At Beth Israel, the authors sent surveys to 648 staff members. This included physicians, nurses, residents, technologists, and administrators. More than half, or 363 staff members, filled out the survey.

The results:

#1: Only half of the staff indicated they always report safety problems. Remarkably, half of the staff does not always report safety problems or violations! This is a potential issue.

I will frame point #2 as a quiz question: Which group in the radiology department is least likely to speak up about safety issues? The answer? The residents and fellows. 89% do not report safety problems, by their own admission! Another potential nightmare for your department head. The other groups that do not always report safety problems: schedulers, technologists, and transport staff. More than 50% do not report problems.

#3: What is the most important reason safety problems are not reported? The most common reason, the staff only wanted to report problems unless they were absolutely certain they were right. They did want to cry wolf. I suppose that is very common. Most of us do not want to make a fuss for no reason. Part of that could have been 9/11. I’m sure those flying instructors thought the pilot training was a little odd, or landlords marveled at all the cash paid for the apartments and hotels. Now we go to the airport – we are told, if you see something, say something. But we do not do this at our hospitals and clinics. That behavior is not encouraged.

#4: The second-most common barrier, this is termed the “authority gradient.” A study in 1966, nurses obeyed the wrong physician order 80% of the time, even when they knew it was wrong. In my experience, that problem with nurses no longer exists. But we still have huge issues with residents and fellows – a large proportion do not report safety problems, probably because of their junior status. We frequently talk about the captain of the ship in hospitals – the captain is supposed to know everything and be responsible for everything that goes on. That attitude results in a lot of lawsuits against physicians. And the captain of the ship approach is really detrimental to patient safety.

Another major problem, lack of listening. Staff indicated that no one had or would listen to their safety issues.

In conclusion: we all lose when safety issues happen in a hospital or in private clinics. As a manager, you might feel anxious even now, thinking that only half of your staff will mention a safety problem. Each of you are staff members – and you remember those small safety issues that happened. And usually, you get away with it – no bad outcomes. But next time it may happen. The authors of this interesting article have included a web link to the survey they used. You might want to compare your practice results with theirs.

Next: on to some of our science articles for September.
What about clinical applications? Temporal lobe epilepsy is thought to be a potential application. In 2011, an article in Radiology suggested that hippocampal sclerosis is better depicted at 7.0-T. In addition, you have probably seen amazing 7.0-T images of brain vascularity. This may be critical for determining boundaries and vascularity of brain tumors. Cartilage imaging may also benefit from 7.0-T imaging.

What about 7.0-T safety? We know very little about this to date, and there are few published articles on 7.0-T safety. Nearly all experience is from research sites. Many centers are said to exclude all patients with implanted devices and with tattoos. Dr. Frank Shellock is famous for his work on MRI safety. In 2014, he published an article about various implanted devices at 7.0-T. This included aneurysm clips, surgical clips, and orthopedic implants and breast biopsy markers. Of 28 implants, there were 8 with concerns at 7.0-T. Safety concerns include heating of the implant, and deflection or pulling of the implant by the magnetic field. Large artifacts from the metal implants are also a practical concern.

Dental implants are the most commonly encountered type of implant. Dental fillings can be made from precious materials such as gold. But for 200 years, a material called dental amalgam has also been used. That’s the silver material that most people my generation had when they were children. Dental amalgam contains about 50% mercury. Dental amalgam is used in about 100 million procedures in the United States per year. Since 2008, dental amalgam has been forbidden or restricted in Sweden, Norway, Denmark, and Germany. The European Parliament has adopted a ban on amalgam use in children younger than 15 and in pregnant women.

What is the concern with mercury and dental amalgam? Mercury can be released by evaporation of mercury and then inhaled. Or the mercury ions are released into the saliva. Free mercury has detrimental effects on the body, and federal agencies limit our exposure to mercury.

Purpose: The purpose of this study was to see if mercury was released from dental amalgam at 1.5-T or 7.0-T MRI.

Methods: The authors started with human teeth that were extracted from dental patients. They scored hippocampal calcification as present or absent on one or both sides. They also scored calcification medial to this, in the brain substance of the temporal lobe. For the CT scans, the authors looked near the posterior horns of the lateral ventricles, to identify hippocampal calcification in the temporal lobes. If you have not looked at a brain CT for a while, the predominant posterior and lateral calcification is of the choroid plexus. The choroid plexus produces cerebrospinal fluid. Calcification of the choroid plexus is considered to be a normal variant. Hippocampal calcification is just medial to this, in the brain substance of the temporal lobe.

