 6 meters of sampling sheets that come with the meter allow me to do this testing so I can decided whether to spend \$33 on sampling sheets. May have to lay dry toilet paper on the sensor and wet it with saliva rather than laying the paper on my tongue and transferring the wet paper to the sensor. I'm thinking the wet toilet paper may not hold up to being handled.

Shipping: You can get the same cost for the meter and large bottles of solution on AS's own site (you have to buy the meter and large size solutions separately), but right now the AS site is charging about \$3 more for USPS Priority Mail than buying their bundle through amazon, however, amazon doesn't promise Priority, just ground.

A very special thanks to everyone who has posted their Cardy Meter results as compared to lab tests. I really, really value this type of info.

Jann

Jann, you're on the right track (eg toilet paper, deionised H2O comments).

Easiest in my opinion:

1) ~4 drops of Calibration solution direct into pit (hardly any more than using test strip, costs almost nothing, faster.).

2) Calibrate.

3) Sop off with roughly folded tissue from nearby box (easier than toilet roll).

4) Cover pit with deionised H2O - meter immediately goes to zero. (Trust me, with qualifications in exacting chemical lab techniques, any deionised/distilled/ironing H2O is adequate).

5) Repeat (3)

6) Bit of spit into the pit (several ways).

7) Read result.

8) Repeat (3).

9) Repeat (4).

10) Repeat (3).

Stow Meter.

Ian

Ian,

Thanks so very much for your detailed instructions. Can I take advantage of your qualifications in "exacting chemical lab techniques" and ask a question? I'm not sure what can touch the sensor without causing a reading error. For example, if I understand correctly, touching the sensor with my finger can cause an error (because my finger leaves contaminating ions on the sensor's surface), but if I use a q-tip or a tissue to clean the sensor, no contamination occurs. A q-tip in deionized water doesn't affect the reading, but my spit in deionized water does. So I'm wondering what does and doesn't contaminate the sensor? I'm mostly looking for general guidance here rather than a list of specific items. Any thoughts? Any help will be appreciated.

Jann

Yes, well, those are exactly the kind of questions I thought that non-scientists might stress and freeze-up about when confronted with a precision instrument like this (and it IS a precision instrument), and exactly why I thought a highly simplified, low-stress method might be beneficial to lay out as above.

Your concerns are entirely valid, but, at the same time, in the end it's all common sense and straightforward:

a) The sensors **are** delicate, and should be treated with respect.

b) Any foreign body that has significant K (potassium), or even possibly some other ions, can contaminate them or the readings, but this is different from damaging them. Any contaminating ions will wash away with DI water (for our purposes, distilled, DI, etc, all the same).

c) The unit's instructions are written to **maximise** precision and protection of the unit. But, in practice, there's a fair bit of leeway. It's not going to make the slightest difference to you whether the meter reads 954 or 942. or even, really, 912. For our purposes, the gross variations are what's relevant. You'll find that your readings jump around more than that (probably much more), even when you think it's exactly the same time of day and you've eaten and done **exactly** the same things. (Not jump around minute to minute though).

d) So, re (a), I've seen that rubbing on the sensors seems to muck readings around a lot. The instructions emphasise forceful contact, but don't particularly stress about rubbing. But you can see we're verging into damage.

e) Re (b), and your comment: "spit in deionized water does (contaminate)": well of course it does - the spit's got plenty of K ions in. But in some cases this can be an advantage if you think about what you're doing - see (g) below for an interesting example..

f) So, re (c) and (d), that's exactly why I recommend the simple routine in the other post. It avoids rubbing the sensors, is the quickest routine I've found, but gives entirely adequate readings. A folded tissue will sop off the 2000ppm K solution in a flash, until there's non visible. Then a test pit's worth of DI will instantly dilute any remaining K ions down to insignificance - say 1ppm, although the meter invariably reads zero. Then a folded tissue will

instantly sop off all the visible DI, and apparently a tissue doesn't contain any significant stray K. Then a test pit's worth of spit will instantly "dilute" or "swamp" any trivial remaining DI or K from tissue, by a factor of 1000 or more - so entirely adequate for our purposes. Very quick. No rubbing.

