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Carotid Ultrasound Scans for Assessing Cardiovascular Risk

### RELATIONSHIP OF CAROTID IMT SCORES AND CARDIOVASCULAR DISEASE.

You are listening to ReachMD, The Channel for Medical Professionals. Hi! This is Dr. Thomas Bersot, president of the National Lipid Association, and I would like to welcome you to Lipid Luminations hosted by Dr. Larry Kaskel and presented by the National Lipid Association. Joining me today is Dr. James Stein, Director of Preventive Cardiology Program at the University of Wisconsin Hospital and a Professor within the Division of Cardiovascular Medicine at the University of Wisconsin School of Medicine and Public Health and we are going to discuss the relationship of carotid IMT and cardiovascular disease and testing IMTs.

**DR. LARRY KASKEL:**

Dr. Stein welcome to the show.

**DR. JAMES STEIN:**

Thanx for having me I appreciate it.

**DR. LARRY KASKEL:**

Could you start out a little by educating our audience as to what exactly is IMT?

**DR. JAMES STEIN:**

Sir, IMT stands for intima media thickness and it refers to the thickness of the walls of the carotid arteries. Measuring carotid IMT has been used for 2 to 3 decades now as a research tool, but in the past 5 or 6 years, it's really come into play the clinical test that can be used to help with risk stratification.

**DR. LARRY KASKEL:**

All right! So, there is lot of things out there that say that they can help with risk stratification. For years we have used Framingham, there is blood test and new biomarkers always coming out saying that they are better predictive model and so the question is how do we determine whether this new model predicts risk more accurately than existing models and whether or not the risk that is predicted for an

individual is actually different enough to warrant a change in how we treat patients.

**DR. JAMES STEIN:**

Yeah! That's an excellent question. It seems like every month a new Journal comes out with yet another great biomarker that's going to make cardiovascular risk prediction better or easier than what we had before. I think the first point for listeners to understand is that traditional risk factors actually do a very good job and it's very rare for patient who develops heart disease in the absence of smoking, high blood pressure, high cholesterol, family history, ageing, etc. The problem though is that with our traditional risk factors even when you put them in a traditional Framingham risk model is that these models do well at predicting risk in populations of people, but they start to fall short when applied to individual patients, so if I put my patient's risk factors into the Framingham risk model and it comes out at 6% risk over 10 years, the patient often times is concerned well am I am at 6% or am I am at 94% and without having better tools, they often times walk away from their office visit with their physician really unclear about whether or not they are high risk, low risk, or intermediate risk.

**DR. LARRY KASKEL:**

So, let's do a real life example of say someone who has come to see you recently and you are deciding whether or not they were at moderate or high risk and how IMT actually helped you reclassify.

**DR. JAMES STEIN:**

What I would do with the patient is go ahead and look at the risk factors, do the Framingham risk score, but if they end up in what I consider to be an indeterminate range between 6 and 20% over the next 10 years than I think getting additional information can be very useful and you could get a biomarker such as C-reactive protein or advance lipoprotein testing or you could get an imaging test that is in my opinion more personal because it looks right at their arteries and in this circumstance I would probably get a carotid intima media thickness ultrasound scan.

**DR. LARRY KASKEL:**

Now, if you do an IMT, what numbers do you use as normal, abnormal, and what is the basis for using those. Where did you get those numbers from?

**DR. JAMES STEIN:**

The basis for determining if the carotid IMT value is normal or abnormal comes from several large population based studies that have been done over the past 2 decades, cardiovascular health study, Eric, Maza, etc. that really defines for whites, for blacks, for males, for females, and for certain ethnic subgroups what normal values are and according to the American Society of Echocardiography consents of statement and clinical use of carotid IMT, we use the 75th percentile as a cut point. Similar to what we do with coronary calcium scoring, so we say if a patient is above the 75th percentile for the carotid IMT, it's under age, sex, and race, they are at increased risk and in the population-based studies having an IMT above the 75th percentile corresponds to a relative risk for cardiovascular event of about 2 to 3 fold increase.

**DR. LARRY KASKEL:**

Now, if you do an IMT on someone and you see a second IMT, let's say it is 0.9 mm, but you see no plaque present. What you say to the patient? Do you say, you've got the beginnings of plaque, you've got early plaque, you have got, I mean, and how do you couch it?

