

DOCTOR HOLTZ'S PERSPECTIVE

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RADIATION DOSE FROM CARDIOLOGY STUDIES

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One of the fastest growing costs in health care is for radiological imaging. We often accept this as part of the technological progress in medicine. There is no doubt that the development of tests like CAT scans and nuclear stress tests have been vitally important additions to cardiac care. However, I am concerned about overuse of these tests and the radiation exposure and cancer risk they pose.

Many individuals come to my office inquiring about a particular diagnostic test that has been featured in the media or suggested by a friend. They are enthused about its potential benefits- I say "potential" benefits because very often these new technologies have not been rigorously tested. For example, the cardiac CT angiogram is a fantastic technological innovation, but at this juncture, its benefit to patients without cardiac symptoms is conjectural. There was an excellent discussion of this topic in a June 29, 2008 New York Times front page article, which can be accessed at:

<http://www.nytimes.com/2008/06/29/business/29scan.html?scp=7&sq=coron,ary%20Ct&st=cse>.

What is less well appreciated is the risk of new procedures. A recent article in the Journal of the American Medical Association* helped quantify the radiation risk of cardiac CT angiograms. This test uses a fast CT scanner to visualize the arteries of the heart after a dye is injected into a vein. A typical cardiac CT angiography exposed a patient to the same radiation dose of about 1000 chest X-rays.

RADIOLOGY STUDY	RADIATION DOSE (MsV)
Dental Radiography Front View	0.005
Chest X-ray Screening	0.01
Mammography Adult	3
Abdominal CT Diagnostic	10
Cardiac Catheterization Thallium	5
Nuclear Stress Test Technetium	22
Nuclear Stress Test	11
Coronary CT Angiography	12

Radiation exposures are cumulative, so yearly or biennial testing further increases radiation exposure and cancer risk. A current estimate of that 1-2% of all cancers in the United States may be due to CT use.

HOW TO PROTECT YOURSELF FROM THE RISKS OF TESTING:

- 1. ASK YOUR DOCTOR IF THE TEST IS ABSOLUTELY NECESSARY**
- 2. WHAT IS THE ESTIMATED RADIATION EXPOSURE OF THE TEST?**
- 3. ARE THERE SAFER ALTERNATIVES?**
- 4. IS THERE EVIDENCE THAT THE PROCEDURE LEADS TO LESS DEATHS, HEART ATTACKS, STROKES OR OTHER OUTCOMES OF INTEREST?**
- 5. WHAT ARE THE CHANCES OF FALSE NEGATIVE OR FALSE POSITIVE RESULTS?**
- 6. WILL THE TEST RESULT AFFECT MY TREATMENT, AND IF SO, HOW?**
- 7. COULD TESTING LEAD TO FUTURE REPEAT TESTING OR OTHER TESTS?**
- 8. IS THE TEST FOR AN ASYMPTOMATIC CONDITION? (BENEFITS ARE USUALLY LOWER AND RELATIVE RISKS ARE HIGHER IN INDIVIDUALS WITHOUT SYMPTOMS OR KNOWN DISEASE)**
- 9. IF A TEST WITH RADIATION IS REQUIRED, ASK YOUR DOCTOR HOW TO MINIMIZE YOUR EXPOSURE (FOR EXAMPLE, CERTAIN CT SCANNERS AND SETTINGS EXPOSE YOU TO MUCH MORE RADIATION THAN OTHERS)**

*Hausleiter J et al. Estimated radiation dose associated with cardiac CT angiography. *JAMA* 2009 Feb 4; 301:500.

VITAMIN D: NOW

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In my opinion, the most exciting news coming out of vitamin research in recent years has been with vitamin D. Several years ago, many of my patients wanted to know why I was ordering vitamin D levels with their lab tests. Today, it is not unusual for patients to ask *me* about vitamin D: the word has been spreading.

Vitamin D is made in the skin after exposure to ultraviolet B light from the sun. Its traditional role in health has been to increase the absorption of calcium and phosphorus in the intestines so that these minerals could be used to make the bones stronger. While vitamin D is still very important in preventing bone thinning or osteoporosis, as well as the devastating fractures caused by osteoporosis, its potential benefits extend far beyond the bones.

