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REPORT

Body Scans
Do you know the risk?

Scan centers make body scans sound like they're as safe as a stroll down Fifth Avenue. Our investigation into the scan industry raises grave doubts about the safety of so-called health scans.

Ever considered relaxing in a radioactive bath? Back in the 1920s, you could buy radioactive bath salts. They were a cure for insomnia. Once in bed, you could apply your Radium Ore Healing Pad-a nifty device said to be good for stomach, liver and spine. You might think this is laughable - you wouldn't consider taking a radioactive bath or curling up with a radioactive heating pad. But you might consider getting a body scan-something that may turn out to be just as laughable and far more dangerous in the long run.

Body scans are the latest health fad. A blizzard of media attention has healthy people flocking to "scan centers" to get their bodies scanned. The concept is terrific. State-of-the-art machines known as CTs (computed tomography) "slice" internal organs into wafer-thin serial images that are then viewed on a computer screen. CT scans can reveal cancer, heart disease, osteoporosis and more at their earliest stages. They don't hurt, they're fast and if you've got $700 to $1300, you too can see your insides.

The danger

Sounds great and it is great-except for one thing. Radiation. And lots of it. In effective doses, one CT chest scan is the equivalent of 400 chest x rays or 3.6 years of background radiation; a scan of the abdomen 500 chest x rays or 4.5 years of natural background radiation. A scan of the head is the equivalent of 115 chest x rays, or one year of natural background radiation.* Combine the chest and abdomen, and you've got a body scan-almost 1,000 x rays (imagine sitting on an x ray table while 1,000 x rays are taken). These are "effective doses", meaning that depending on your body type and the scanner, you could get even more radiation. It's estimated that the risk of a chest x ray causing fatal cancer is 1-in-1,000,000. A CT scan of the abdomen has been estimated to up the risk to 1-in-2,000.** All of this for what experienced radiologists say are "unnecessary evaluations".

According to Dr. Robert Stanley, president of the American Roentgen Ray Society, a 45-year-old healthy person who gets one scan doesn't have to worry. But the FDA's Dr. Thomas Shope has cautioned that multiple scans can expose a person to radiation approaching the lower levels of Hiroshima and Nagasaki. A controversial new report estimates that if 600,000 children get head and abdomen CT scans, 500 will get cancer from those scans. The body doesn't forget radiation: it keeps count of every x ray you get. It's important to think about your own lifetime exposure before you volunteer to be irradiated. Radiation damage to DNA is never completely repaired.

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So-called "health scans" or "body scans" have gotten the FDA's attention. CT scanners were never intended to be used in people with no symptoms and unknown risk. There are many diagnostics that can be done for a person who is concerned about their health that either don't involve radiation, or involve significantly less. These modalities can be used before a CT scan. CTs were designed as serious diagnostic devices, not health enhancers.

Experienced radiologists are also distancing themselves from whole body scans in a big way. The American Roentgen Ray Society wouldn't be the first place you'd look for a CT critic. Yet its president is highly critical of whole body CT screening in asymptomatic people. Stanley, who knows CTs inside and out, points out that the damage from a body scan might not be evident for many years. CT scans, he says, are much more complex than simply putting a person in a scanner and reading a computer print-out. That's like taking a jet fighter out for a joy ride.

It has been repeatedly proven that CT scans are subjecting people to unnecessarily high levels of radiation. New calls by

radiologists themselves for radiation reductions are only the latest in a decades-old demand for radiation reductions. Radiation reductions of 50% or more are possible today without any effect on picture quality. A study published in 1991 on CT scans of the head is typical: "While computed tomography (CT) has become an important imaging modality in the evaluation of the paranasal sinuses, the radiation dose remains higher than is necessary… images were of diagnostic quality even when dose levels were reduced by a factor of 28."

Yet despite these kinds of findings, radiologists continue to ignore the issue of radiation exposure, and manufacturers carry on business as usual. The public has been in the dark about radiation and CT scans until recently when the media picked up on studies published in the American Journal of Roentgenology showing that CT radiation is off the map. One of the editorials is unprecedented in demanding that CT manufacturers lower the radiation. Another asserts that radiologists have been unaware or indifferent to the high doses of radiation associated with CTs.

Rapid scans

Some scan centers offer "rapid scans"-usually for detecting calcium in arteries. A common perception is that a speedy scan exposes you to less radiation. This isn't necessarily true. "Rapid" scans are like a stop-action camera. They enable radiologists to capture an image of a beating heart or a scanee who moves. In order to do this, the machine must generate more intense radiation. However, although the person undergoing the scan is subjected to more radiation, it is for less time. For this reason, rapid scans expose a scanee to about the same amount of radiation as a regular scan, although some scanners generate more or less than others.