g) In fact an extension of the above; and even more precise; and re (e) above; and a standard precision analytical technique; and such a standard, in fact advanced, technique that it's currently being used by NASA's new multi-billion dollar Mars Rover, on Mars, as we speak, is to "swamp" any contaminants which you're worried about, with a "pre-dose" of the material you're trying to assay! So, in this case, that means spitting in the test pit then sopping it up, before you spit in again and take a reading! Nothing is more precise than that. By the time you put in the second spit, any possible contaminants are diluted infinitesimally!! Totally unnecessary in our case - but I just mention it to demonstrate that "contamination by spit" is not necessarily a bad thing, and that, really, the whole process is just one of common sense if you think it through. Half a pit of spit mopped-up before your main spit would be a good thing! But half a pit of spit still in there when you put your 2000ppm K calibration solution in would be decidedly stupid! You'd lower the calibration K way below 2000; thus you'd calibrate your meter to the wrong setting; thus your reading from your later test spit would be completely wrong!

The newly-landed Curiosity Mars rover, or "Mars Science Laboratory", is currently, right as we speak, shovelling two successive shovel-fulls of Martian soil, painstakingly, over about 7 days, at a cost of 10's of millions of dollars in highly expensive scientists' time here on Earth, and agitating them right through it's incredibly sensitive instruments (which left Earth spotlessly clean anyway), only to totally throw away every single microgram of them without doing any measurements on them whatsoever! It's doing this, before immediately putting in a third shovel-full on which it **will** test for signs of Martian organic chemicals (not quite the same as Martian life, but close), **just** so that **any** possible contaminants are basically the same as the test sample anyway!!! **That's** good lab practice for you!

So, got all that? When using instruments like this, it's much better to have some idea what you're doing, in a logical sense, rather than blundering along to a formula with no real understanding and either making simple but dramatic errors, or indulging in massive overkill. I've tried to make it interesting! You've asked all the right questions. Good luck.

Footnote: Only a couple of things not covered in the earlier "method" post: the monthly or so 150ppm calibration, but that's straightforward. Also, Step 1): can't remember if 4, 5, 6, drops usually cover the electrodes - but you can easily see. No need for more. And no need for a pre-"2000ppm solution" dose of DI if you cleaned the instrument with DI as the last step before stowing, and if the electrodes look dry (which they should). The several drops of 2000ppm will totally swamp any infinitesimal stray K hanging around, for our purposes of accuracy.

Ian

I use the roll of paper that comes with the unit for Calibration and saliva texting.
I use distilled water and tissue or toilet paper to clean up. Thanks Shannon for you're reply.
Colin

Ian,

This is a quick Thank You Very Much for your extensive explanation. I have only scanned it but I can see it answers a lot of my questions. I like to understand how things work before I use them - otherwise I do freeze up and then go for overkill in trying to use them correctly, and more importantly in this case, I won't trust the meter's readings. Things that caught my eye during my scan are that there is some leeway even with this precision instrument, it's important not to rub the contacts, a sample's worth of spit will swamp any stray trivial remaining DI or K from tissue. Didn't want to wait until I study what you said to thank you.
Jann

If you have to deal with afib or aflutter, you need to own a Cardymeter so that you know your Potassium levels at any time. Maximizing mag levels is fairly simple : supplement until bowel intolerance, but Potassium can be tricky when you are supplementing and eating K rich foods at the same time. For me simply quitting all wheat products(highly acidic) saved me the 1600 mg.of Potassium I was taking daily. I have since quit the supplement and my levels hover around 4.5.

TomC

Tom,

What make of cardymeter do you use and where did you buy it?

Hans

Hans, I have a Horiba Compact Ion Meter C-131, purchased from QA Supplies, price around \$235. I have noticed that since I purchased mine over year ago the description now includes saliva as something that can be tested, this was not mentioned before, perhaps they now realize a sales opportunity even though they used to specify that it was not a medical device.

TomC

Tom,

Have you tested your potassium level when having an Afib event? I have found my level to rise. I am having PVC's for the last couple of days and find potassium levels high and I wonder why?

Colin

Colin, fortunately I have not had an afib incident since my ablation to test for that scenario.

