Cobalt

Diagnosis • Research • Education

Interview with Dr Sarah Vinnicombe, Consultant Radiologist and honorary Senior Lecturer, Breast Centre

What is the role of a Radiologist and how did you come to specialise in radiology and breast cancer/imaging?

Breast imaging, I would say is fundamental to sorting out breast problems. If somebody goes along to their GP with a breast problem, like a lump or tenderness or changes in the nipple, they will usually be referred along to a Breast clinic at their local Breast Centre.

What the breast radiologist does is carry out and interpret breast imaging tests and inform the patient and the surgeon what the basic problem is, if indeed there is a problem at all, as there is a limit to how much information you can get from physically examining the breast.

We are intermediaries between the surgeons and the patient, and if it turns out that the patient needs an operation after her breast imaging tests and a needle biopsy (which will usually be done by the breast radiologist), then we can help inform the surgeon what sort of operation is needed. We really are absolutely at the centre of a Breast Unit.

Our other major role, aside from helping to diagnose breast symptoms, is to carry out breast screening. As I am sure you know, every woman in the country between the ages of 50 and 70 is entitled to 3 yearly screening mammography as part of the NHS breast screening programme. It's the breast radiologist, together with advanced practitioners, who read those mammograms and determine whether or not there is an abnormality that might have a significant chance of being a cancer. The radiologist is really pivotal to that whole process.

So effectively we have two different hats; we have the screening hat and then we have the symptomatic hat. If you look back at how cancer care has grown in the UK, and indeed the rest of the developed world, breast cancer screening and imaging was really the model for multi-

disciplinary cancer management. When the NHS Breast Screening programme was set up, that kick-started the multi-disciplinary team approach and it has now spread out to all sorts of other cancers as well, because it's accepted that a multidisciplinary patient-focused approach is the best way to deliver care - and the radiologist really is right at the heart of that process.

At the beginning of your studies, did you get involved in lots of different specialisms and then decide that's what I want to do?

My route to radiology was quite, I wouldn't say roundabout exactly, but drawn out! I always loved radiology as a medical student, but after I qualified as a doctor, I did a lot of internal medicine. I was a medical registrar in London and at the time I was trying to decide whether I wanted to specialise in cancer medicine or cardiac medicine or whether actually I really wanted to go for radiology. In the end, I opted for radiology. So,that was then another 6 years training on top of all the training I had already done, but I haven't regretted it for one single moment. When I did my radiology training, I loved virtually all specialist areas of radiology. But, at the end of the day I decided that what I really loved was cancer imaging. That was how I came to specialise in cancer imaging and breast imaging in particular.

What are the signs and symptoms of breast cancer that often instigate further investigation?

The commonest symptom is probably a lump or thickening of the breast tissues. Sometimes women notice nipple changes and sometimes they have a blood-stained nipple discharge, but neither of those symptoms is as common as a lump. Pain is actually very rarely due to breast cancer. Very occasionally, breast cancers can be a bit painful but that's quite unusual.

Why is screening offered to women at certain ages? Why do we wait until after the age of 50?

There's a lot of debate about this, but basically the biggest single risk factors for developing breast cancer are a) obviously being female and b) age. So, even though you hear about breast cancer developing in young women, like Kylie Minogue for example, it's actually relatively unusual. Whenever you are setting up a screening programme, for it to be worthwhile there have to be enough cases of the condition you are screening for. Screening women under the age of 50 has been shown to have some benefit, but the benefit is much smaller than for women over 50 because far fewer women under 50 develop breast cancer in the first place, and this makes it very expensive. The other major problem is that you get a lot of false positive examinations as well. It's important to remember the psychological harm and anxiety that women go through if they are recalled for an abnormality that turns out to be harmless, and we always need to remember the potential harms from breast screening as well as the benefits. That's why, for women at average risk of breast cancer, we don't start routine screening until the age of 50. The lifetime risk of developing breast cancer in this country is about 12%. In other words, roughly 1 in 8 or 9 women are likely to develop breast cancer at some point in their life, but it's very unusual under the age of 50. On the other hand, if you have got a strong family history of breast cancer (perhaps affecting your mother or aunt or sister at a young age), your risk may be a lot higher than that 1 in 9. In that situation, we would actually start screening earlier, usually at the age of 40.