The amount of radiation a scanner generates is not regulated by the FDA; however, the agency does require that scan manufacturers disclose the radiation dose to anyone who asks. Excessive radiation exposure is often the end result of the quest for good picture quality. Picture quality is a big selling point for manufacturers. Their promotional material is full of information about how good the pictures are, but virtually silent when it comes to radiation doses.

The next generation of scanners is supposed to automatically adjust the amount of radiation according to a person's own absorption potential. For example, if a child is given the same amount of radiation as an adult, they will be much more affected by it. Similarly, a heavy person will diffuse or divert more of the radiation away from internal organs than a thin person, and be damaged less. The need for automatic adjustment is obvious, yet self-adjusting scanners are not on the market yet.

Heart scans

Scan centers are offering scans of the heart to detect calcium deposits in coronary arteries. The American Heart Association in collaboration with the American College of Cardiology has issued a statement of non-support of Electron-beam computed tomography (EBCT)-rapid scans-for heart disease detection in asymptomatic people. Their position is that rapid scans are no more predictive than usual risk factors. For example, ankle-brachial pressure index-a simple measurement-is highly predictive of whether or not a person with no symptoms will have a heart attack, whether they will die of that heart attack and whether they have narrowing of the arteries. The accuracy of ankle-brachial pressure as an indicator of heart disease risk is on par with smoking, the most predictive indicator. It and homocysteine levels are better predictors of heart disease than cholesterol levels, with one study suggesting that homocysteine is better at predicting the extent of atherosclerosis in low-risk patients than high-risk. C-reactive protein is another predictor. All are simple tests that can be performed at any doctor's office without exposing you to radiation.

Healthy radiation?

The idea of safe and healthy radiation won't go away. As late as 1964, radioactive cigarette holders were being sold to protect a smoker against the "injurious elements" in cigarettes. Today, if you live in Japan, you can buy an "Endless Refrigerator/ Freezer Deodorizer". This plastic device (which was banned in the U.S.) is impregnated with radioactive Th-232. It has been commented that since the half-life of Th-232 is 10 billion years, the product is truly endless. In 1981, a department store in West Virginia was informed that the x ray device it was using to fit shoes had been banned a decade before. Today, you can subject yourself to a "health scan" and find out what your insides look like. Is this health or hype?

The AHA and ACC also point out that CT scans only measure calcium, and calcium is only one facet of heart disease. EBCT does not detect "soft" lesions or unstable plaques. And while the presence of calcium is highly predictive of having a heart attack, the groups argue that false-positives "can result in additional expensive and unnecessary testing to rule out a diagnosis of CAD (coronary artery disease)." In other words, if you get a scan at a scan center and something shows up, you will have to undergo additional tests that may involve more radiation to find out what it means. One of those tests may be the same scan, only this time with intravenous contrast which can illuminate lesions, plaque and the like.

The failure to use intravenous contrast is one of the problems with scan centers. CT scans done at such centers are one-half of a proper scan. The other half is the contrast material. It's the contrast material that tells the story. It enables the radiologist to

differentiate between cancer and a benign growth, heart disease and calcification only.

Virtual colonoscopy

Another popular scan these days is a CT scan of the gut. "Virtual colonoscopies" appear to have widespread support, with some predicting they will become the next mammogram if they can be improved. However, radiation exposure is one of the hurdles that has to be overcome before virtual colonoscopies replace colonoscopies as the diagnostic tool for colon cancer, according to Dr. Joseph T. Ferrucci of the American Roentgen Ray Society. There are other problems as well.

Colon cancer is the second most deadly cancer in the U.S. (after lung cancer). The number of people who have colon cancer without knowing it is alarming. A study published in the New England Journal of Medicine found that 37% of men tested (only some of which were at high risk) had adenomas or invasive cancer without knowing it. Sigmoidoscopy, a procedure where the doctor examines the lowest part of the colon, is inadequate to diagnose this disease. Anyone age 50 or over with average risk factors is advised to get a colonoscopy which can enable the physician to see the entire colon. Men are especially at risk for colon cancer. The good news is that colon cancer responds to treatment if caught early. It's clear that colonoscopies save lives. Unfortunately, the unpleasantness of the procedure keeps some people away until they have symptoms so obvious, they can't ignore them anymore, and by then cancer can be advanced.

Virtual colonoscopy will change all that once it's perfected and put into widespread use. The studies already look very promising on virtual colonoscopy. But there are problems that have to be overcome before virtual colonoscopy replaces traditional colonoscopy. One of them is that although virtual colonoscopy detects most cancers and growths 10 mm or larger, it has trouble with small polyps and flat adenomas. Some cancers are simply undetectable by virtual colonoscopy at this time.