TomC

Lynda, I'm also wondering where to purchase a Cardymeter and the supplies, especially those that require on-going purchase.

I searched this forum and found one suggested source but it doesn't seem to sell the meters anymore, just the supplies.

Agriculture Solutions LLC looks like a promising source for the meter but doesn't seem to sell the sampling sheets; I'm planning to contact the company to see whether they do. Actually I'm wondering if people here use the sampling sheets since it seems possible to place saliva directly on the meter; seems that might be more difficult with blood.

Agriculture Solutions LLC's best deal appears to be on amazon because the meter comes with an additional wash bottle and 125ml each of additional calibration solution for \$239.99

plus \$5.49 shipping. Haven't found the same deal on their own site or elsewhere.

Also, wondering whether people use distilled water or lab grade deionized water, and their source. I'm thinking I may be able to get lab grade deionized water locally, but haven't checked. Will appreciate any help.

Jann

You can buy a kit along with the meter that has extra supplies of deionized water and calibration solutions. I bought mine over a year ago and am still using the original bottles - once I found and stuck to the right diet for optimal potassium, I only need check every month or two.

TomB

Tom B - can you pass on your "right diet for optimal potassium"? Doing all the right things, and with K Gluconate supplement, I keep my K higher than it was. But it jumps around a lot, and is rarely 4.5. So all info from anyone who has played around a lot and feels they have an optimum diet for this is welcome. However, there's clearly a lot of variation in individual responses also.

Ian

Can anyone help me understand what my Cardy Meter readings should be at? I have been in some level of afib, or flutter or close to it all night and am still unstable this morning. My reading this morning on the CM was 100 - and when I enter this into the online calculator it gives me a conversion of 3.14.

What does this mean in real life terms? Is this reading for Potassium on the extreme low side. Should my doctor be able to give me a blood test for Potassium to confirm this, or should I get another Exatest? My last Exatest in March reported a reading of 117.5 (range 80 - 240) and my doctor said this was fine, but it seems low.

Any help would be appreciated.

Ron

Yup. 3.14 is too low. You should be easily able to get an "Electrolytes" test from your Doc to show potassium. If you check the Cardy just before and after, you'll get a very good check of its accuracy in your case.

Ian

Ron, are you sure you are reading the meter correctly? The small cursor to the right on the screen tells you to multiply by 100 or 10 or 1, I just tested mine to verify this, my reading was 10x 100 (the cursor was next to 100), my reading is then 1000 which translates to a 4.70 level when I use the Periodic Paralysis News Desk Chart.

TomC

I just took another reading and I am at 330 = 3.54 still obviously too low. I had been taking 99mg of potassium when I take my other supplements four times daily. Things seemed to be

going reasonably well, and I cut it back to 99mg x twice a day, and I have been in afib much more of the time in the past week than previous. Can it be that I am living on that fine of a knife edge that reducing the potassium supplements make such a big difference??

Ron

Ron, 3.4 to 5.4 is the range considered normal, so yes you are still too low, 4.5 seemed to work best for me and to maintain that I was taking a teaspoon of the powder Jackie mentioned 540 mg. 3X. Eating a salty meal would knock my level down and so sometimes I would take a little extra. You are very fortunate to be able to get out of afib on your own and do not have to run to the hospital for a cardioversion, just ask Tom Poppino, so you can experiment and see what works best for you, obviously less potassium started afib, now you know, the Mag. is easy, just take it until you reach bowel intolerance and then back off a little, it can take awhile to build up the Mag in your tissues, perhaps a few months, I use Bluebonnet Mag from Hans I Herb store.

That said I am going to tell you that I quit eating anything made from wheat for non-afib reasons, I just wanted to lose a few pounds. Well my Cardymeter readings started to get high, way too high, over the 5.4 threshold. So I quit the potassium supplement and my readings went back to the desired level, around 4.5, if I find I am getting too low I do take a teaspoon and it pops right back up. I honestly think that the "new genetically modified strains of wheat" are worse for afibbers than sodium.