Research has shown that vitamin D receptors are not just found in the intestinal cells but in virtually all cells in the body. What happens in these cells in the presence of vitamin D is a ratcheting down of cellular inflammation. In English, this means cells should have less risk to become cancerous or contribute to chronic degenerative diseases.

These lab discoveries are supported by numerous studies in patients. Vitamin D was shown to be protective against breast cancer in one randomized clinical trial. Over 15 other cancers are associated with vitamin D: the higher the dietary intake or blood level of vitamin D, the lower the risk of the cancer. More vitamin D is also associated with lower risks of coronary disease, diabetes, multiple sclerosis, dementia, muscle weakness, falls and a host of other conditions. A week doesn't pass when I don't read one or two articles about vitamin D. What is amazing is the consistency of positive results.

We still need more randomized controlled trials (true experiments) with vitamin D and less "association" studies; but I believe the consistency of the published studies and the relative safety of vitamin D, make it very important to talk about "D" NOW. Thirty percent of my patients are vitamin D deficient when I measure their blood levels. I do not recommend more time in the sun because of the risk of skin cancers but I often recommend over the counter, and for some patients, prescription strength vitamin D supplementation after weighing an individual's risks and benefits. No one should start Vitamin D supplements without consulting their physician, as studies are ongoing and there is the potential of Vitamin D being harmful when used in large amounts when long term studies are completed.

There are some risks of taking vitamin D and so supplementation must be addressed with a health professional or certified dietician/nutritionist who knows your medical history. I am confident the government will be raising the recommended daily dose of vitamin D. In the meantime, talk to your doctor about measuring your blood level of this important vitamin and look to add fatty fish such as wild salmon, mackerel, and sardines, and vitamin D supplemented low-fat dairy or orange juice products to your diet.

HOW TO REDUCE YOUR RADIATION EXPOSURE DURING CARDIAC CT ANGIOGRAPHY (CTA)

www.drhowardholtz.com August 13, 2009

An important article appeared this year in the Journal of the American Medical Association which can help people choose a radiology site with the lowest radiation exposure for cardiac CT scan studies. As you know, I am concerned with the dramatic increase in cancer risk from diagnostic radiation exposure (see March, 2009 above). Now a study has demonstrated differences of 700% in radiation exposure for the same test, CT scanning of the coronary arteries, done at different radiology practices.

The average radiation dose was 12mSv in this study which investigated 50 sites around the world and almost 2000 patient CTA tests. But the safest site delivered 4.6mSV and the site with the highest radiation exposure exposed patients to more than 30mSv per CT scan! So the simplest question to ask before you schedule your CTA is to ask the receptionist to check with the radiologist about the average radiation dose of the test in millisieverts (mSV) units. Heavier patients and those with abnormal heart rhythms will receive a higher radiation dose but the factors that the radiologists could control accounted for the biggest differences. These were:

1. Use of ECTCM or electrocardiographically controlled tube current modulation reduced radiation exposure by 25%. This dose-saving technology uses your EKG to “instruct” the CT scanner to take pictures only when the heart is resting, in between beats.
2. CT scanners using a 100 kilovolt tube voltage as opposed to 120 kilovolt or higher voltage reduced radiation 46%.
3. CT scanning using a sequential scan mode, rather than a spiral mode, also allows for imaging during the resting cardiac phase like ECTCM. Its use resulted in a huge 78% reduction in radiation.
4. The CT scanner manufacturer also made a difference. The Siemens “single source 64” scanner exposed patients to substantially less radiation than the other 64 (slice) scanners, especially the GE scanner (97% less) and the Toshiba (59% less).
5. Shortening the length of the CTA also reduced radiation exposure. Some places scanned from the neck to the diaphragms but the heart occupies a smaller length within the chest. Every 1 cm the CT technician reduced in scan length, by focusing in on just the heart, reduced the radiation by 5%. (One inch equals two and a half centimeters).

An amazing finding in this study was that THERE WAS NO DIFFERENCE IN IMAGE QUALITY BETWEEN THE HIGH RADIATION DOSE AND LOW RADIATION DOSE CT SCANS!