But, unlike other scan procedures where the risks of unnecessary radiation exposure and side effects may outweigh the benefits, the high incidence of colon cancer and the favorable response it has to early detection make the risk/benefit ratio of this CT scan very favorable. Older men are particularly at risk and they should undergo a colonoscopy no matter what. A virtual colonoscopy is better than no colonoscopy, but traditional colonoscopy remains the gold standard for diagnosing colon cancer and precancerous conditions. Young people with no symptoms and no risk factors should not get virtual colonoscopies. If such a person can't sleep at night wondering if they have colon cancer, they should get the traditional colonoscopy that involves no radiation.

Would you swallow a camera?

Given Imaging Ltd. thinks you might if you're having problems with your small intestine. A tiny camera is put into a capsule that has a tiny windshield. As it makes its way through the small intestine, it takes pictures and relays them back to a data recorder worn around the waist. That data is then transferred to a computer and analyzed. Unlike an endoscope, the capsules can take pictures of all 20 feet of the small bowel. It's painless, it's quick, it's highly efficient, and it has just been FDA-approved. Unfortunately, the colon version is not yet available.

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*Data on x ray equivalencies obtained from the European Commission. The International Commission on Radiological Protection is in accordance with these figures as being average doses world-wide.

**European Commission Radiation Protection 118, p 20.

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Breast scans

As a screening device for breast cancer, CT scans do not work. Some radiologists are alarmed that women might think a chest or body scan can replace a mammogram. There are many differences between a CT scan and a mammogram. Mammograms were designed specifically for screening the breasts. They have a history of development and refinement behind them. They use far less radiation (200 millirads, or approximately eight chest x rays), and they reveal far more. While CT scans can be used for guiding breast biopsies, they are not a good screening device for breast cancer.

Unlike CT scan centers which are regulated by the state only, mammogram facilities have to be certified by the FDA. They must use the lowest radiation possible and they must retain radiologists who read at least 480 mammograms a year and attend continuing education classes. Radiologists who read mammograms have a lot of experience in looking for breast cancer.

CT misdiagnosis

Most people don't think about what will happen after the scan. But according to a Wall Street Journal report, one scan center sends 80% of its scanees to specialists post-scan. Either a whole lot of people are very sick or scan centers really don't know what they're doing. Stanley points to comments like one recently attributed to the director of a scan center who said that he's never seen a normal body scan-to argue that something is wrong with what they're doing. "Their motivation is misdirected," he argues. CT scans, he says, were never intended to be used without contrast material in asymptomatic people. Scans used in this way can reveal all sorts of "abnormalities". "When you're looking for abnormalities millimeter-by-millimeter, you're going to find them," he says. A person may go through thousands of dollars of unnecessary and invasive tests after a scan, including more radiation, to find out they have. . . nothing. It's like believing every mole on your body is melanoma. Stanley points out that if you take anyone who has died and section their kidneys millimeter-by-millimeter, in 22% of them you will find renal tumors. (A similar situation exists in the liver where "cavernous angiomas" develop). But these tumors are rarely cancerous, and rarely develop into full-blown cancer which is detectable anyway by other means, is uncommon, and treatable.

Stanley is not against screening. Mammograms and other screening modalities save lives (although he's quick to point out that diagnosing cancer early does not always lower the mortality rate-it depends on the type of cancer). But he and other radiologists are adamantly against asymptomatic people undergoing whole body scans as part of a health program.

Let's face it: blanketing yourself with radiation is not healthy. Because there is a risk involved, serious consideration should be given to whether the benefit is likely to be offset by the damage a CT scan does to the body. By all means, a person at risk for a disease, either because of lifestyle or genetics, should get whatever tests they need to assure them they are healthy. In most cases, tests not involving radiation can be done first. These tests should be exhausted before a CT is considered. If a CT scan is warranted, it should be done-correctly, with proper contrast material, by an experienced radiologist in that field. Contrast material increases the ability of the radiologist to detect small cancers, precancerous conditions, and distinguish between something important and something that isn't. If a body scan is chosen as the first-line diagnostic tool and it finds something, chances are the scan will have to be repeated with intravenous contrast material, subjecting the scanee to a double dose of radiation.