TomC

Heather, I ordered the Cardymeter from QA Supplies USA 800-472-7205. Do a little searching on the net and you will find their website, go to youtube for a demo of how to use it, I use a saliva sample instead of blood, you will need a conversion chart as well, this is available at the Periodic Paralysis News Desk, people afflicted with that are very sensitive to Potassium balance.

TomC

Many visiting this site have now found the Cardymeter useful for monitoring serum Potassium variation; including, indirectly but conveniently, via saliva. In my case it definitely shed light on potassium supplementation effects, and thereby allowed some improvement in the PLAF.

However, in my case, my AF still seems more susceptible to calcium dosing, but in complex ways that I cannot clearly pin down. In a couple of cases, blood draws have shown serum calcium well toward the low end of normal, but just gulping down wedges of calcium is certainly not the answer!

There is definitely something going on here, so I'm intensely interested in monitoring diurnal (daily) and food/supplement-related calcium variations via some convenient method. I'm fairly certain that saliva concentrations (taken under reasonably standard, non-food-related conditions) would provide some sort of reflection of underlying serum concentrations, just as with potassium. And I'm sure it would be completely unnecessary to have a specific saliva-serum conversion or interpretation chart, such as that available for the potassium, since it is essentially entirely the RELATIVE changes one would be interested in (given that numerous bloods have always shown Ca in the normal range, regardless of dosing).

The Cardymeter is a "selective ion meter". Such meters are available for calcium. They

typically seem to be perfectly recommended for pH ranges and sodium concentrations that would make them perfectly functional in saliva. However there is a confusing range; a first look indicates they're probably more expensive than the Cardymeter; and some (all?) seem to need a "reference electrode" also?

I don't suppose any of the great range of authorities on this site would have any tips or know anything about this subject? Perhaps there are other, easier/cheaper ways of measuring calcium? (Tho' that seems unlikely). Or does anyone have any idea what is, and where to get, a cheap Ca electrode? Or does anyone know this won't work?

Any info gratefully received, particularly on the basic question of "cheapest functional meter", since I'm fairly determined to give this a shot regardless of most supposed difficulties, having been totally convinced by the Cardymeter that saliva is pretty certain to reflect serum calcium variations, at least to some extent, and that great accuracy will not be required. I'd look forward to sharing the results.

This seems like something that George or Researcher might know about, but all info welcome.

PS: Vitamin D is high-normal and steady. It's definitely the calcium I want to monitor.
Ian

Ian, you will need a conversion chart of some kind to translate Calcium levels to correspond to medical tests, and what do you test blood or saliva? There is a Cardymeter for Sodium that might be of help to Afibbers available but without a chart to convert and not knowing what to test it cannot be utilized for our purposes.

Researcher, thanks again for making us all aware of the Potassium meter and the Periodic Paralysis site.
TomC

Tom, I think you may be missing my point. Based on my science background, I'm pretty sure there would be VERY useful information completely WITHOUT a conversion chart. Just as the raw Cardy K figures instantly give a regular user an immediate guide to where he/she is on the spectrum completely without conversion to actual serum levels, after a bit of experience, then if saliva Ca bears any relationship to serum Ca whatsoever, and if a person's Ca has always been normal range, the raw saliva Ca levels will similarly give an instant guide to where one is (in relative terms) after a few days' experience. A conversion chart is almost certainly irrelevant, and even the experience of any prior experimenter. This is an experiment (like the P.P. people would have been doing initially), and the question remains simply: what's the most practical way (probably cheapest Ca ion electrode) of measuring saliva Ca?
Ian

I agree with Ian regarding the ability to self-reference the data.

It would especially be useful if you have an objective source of data for PVC/PAC ectopics such as a holter, Polar or other recording heart monitor. Then, perhaps you could correlate high/low levels of an ion with high/low ectopic counts.
GeorgeN

The self-reference method is what I tend to go by. In the case of potassium, I used the cardy meter, and an inexpensive EKG machine (about \$200 as I recall) to find the "sweet spot" for diet control. As it turned out in my case, the optimum level of potassium for many here was a bit too high for me and was causing PVC's. My blood serum levels for calcium have been right at the upper bound consistently over the last 10 years, yet reducing calcium from my diet (no dairy, etc) has done little to change that result - it seems some ion levels are pre-programmed regardless of diet. As individuals, I wonder if that pre-programming is, in fact, the level they should be if, as in my case, those levels existed long before any heart rhythm issues arose.