Why has there been a trial calling women for screening between the ages of 47 and 49 and 71 and 73? Is it still going?

It is still going on. If you look at countries where screening is frankly disorganised and is not controlled by regulatory bodies who look after the quality aspects of a national screening programme, there is a tendency to recommend annual mammography from about the age of 40, but it is very haphazard. The evidence for doing that is a bit limited and so, a question that the NHS Breast Screening Programme raised quite a few years ago was whether it would actually be better to start screening at the age of 47 and finish it at age 73. This was in part to make sure that every woman in the UK had their first screening mammogram by the age of 50 and their last one at or just after the age of 70. That trial is still ongoing, but we won't have the results for a few years yet.

What is a mammogram? Can you describe what it is?

It's basically a low dose X-ray. The dose of radiation that is given to the breast tissues is very, very small and there have been lots of studies looking at whether or not that radiation effect is harmful. The bottom line is that, for women over the age of 35, it isn't. What it basically does is give you a picture of the breast, where hopefully you will be able to pick up any abnormal lumps or bumps in the breast. The other thing that it can pick up (and it's one of the reasons mammography is still thought to be a very good test) is the development of little bits of calcium in the breast. This is what we call microcalcification and that calcification can be an early warning sign that some of the breast tissues are starting to behave in a cancerous way. They don't necessarily indicate that there's a cancer, but it may be a sign that the tissues are heading in that direction and mammography is the only test that reliably picks up those little bits of calcium. So that's one of the things we look for on screening mammograms, some of the others being a lump and distortion of the breast tissues.

How is the new equipment different to the existing technology?

One of the things that we have become very aware of in the last five to ten years, the last five years in particular, is that mammograms do not pick up all cancers. If the breast tissues are very dense, that is to say if there is a lot of gland tissue and not much fatty tissue, you can miss cancers altogether. Not because you are not reading the mammogram properly, but simply because the abnormality is not evident on the mammogram. If there is no accompanying microcalcification or distortion, you simply may not be able to see a lump if the surrounding tissue is very dense. That is a real problem. We have known about the issue of the 'dense breast' for some time, but increasingly we have become aware that we need to personalise breast screening according to how likely it is that a mammogram may miss a significant abnormality.

So, what we would like is for breast screening to pick up the cancers that matter and to help us discard or ignore the less aggressive cancers that are probably never going to do the woman any harm in her lifetime. As a way of dealing with the problem of breast density obscuring breast cancers, there have been two different developments in mammography that we think will help. One is the procedure called digital breast tomosynthesis (DBT). You can think of DBT as being a bit like a CT scan. It's still low dose X-ray, but as opposed to just squishing the breast and taking one image, what it does is takes a series of very low dose X-rays at angles through the breast, and the computer part of the mammogram unit then reconstructs those images into a series of slices through the breast. What this does is get rid of overlapping shadows. So if there is a lump, you've a much better

chance of seeing it if you do a DBT examination. There have been lots of studies that have shown that DBT will increase the pick-up of cancers at breast screening by a variable amount. It depends on whether you are looking at UK and European practice or practice in the USA, but basically, you will increase your cancer detection rate by about 20-30%. The other great thing that DBT does is get rid of overlapping shadows, so you cut down the number of false positive examinations that happen when bits of normal breast tissue overlap each other, making it look like a lump when actually, there's nothing there at all. What studies from the USA in particular have shown is that DBT can have a massive impact on your recall rates from screening, and cut down unnecessary recalls by about 30%. That is a huge benefit, because we know that false positive recalls from screening are a major source of anxiety for women, so if we can cut down on those, while at the same time increasing our cancer detection rates that could be really useful.