Radiology practices that are using these dose-saving techniques are taking steps to reduce your cancer risk and they are most likely taking steps to reduce your radiation exposure in all their diagnostic studies. Don't be afraid to ask about your radiation exposure: to the doctor who prescribes your test and the radiologist who interprets it.

PREVENTATIVE CHOLESTEROL LOWERING - IS JUPITER A PLANET?

Astrophysicists debated the status of our smallest planet for years before demoting Pluto to a dwarf planet in 2006, thus changing planet mnemonics for elementary school kids everywhere. Another controversy concerning “Jupiter” is now raging in the medical community.

You have probably guessed I am not discussing the celestial body Jupiter. JUPITER is an acronym for a controversial study, “Justification for the Use of Statins in Prevention: an Intervention Trial Evaluating Rosuvastatin,” published in the New England Journal of Medicine in November, 2008.

Some argue this study changes the landscape of preventative care, vastly expanding the number of people who should take statin medications (Table) to prevent heart attacks and strokes. They point out the average “bad” or LDL cholesterol of the study’s participants was only 108 mg/dl at the start of the study and those who received medication had half the number of heart attacks and strokes as the placebo group.

Others argue the study has major flaws, including the economic incentives of both the lead author and the study’s sponsor AstraZeneca which manufactures Crestor. They highlight the premature termination of the trial which may have inflated the drug’s effect and note other methodological flaws in the study.

Without getting enmeshed in the technical aspects of this debate, I would like to present my take home points about the “JUPITER” controversy:

1. This was a primary prevention study. That means it did not include people who already had coronary disease or a stroke. It is well established that people with established vascular diseases get much more benefit from statin medications than healthier individuals who do not have these blood vessel diseases.
2. Screening most adults with the blood test hs-CRP (high sensitivity C-reactive protein) is not necessary. Everyone in the JUPITER study had an elevated hs-CRP so the study did not address whether adding this blood test helps in determining who should be treated. In certain

cases, when a patient's projected risk of heart disease or strokes is in question, the test may be useful.

3. While the JUPITER trial was unusual in some aspects, it was quite consistent with other statin prevention trials in one important respect: it followed the Rule of One. The Rule states that for every one point decrease in your LDL (bad) cholesterol, whether by medication or diet or exercise, a person's relative risk of heart or stroke disease decreases by one percent. In the JUPITER trial, the potent statin drug rovastatin (Crestor) decreased the bad cholesterol from 108 to 55, about 50 points. It was not surprising to those who know the Rule, that the relative risk of vascular events like heart attacks and strokes was reduced by almost exactly 50%.
4. The key to cutting through the hype of this debate is understanding why I underlined and italicized relative risk.

Let's take two individuals who have the exact same LDL cholesterol of 108. Derek is a healthy 39 year old with no other vascular risk factors: he does not smoke, or have high blood pressure or diabetes, he has a high good (HDL) cholesterol, no family history of early heart attacks or strokes and jogs three miles a day. Craig is a sedentary 68 year old, who smokes a pack a day, has high blood pressure, diabetes and a very low level of good cholesterol.

Derek has an estimated low (absolute) risk of getting a heart problem or stroke in the next 10 years, about one chance in a hundred or 1%. Craig's ten year (absolute) risk is quite different, about 30%. Both are put on a statin drug which lowers their bad cholesterol by 50 points. They follow the Rule of One and their relative risk decreases by 50%. At the end of ten years of medication use, Derek's risk decreases from 1% to a half percent while Craig's risk (if he hasn't died of lung cancer) decreases from 30% to 15%, a much larger benefit. The same principle applies to women.

In summary, I would have to come down on the side that JUPITER is not a planet. It is not revolutionary (excuse the pun) and is more like a dwarf planet in the medical literature. Physicians should not start adding hs-CRP routinely to blood test prescriptions and we should not add statin drugs to

our water supply. These drugs remain important in our armamentarium to reduce cardiac risk and the study did demonstrate to doctors that the Rule of One applies to people who start off with lower bad cholesterol than we often treat. However, the overall benefit of statins relates to a person's specific vascular risk. The lower that absolute risk, the lower the probability statins will benefit that individual. The participants in the JUPITER were older and had a fairly high projected risk of vascular disease.