So in a nutshell, dietary potassium has a strong link to serum potassium levels, but dietary calcium does not have a strong link to serum calcium levels in my case.

Tom B

George, my apologies, I believe it was you who initially gave us the info on the Cardymeter and the conversion chart, thanks again. Ian what would make you think that saliva would be able to show a calcium content better than blood and if what you are saying holds true could Sodium be tested with a Cardymeter as well and what would you use blood or saliva? The Sodium Cardymeter would be inexpensive compared to the Ion Selective Electrodes system.

Tom C

TomC,

No doubt blood Ca is a better thing to know than saliva Ca - presumably it's much more directly related to any rhythm effects (ditto for K). It's just that blood tests are somewhat painful, much more inconvenient, expensive in some places (not where I am - but not easy to get many), and basically impossible to get with high frequency throughout daily cycles or food/supplement effects. If you are talking about self-testing with an Ion Electrode, it might be possible - but I don't know how much blood you'd need each time, and I note that one thing which does affect electrode accuracy is presence of Fe, so ...? So I'm not saying saliva is better than blood, just that if one could pick-up the relative variations that way, it would be immensely more convenient, and one could test frequently and under all sorts of circumstances.

Yes, I noticed the Na Cardymeter - pity there doesn't seem a similarly cheap Ca one. But, yes, in principle one could certainly use the Na meter that way. The comments above would apply re blood/saliva.

Ian

Sorry for taking so long replying to your questions. I did not notice a thing from my heart when at 5.2, however I was prompted to check my levels when I kind of sneezed when drinking something and my nose started to bleed, something that never happens to me. I ordered my Cardymeter from QA Supply Co. USA 800-472-7205, the price was \$239. and included a starter kit that contains all that you need to calibrate the meter each time and do the test. The Cardymeter is not a medical device, it is used in agriculture to test Potassium in anything placed on it in the specified manner. I do not know of any other home tester that would measure Pot. This whole Cardymeter discussion started when someone on this site, I think it was "Researcher", found a website for the people that suffer from a condition called Periodic Paralysis, this is a condition that freezes up your muscles for a length of time in part due to a low Potassium level, if you search out Cardymeter on Youtube you will find two very informative videos on just how to measure using the meter, they test blood and the

demonstrator prefers it however saliva has the same ratio and I feel is much easier to test. You will need the conversion chart available from the Periodic Paralysis news desk, [www.hkpp.org] There is a Cardymeter to test Sodium, however I was not able to find a conversion chart or anyone who could explain what to test, blood saliva ect.in respect to human Sodium level testing.

I have been using 8oz. of V8 low Sodium, once in the morning and once at night and have been staying right around 4.7, when it is not convenient to get the V8 I use the Now brand Potassium Gluconate powder. I cannot stress enough how when supplementing or adding Potassium to your diet that you can easily exceed the normal levels. The V8 has 900 mg. of Pot. in 8oz, 2X a day keeps me at 4.7, an added 8oz or more would likely put me above or close to the limits of the normal range which is 3.4 to 5.4. You must also keep in mind other high Potassium foods as well that would increase this level even higher.

TomC

I have been supplementing with Potassium Gluconate Powder, one teaspoon or 540 mg. 3X a day. I monitor my levels with a Cardymeter and try to maintain around a 4.5 level. Recently went on a vacation to the Dom. Rep. to one of those all-inclusve resorts. They had Banana juiced drinks for breakfast, very tasty, Papaya ones as well. I would usually have a couple and really did not think much about it. However when I checked my Pot. levels I was around 5.2, the upper limit of normal. So what I am getting at is that if you supplement with Pot., it is very easy to get too much when you add high Pot. foods.I stopped using the powder for the rest of my vacation and just had a couple of the Banana drinks a day and I stayed around 4.5. I am now home and drinking an 8oz. cup of Low Sodium V8 2X a day to maintain the correct level, I will use the powder when it is more convenient to do so, but for now I am going to get my Pott. through food sources.