The authors scored hippocampal calcification as present or absent on one or both sides. They also scored calcification

## Hippocampal Calcifications: Risk Factors and Association with Cognitive Function

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Our next article is about calcification in the brain. The title is “Hippocampal Calcifications: Risk Factors and Association with Cognitive Function.” The first author is Dr. Esther de Brouwer, from Utrecht in the Netherlands.

Background. The topic is dementia and whether brain calcification is associated with dementia. Dementia includes Alzheimer disease and vascular brain lesions. These lead to atrophy of brain cortex and the hippocampus.

Hippocampus calcification has been studied pathologically. The calcification seems to be related to vasculopathy and fibrosis. Calcification is associated with neuronal loss. A reasonable conclusion may be that hippocampal calcification resulting from vascular abnormalities contributes to atrophy of the hippocampus. The hippocampus is associated with memory function. The authors asked the question, is hippocampal calcification associated with cognitive function? And, what factors lead to hippocampal calcification?

Methods: The authors evaluated 2,000 patients who were referred to the memory clinic at their institution. Patients had an extensive evaluation of cognitive function. Patients were assessed for dementia, including Alzheimer disease. In addition, all patients had a CT scan of the brain. They also had clinical history about various risk factors that might be related to hippocampal classification.

For the CT scans, the authors looked near the posterior horns of the lateral ventricles, to identify hippocampal calcification in the temporal lobes. If you have not looked at a brain CT for a while, the predominant posterior and lateral calcification is of the choroid plexus. The choroid plexus produces cerebrospinal fluid. Calcification of the choroid plexus is considered to be a normal variant. Hippocampal calcification is just medial to this, in the brain substance of the temporal lobe.

The authors scored hippocampal calcification as present or absent on one or both sides. They also scored calcification
as mild, moderate, or severe. Mild was one high-attenuation area. Moderate was multiple areas. Severe was confluent calcification.

Results: The average age of the patients was 78. Nine did not get a CT scan, so 1,991 patients were included. 20% had hippocampal calcification. 40% were men, 60% were women.

Recently, we spoke in this podcast about multivariable regression analysis. That approach was used in this article. This is done to add up all of the factors you can think of that might cause calcification. Age and gender are always included. Educational level is used to measure socioeconomic status. Lifestyle and economic status is often related to the prevalence of disease. Statistical software gives a weighting to all of the various factors. Which ones are most important to predict who had hippocampal calcification?

When all of the risk factors were added together, there were only 3 main factors related to hippocampal calcification: age, diabetes, and smoking. If you smoked or had diabetes, you were 50% more likely to have hippocampal calcification. Also, older age was associated with calcification. For every extra year of age, there was a 5% likelihood of calcification. There was no difference between men and women.

The next issue was to determine if calcification was associated with cognitive function. Of the nearly 2,000 people in the study, 42% were diagnosed with Alzheimer disease. 25% had mild cognitive impairment.

The authors added up the all of the possible risk factors, including smoking, diabetes, age, and gender. The regression equation was set up to see if those risk factors were associated with cognitive impairment. There was no association with cognitive impairment.

Conclusion: There is new knowledge here. Several points were not previously known, mostly because prior studies had much smaller sample sizes. Here are the main points:

- Calcification of the hippocampus is more frequent in the brain if you have diabetes or if you smoke. The other factor is age. These are well-known risk factors related to vascular disease. You can think of diabetes and smoking as causing accelerated aging. The current results in thousands of patients strongly reinforce pathology studies, that abnormal arterial vascular calcifications are associated with hippocampal calcification.
- Hippocampal calcification is not associated with cognitive decline that could be detected. This contradicts earlier, small studies. In those studies, there was no multivariable adjustment for factors such as smoking and diabetes.
- If you dictate a CT scan with extensive calcification and want to make a comment: indicate if hippocampal calcification is on one or both sides, and if it is mild, moderate, or severe. The clinical significance is not known.