Each person's absolute risk of heart disease and strokes should be estimated before deciding whether the risks of lifelong medication use is justified by its benefits. Those marketing pharmaceuticals are shouting, "reduce your risk of heart attacks by 50%!" We should be shouting back, "fifty percent of what?"

STATIN DRUGS	
Rouvastatin	(Crestor)
Pitavastatin	(Livalo)
Atorvastatin**	(Lipitor)
Simvastatin*	(Zocor)
Lovastatin*	(Mevacor)
Pravastatin*	(Pravachol)
Fluvastatin*	(Lescol)

Trade names in parentheses.
*** Available generic**
**** Expected to be generic in next year**

January 1, 2011

NEWER MEDICARE PREVENTATIVE SERVICES

There are now two different preventative-oriented Medicare benefits. The first is called the Initial Preventative Physical Examination (IPPE), which is also called the Welcome to Medicare physical. It became effective January 1st, 2005. Patients are eligible for this benefit only once, in the first year of Medicare enrollment. The second benefit began January 1st, 2011 and is called the Annual Wellness Visit to provide a Personalized Preventative Plan or Annual Wellness Visit (AWV)*. It was part of the March 2010 Federal Health Care Reform Act. The AWV is an annual benefit but can not be provided within a year of the IPPE.

If you are dizzy with acronyms, join the club. Despite some initial confusion, neither of these benefits is the expanded preventative services I have been providing annually to Medicare patients. My office manager and I, with legal counsel, are still trying to understand all the particulars. We should be able to clarify this situation shortly and will have more information available in the office.

*This is also called the Annual Wellness Visit, including Personalized Prevention Plan Services (PPPS).

February 2, 2011

UPDATE-VITAMIN D

The Institute of Medicine recently warned about excessive vitamin D use. I believe they were responding to overly enthusiastic vitamin D dosing by doctors in response to the “association” studies alluded to in my previous “Vitamin D: Now” perspective (see above, April 4, 2009). The Institute’s recommended dietary allowance for Vitamin D is 600 units a day, (age 71 and above “may require...800 units” a day). My opinion is these recommendations are somewhat low. However, I do agree with the Institute’s recommendation that, for most people, the upper level of safe vitamin D intake is 4,000 units a day.

February 5, 2011

UPDATE ON CARDIAC RISK ASSESSMENT

This update concerns screening individuals without symptoms or history of coronary disease.

Primary care physicians estimate their patient's risk for coronary disease using traditional risk factors. These include age, sex, good and bad cholesterol levels, tobacco use, diabetes, hypertension and family history of heart disease. Recently, the American College of Cardiology/American Heart Association released updated guidelines on this subject. The guidelines stress the importance of the traditional risk factors listed above, but also listed other cardiac risk assessment tools that may be appropriate in selected patients.

One such tool that can add to an individual's cardiac risk assessment is CACS or computed tomography coronary artery calcium scoring. This CAT scan test has been shown to more accurately predict an individual's heart risk in long term follow up studies better than the aforementioned risk factors alone. The test detects calcium in coronary arteries, which correlates with atherosclerotic blockage in the heart arteries. It is not the same test as coronary CT angiography noted in my March 2009 perspective. That test uses intravenous contrast dye and gives a much higher radiation dose to the patient. The calcium score is most often used in individuals with intermediate risk for coronary disease based on traditional risk factor assessment. People at very low or high risk for coronary disease generally don't benefit from the CACS because their preventative coronary care (ex. aspirin, diet, exercise, cholesterol lowering drugs) will not

typically be affected by the results of the test. However, the treatment of those with intermediate coronary risk may change significantly after the CACS results are known.

What are the downsides of CACS testing? As you know, I am concerned about radiation exposure. The CACS, like any CAT scan test, exposes patients to radiation. Yet recently, technical advances have substantially reduced this dose (to one to several mSV, compare to radiation doses in Cardiology Studies table in March 2009 perspective above). Additionally, CACS testing for asymptomatic individuals is often not covered by insurance companies. Again, however, the cost of the test has dropped dramatically in recent years.

I have surveyed local radiology testing facilities, and can share cost and radiation exposure information with my patients. I have used CACS for selected patients and based my preventative treatment on the test's results. Of course, this is a rapidly changing field, and cardiac risk assessment will likely change as new information, technology and studies become available.