Tom C

I bought the Cardymeter recently and I'm running out of the supplied deionozed water. I stopped at a few pharmacies and all they carry is distilled water. When I googled deionized water vs distilled water it seemed that distilled water was actually more pure. Is anyone using distilled water with the Cardymeter and is it just as good?

As always, thanks for your input.

Leo

Leo, the replacement supply kit from QA supply has several bottles of DI water and the other solutions. You are probably in need of replacement test paper as well and it is also available, everything is expensive. However I found a place, CQ Concepts, that has 32 oz. for \$2.41, which would probably last you several years, just search the two distributors and you should find everything you need, I would not buy a large quantity because I would think that fresh product would give better results. There is a difference between the two types of water and I would think that using the distilled type would never get your base measurement to zero, thus making the test useless.

[www.cqconcepts.com]

Tom C

GeorgeN

We know that there is an inverse relationship between sodium and potassium levels inside the cells. As one increases the other must decrease proportionally. I was looking at my recent blood tests that checked serum levels of potassium and sodium and I was trying to find an inverse relationship and I found no relationship at all. My levels of both appeared to vary somewhat randomly.

- 1) Has anyone noticed any relationship between serum sodium and serum potassium levels?
- 2) Is serum potassium an accurate indicator of cellular potassium? We know that in the case of magnesium, it is not an indicator at all.
- 3) My potassium levels have been fluctuating between 4.2 - 4.9 mmol/l. Has anyone noticed what serum potassium level they need to stay above to greatly reduce Afib?
- 4) I've been thinking about buying the CardyMeter. Do the CardyMeter results correspond well with the normal blood test potassium levels?

Thanks for all your help.

Leo

Leo,

There are posts in CR72 [www.afibbers.org], which may help answer #4

As to #3, I tested mine fasting and 4 hours postprandial. Results were 4.2 and 4.8 respectively.

This works well for me. Jackie has said she needs to keep her level above 4.5 mmol/l.

George

George, thanks for your response, it was very helpful. One item that I'm still trying to understand is: Are the serum potassium levels that we always get from our typical blood tests an accurate indicator of potassium levels inside the heart cells? Does it take a long time to increase cellular potassium levels (we know that magnesium levels take a long time to increase inside the cell) or do the potassium levels increase/decrease quickly? Thanks for all your help.

Leo

Jackie, thanks for your reply, that was very helpful. I have two followup questions that I'm having trouble understanding:

- 1) Do potassium levels inside the cells (particularly heart cells) change rather rapidly (do levels change in hours or 1-2 days)? We know that magnesium supplementation may take months to increase the mag levels inside the cells.
- 2) My personal Afib situation is often-- 1 week of Afib followed by 1 week of NSR followed by 1 week Afib, etc. Near the end of the 1 week of NSR, my ectopics increase and it feels that I'm "inevitably falling into Afib." Do you think that this cycling in/out of Afib could be related to my potassium levels falling during my week in NSR (even though my supplementation routine stays the same)? If it is the potassium levels decreasing, do you have any idea why the potassium levels would decrease during my week in NSR?

Leo

Leo, assuming you are most likely on meds if you are in and out of afib on a regular basis, meds alone will screw up your Potassium and Mag. levels perhaps even more than Sodium,

so you are caught between a rock and a hard place when it comes to trying to maintain a good balance of levels and supplements. Please refer to my current post with Tom Poppino about his situation.

As to the Cardymeter being accurate, the two people that I know of that bought a meter and compared the results with the hospital results were satisfied with the accuracy. The nice thing about the meter is that you can test whenever you want and know the results in minutes.

TomC

The AFIB Report is published by Hans R. Larsen MSc ChE
1320 Point Street, Victoria, BC, Canada V8S 1A5
Phone: (250) 384-2524
E-mail: editor@afibbers.org
URL: <http://www.afibbers.org>
ISSN 1203-1933.....Copyright © 2012 by Hans R. Larsen

The AFIB Report do not provide medical advice.
Do not attempt self- diagnosis or self-medication based on our reports.
Please consult your health-care provider if you wish to follow up on the information presented.