Overall, this article reminded me of other landmark research articles on calcification. Radiologists mostly ignored coronary artery calcification on CT scans for many years. It was so common, radiologists could not even think of it as important. It simply seemed that if you were older, you had more coronary calcification. Then, two cardiologists published a research article in a cardiology journal, called the Journal of the American College of Cardiology, or JACC, in 1990. The first author of that article also wrote a best-selling book, called “The South Beach Diet.” His name is Arthur Agatston. He made a lot more money from the diet book. But in cardiovascular medicine, we quantify coronary calcification by the Agatston Method, first published in 1990. The NIH has spent several hundred million dollars on research since then about coronary calcification. The three most powerful reasons for coronary artery calcification are the same as in the brain: age, diabetes, and smoking. Sometimes simple observations can be quite powerful.

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Ablation versus Resection for Stage 1A Renal Cell Carcinoma: National Variation in Clinical Management and Selected Outcomes

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Johannes Uhlig, MD, MPH • Nima Kokabi, MD • Minzhi Xing, MD, MPH • Hyun S. Kim, MD

The last article for today is about renal cell cancers, and early treatment. The problem is growing, with many small tumors being incidentally detected by imaging studies. The title is, “Ablation versus Resection for Stage 1A Renal Cell Carcinoma: National Variation in Clinical Management and Selected Outcomes.” The article first author is Dr. Johannes Uhlig; the senior author is Dr. Kevin Kim. They are at Yale University.

Background. Stage T1A renal cell cancers are up to 4 cm, and are in the kidney only. Overall survival is about 80%, but this depends on age and comorbidities. The treatments are either surgery, or minimally invasive thermal ablation. Thermal ablation can be either cryoablation or radiofrequency ablation. Surgery is typically partial nephrectomy.

National guidelines call for consideration of thermal ablation especially for older individuals. No differences in survival have been demonstrated for percutaneous thermal ablation versus laparoscopic thermal ablation. A prior survey suggested that thermal ablation is underused compared to surgery.

Purpose: The purpose of this study was to compare the use of thermal ablation to surgery in a large United States database.

Methods: The National Cancer Database was used. This contains data on about 70% of cancer cases in the U.S. The records were evaluated from 2004 to 2013. Adult patients were evaluated. The authors looked at the use of surgery and thermal ablation, and overall survival.

Results.

1. Thermal ablation was used to treat only 9% of approximately 56,000 patients. By comparison, 91% of patients had surgery. About 60% of those who had surgery had a partial nephrectomy, the remainder had complete nephrectomy.

2. Patients who had thermal ablation were about 8 years older than those who had surgery. They were usually white males with treatment in an academic medical center. Thermal ablation was most common in the Southeast Atlantic region, where about 12% of patients had thermal ablation.

3. In the database, 4,817 patients had thermal ablation. The authors found 4,817 matching patients who had surgery. The groups were matched on age and gender, and other comorbidities.

When this matched group was compared, 30-day and 90-day survival was better for thermal ablation. At 90 days, no patients with thermal ablation had died. However, 68 patients who underwent surgery had died.

4. Long-term survival: The 5-year survival for nephrectomy was 82%. The 5-year survival for thermal ablation was not as good, at 76%.
The situation was different, however, for patients who were more than 65 years old. The survival for this older group was the same for both procedures, about 54 to 59% at 5 years.

Conclusions: Clearly, minimally invasive techniques resulted in fewer immediate complications, as well as fewer deaths at 30 and 90 days.

However, in general, survival is somewhat better for surgery compared to percutaneous thermal ablation. For patients who are older than 65 years, survival is comparable for both techniques. This is likely because patients who are referred for thermal ablation are older and more frail. They may not withstand the rigors of surgery. If they have surgery, they could have a number of complications that could result in death.

This is yet another study that also shows wide variation in treatment depending on where you live in the United States. If you live in the Northeast United States, 94% of patients have surgery. If you live in the Southeast United States along the coast, only 88% of patients have surgery. These referral biases might have to do with income levels, training, and tradition for the various procedures.

The conclusion? If you are younger and otherwise in good health, it seems that surgery is the best option for long-term health. Otherwise, as patients get older, their survival is the same with thermal ablation. It is likely that their quality of life will be better as well, with fewer complications after the thermal ablation procedures compared to surgery.

That concludes this week’s articles. I hope these podcasts were helpful to you. Until next time, this is Dr. David Bluemke for the journal *Radiology*. I hope you have a good rest of your week.