**DR. JAMES STEIN:**

So, there are couple of points to be made. First is that in absolute IMT value such as 0.9 mm doesn't mean anything in and of itself. You really have to look at the patient's age, sex, and race. A value of 0.9 can be high for person depending on the age and sex or it could be normal, but let's say that the patient does have an area of focal wall thickening, but they don't have a plaque. What I tell them is that there are increased risks, because they have the early stages of arterial injury that lead to plaque formation. On the other hand if a patient has a discrete plaque in the arteries, the risk is increased, in fact, the risk of having a carotid plaque is somewhat higher than having increased IMT, relative risk there being about 2-1/2 to 3-1/2 fold. Then, I used that to start the discussion about risk intervention such as aspirin, lipid-lowering therapy, blood pressure lowering.

**DR. LARRY KASKEL:**

The next logical question is when someone sees that they have either plaque or thickened IMT is well doctor does that mean that my coronaries have the same or is not a 1:1 correlation.

**DR. JAMES STEIN:**

That's a really good question. There is a very strong correlation between the degree of wall thickening and plaque burden in the carotid arteries and in the coronary arteries. It is not precise. It is not a correlation of 1.0, but the correlation between the carotid arteries and the coronaries is pretty much the same as between any 2 coronary arteries, so it gives us a window. It gives us an insight into what's going on in the coronary arteries, but they are not exactly the same and as a result carotid IMT actually is slightly predictor of stroke than of coronary artery disease where the test like coronary calcium screening does little better job of coronary disease, but doesn't tell you as much about the carotids.

**DR. LARRY KASKEL:**

And you mentioned it's a window and it's a nice window because it's not a radioactive window. There is no radiation involved.

**DR. JAMES STEIN:**

Yeah that perhaps is the biggest advantage as that's completely noninvasive. So, we don't put any needles anyone, they don't need any dye, they don't need beta-blockers. We don't give them any radiation and in the business of preventing disease, the last thing you want to do is create disease even if it's at very small risk.

**DR. LARRY KASKEL:**

If you have just tuned, you are listening to Lipid Luminations on ReachMD XM 160, The Channel for Medical Professionals. I am Dr. Larry Kaskel, your host, and I am talking today with Dr. James Stein, Director of Preventive Cardiology Program at the University of

Wisconsin Hospital and we are talking about carotid IMT scores and what they mean.

Dr. Stein, do you ever continue on lets say you get an IMT on someone who you are suspicious of having disease and it is normal, will you ever look at another arterial bed, perhaps by getting a coronary calcium scan.

DR. JAMES STEIN:

I really don't think that coronary IMTs and coronary calcium scans should be exclusive of each other. Many patients are going to give the same information, I think for white men who are older, the calcium score gives a little bit more strong information whereas the IMT is really useful in those young people, especially women and African-American for more likely of calcium score of 0. If I really need to know whether or not someone has subclinical atherosclerosis, I do start with a carotid ultrasound looking for plaque, looking for wall thickening. If I don't see it in the carotids, I think the calcium score would be reasonable, but only if the patient was over 55 or 60 years of age. If they are young and they don't have anything in their carotids, the likelihood of them having calcified plaque in the coronaries is really low.

DR. LARRY KASKEL:

Well let's say you have a 40-year-old woman who has a thickened IMT. She has normal lipids. She has a normal hs-CRP. By just a presence of a thickened IMT, would you put her in a high-risk category?

DR. JAMES STEIN:

I would put her in an increased risk category. I would say to her that her relative risk is increased by 2 to 3 fold and I would look really carefully at her family history and her blood markers to see why it might be that she has developed this wall thickening, there has to be a reason why you as a clinician felt that she needed to have a wall looked at. I wouldn't go as far as to scare her and tell her that she is sitting on a huge amount of coronary artery disease and she is about to have a heart attack or stroke, but use this as a real wake up call for being aggressive about lifestyle interventions and if we find anything wrong with her lipoproteins, lipid lowering therapy as well.

DR. LARRY KASKEL:

What do you see as advantages of doing this test besides the lack of radiation?