Many people who have undergone body scans did so because they weren't doing what they were supposed to do healthwise. The scan motivated them to pay attention to their health. And that would be fine if CT scans were totally benign. They're not, and any person contemplating a scan should ask themselves before they walk into a scan center if they really need a big dose of radiation to provoke them into doing what they already know they should be doing. Ask yourself: do I really need to undergo the equivalent of

Supplements for Radiation

If you must undergo radiation diagnostics for serious medical reasons, you may want to take thiol antioxidants including N-Acetylcysteine (NAC), S-adenosylmethionine (SAMe) or glutathione. Studies show that thiols help stop free radicals generated by ionizing radiation. NAC also works in at least one other very interesting way. It actually facilitates the destruction of damaged cells. By not allowing such cells to survive, the risk of mutations is reduced. (Mutations inevitably result, even though the

1,000 x rays to find out I'm not exercising, I'm not eating right, and I need to buy a better mattress for my aching back? Can motivation and peace-of-mind be obtained another way?

CT scans have a place in diagnostics. To a person with symptoms of a serious disease or serious risk factors (such as smoking or familial heart disease), the benefit of getting a proper scan, with intravenous contrast, outweighs the risk. But the risk/benefit ratio collapses when the person getting a scan is a healthy individual with no symptoms; vague risk factors, and the scan is delivering a whopping dose of radiation. A person truly concerned about their health won't place that bet. We can't feel it, we don't see it, but we've got to believe that radiation is not healthy. We've got to listen to decades of data that tells us that radiation is something to be avoided when possible. Otherwise, we might as well sleep with Radium Ore Healing Pads tucked under our pillows, as the manufacturer of those devices once suggested.

For the European Commission guidelines on radiation imaging, go to http://europa.eu.int, choose "Commission" and search "Radiation Protection 118". For information on x ray/CT equivalency, see pg. 19.

The International Commission on Radiological Protection can be accessed at www.ICRP.org. See page 11 of "Diagnostic Reference Levels in Medical Imaging" for radiation levels of CT scans.

For the American College of Cardiology/American Heart Association's position paper on EBCT, see http://www.acc.org.

Dr. Stanley's comments will be published in an upcoming issue of the American Journal of Roentgenology.

For information on radiation, see http://www.x-raysandhealth.org.

body repairs most DNA damage). A substantial amount of thiol antioxidants has to be taken both before the scan and after. Melatonin is another antioxidant that can protect against ionizing radiation. And caffeine seems like an unlikely protectant, but it is apparently-as long as it's taken during irradiation. If taken after, it may actually enhance damage. Be aware that although supplements can help, nothing short of a lead apron significantly protects against radiation.

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Important information you should have

According to the Code of Federal Regulations, Section 1020.33(c)(2), the manufacturers of CT scanners must provide information on radiation dose to the public. We contacted General Electric, a major manufacturer of radiation devices. GE representatives refused to provide us any numbers on radiation dose. They, instead, offered us a copy of the technical manual for a CT scanner. A representative told us that that is the extent of their obligation under the law. When repeatedly asked to "translate" highly technical specifications into something we could understand (like rads), or give us information on average radiation doses for any of their scanners, GE refused.

Siemens, another manufacturer, was more forthcoming; however, we ended up with no definite data from them either. The promotional brochure they gave us for one of its scanners contains one table on dose which requires multiple computations to arrive at dose figures which are still ambiguous. When questioned about what the table actually means to a person sitting under a scanner, they abandoned that, and gave us effective doses in millirads for men and for women, but the doses they provided were several magnitudes lower than anything else we had read (for example, they said the radiation exposure for a lung scan was about half that for a chest x ray). They later informed us that their computations had been wrong, but they still insist that high-radiation CT scans are a thing of the past, and that a "three dimensional dataset of the lungs can be acquired today with exposure on the order of magnitude of conventional chest x ray."

As we were going to press, a Siemens representative called and informed us that the company is testing a new device that can reduce radiation exposure up to 50%. The device, known as "Care Dose", can be installed in any scanner in about two hours. Once in place, the device continuously monitors radiation during the scan, and adjusts the amount according to the shape and body size of the scanee. The first "Care Dose" is being installed at the Cleveland Clinic.

Anyone contemplating a body scan should seek dose information from the scan center. Radiation doses are variable, depending on the type of scanner, the body size, what's being scanned and how the machine is operated. Do not accept answers such as "it's like a day in the sun" or "it's the same amount of radiation as flying across the country." These answers tell you nothing about the dose of radiation you yourself will be exposed to. A chest x ray is about 25 millirads, so if you find out how many millirads you will be exposed to, you can get a rough idea of the equivalent chest x rays. If the scan center can't, or refuses to give you information about radiation, find out the name of the scanner and call the manufacturer. By law, they must give you information.

GE can be reached through their web site at www.GEmedicalsystems.com.

Siemens can be reached at (800) 422-7120, or through their web site at http://siemensmedical.com.

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