DR. JAMES STEIN:

One of the real advantages to this test is that it can be done in an office setting. So, to do a calcium scan, requires a CT scan, which obviously can be placed in someone's office. This can be done in an ultrasound machine and there has been a huge proliferation in the past couple years of inexpensive but high quality ultrasound machines that can now be in offices and I actually think that the future of this test is going to be moving into an office practice where a patient comes in and a well trained health care professional. It could be the doctor, but it also could be a nurse, for example, does a limited carotid IMT scan looking at the common carotid arteries, looking for plaque and then can present that information to the physician and patient right at the time of that visit where you are talking about lipids and blood pressure.

**DR. LARRY KASKEL:**

Okay, so it's available and it's expensive, but who is going to pay for it.

**DR. JAMES STEIN:**

Yeah, that's always a challenge. So currently very few people pay for the test. Its not paid for by Medicare or Medicaid. There are local pockets throughout the United States where physicians or healthcare plans have made deals with local care providers, local insurers, usually HMOs to cover it for appropriately selective patients. But there is a very high hurdle for imaging test to overcome to get coverage from Medicare and for most insurance provider. We have to not only show that you are accurate at predicting risk, but you have to take a next step and show that with this risk information in hand doctors act and patient's do better. I think we are a long way off from crossing that threshold with carotid ultrasound as well as many other cardiac imaging tests.

**DR. LARRY KASKEL:**

With IMT, can we actually predict risk more accurately than existing models? Can we prove that to an insurance company?

**DR. JAMES STEIN:**

That can be proven to insurance company. We've got statistical data both in the form of multivariate model that show independent predictive values. We have got area under the receiver operator characteristic curve that shift, although it modestly that makes her dose shift which mean people get reclassified. We even have data that doctors respond to IMT values and carotid plaque presence with interventions that reduce risk. So, we've got data that when doesn't have normal carotid ultrasound, doctors are more likely to prescribe aspirin, more likely to prescribe lipid lowering therapy, but what we don't have is the next step that in the end people do better.

**DR. LARRY KASKEL:**

So, we don't have good outcome data yet.

**DR. JAMES STEIN:**

Yeah, we don't have good outcome data, but I would add we don't have good outcome data for the vast majority of tests that we do in cardiology. We don't have good outcome data for calcium screening and for many of the office-based measurements that we did.

**DR. LARRY KASKEL:**

But we do have. If I understand you correctly, we do have outcome data showing that if you show someone that they've got a giant hunk of plaque sitting in the carotid, they are more likely to be compliant.

**DR. JAMES STEIN:**

Well, we've got good data that if you show a doctor that the patient has a big hunk of calcium, a big plaque or IMT, then they are more likely to make intervention. So, with patients the story is much more complicated and it is less consistent across studies. In general, it looks like patient understand what the results mean and they report increased motivation for certain lifestyle behaviors and some studies they appear to be more likely to take their medication, but I think that's another area that needs more researches, just not consistent across the studies.

**DR. LARRY KASKEL:**

Now, I am sure you are familiar with the concept of number needed to treat, but I don't know if you are familiar with the number needed to screen. Do you think that this is a good screening test and it would help and pay for itself?

**DR. JAMES STEIN:**

My gut feeling is yes, because it satisfies several of the criteria for screening tests. It is safe, its not invasive. It accurately identifies the disease that you are looking for. When you identify the disease, there are interventions that are proven to both reduce the presence of this marker, so with the blood pressure lowering reduced IMT but also reduced events, and we also have a good understanding of what segment of the population is most likely to benefit by screening and that's the intermediate risk group of people in whom the intervention, i.e., taking a picture can raise the risk level to a zone where intervention is likely to lead to a cost effective reduction in the event.

**DR. LARRY KASKEL:**

Excellent James Stein. Thank you very much for coming on the show.

**DR. JAMES STEIN:**

Thanks for having me.

**DR. LARRY KASKEL:**

Dr. James Stein was our guest. He is director of preventive cardiology program at the University of Wisconsin Hospital and a professor within the Division of Cardiovascular Medicine at the University of Wisconsin School of Medicine and Public Health and we were talking today about the relationship of carotid IMT scores and cardiovascular disease.

Thank you for listening to Lipid Luminations presented by the National Lipid Association. For more information, visit [www.lipid.org](http://www.lipid.org).