The other new development that we've started to use in the last five or so years is an examination called contrast enhanced spectral mammography (CESM). CESM works in a slightly different way. It's still a mammogram, but what you do is take two low dose mammograms before and after you've given an intravenous injection of a contrast agent a bit like a dye, much as if you have a CT scan. The dye that we use, combined with advanced computer manipulation of the mammograms, gives us a picture of whether or not there is any abnormal take-up of contrast in the breast and we know from the research that's been done to date that it's a very good test for picking up breast cancers. This, I think, is a potentially really exciting development for the examination of women who've got dense breasts, because it looks as if the sorts of cancers that you pick up with this contrast enhanced mammography technique are the ones that are biologically more aggressive and the ones that we really need to pick up early. What we hope the new equipment will do, is enable us to combine the additional information that we get with DBT with the additional information that we get from the CESM. Now we wouldn't be using it on absolutely everybody. There's no possibility for example of using it in every woman who is coming in for screening, but suppose we've got a woman with a strong family history, who we know is at increased risk, and we know from her mammograms that she's got really dense breasts so we are not seeing into the breasts very well with ordinary mammograms. She might be an ideal person to have this new enhanced mammographic screening technique. It could potentially be fantastic for that.

The other area where we think it could make a big difference is in women who we've shown to have cancer. Sometimes it can be quite difficult from the mammogram to work out just how big the cancer is, and that can have a huge impact on the type of surgery that's planned and in that situation, what we often end up doing is an MRI examination, because MRI is the best technique for picking up breast cancer. It's an extremely sensitive test, but you also get a lot of false positive examinations and, I'll have to be honest, it's quite difficult for women to go through. A breast MRI examination involves the woman lying down with their arms above their head for up to 30 to 40 minutes and going into the MRI tube. Quite a few women have claustrophobia, and if you have a woman who's quite large it can be physically impossible to do it. So, it's quite challenging for the woman and because the demand for MRI is so high in the NHS and it's a scant resource, women with a known breast cancer may have to wait two to three weeks for a scan - and you can imagine that that is not great psychologically if you know you have a breast cancer and you want to get on with treatment as soon as possible. The great advantage of this contrast enhanced mammography technique is we might be able to do it there and then for women who've got a breast cancer if we're not sure how big the cancer is. That could be brilliant, because not only can we do it immediately in the clinic, its much, much quicker. Women aren't going to have to wait two or three weeks and of course it's a fraction of the cost of an MRI scan as well. So we think it could be really exciting development for breast imaging.

Why do you need to compress the breasts to take the image?

There are all sorts of very good reasons for it. The components of the normal breast are all very similar, so there isn't much contrast between the difference components of the breast tissue, whether they are normal or abnormal. So a breast cancer can look very similar to normal glandular tissue in the breast. This is a completely different situation from, for example, a chest X-ray, where you've got great contrast between the bones and the lungs and soft tissues. So in the breast, what we need to do is maximise the contrast between normal and abnormal tissues and the best way to do that with a mammogram is firstly, to use very low energy X-rays and secondly, to compress the breast. What the compression does is get rid of the overlapping tissues, so you get much better contrast between the components of the breast. It maximises the chances of seeing a lump or the little bits of microcalcification we talked about, so unfortunately it is absolutely necessary and there's no way around it at the moment. It's probably worth saying that even with these new techniques like DBT and CESM, unfortunately you still do need to compress the breast.

What is your opinion on people being able to self-refer and have whole body scans?

It certainly is a problem in London where there are many people who use the private sector and are prepared to pay for whole-body scans. I think the problem is that there is a lot of mis-information about these whole body scans, because what they tend to do is pick up abnormalities that are almost certainly harmless, but you don't know what you're dealing with. As a result, a whole load of further tests are required to sort out an abnormality that will probably turn out to be nothing at all. We really don't have a good evidence basis for whole body screening, as been demanded in the States; it's more of a US problem at the moment. To be honest, the evidence for any benefits is not there at the moment. It's quite a different situation if you have a condition, for example a genetic condition, where it's known you are at much higher risk of developing certain tumours. That's a different scenario altogether, and then these whole body techniques can be absolutely fantastic. For an average risk person, without any known risk factors, I think there needs to be a lot more public information about the potential disadvantages of such a scan. And of course in the NHS, where resources are very limited, there's no possibility of providing that sort of service. It's all we can do to provide the service for patients that have symptoms in a timely fashion. I don't think we're at a point where whole body screening is a realistic possibility right now.

FAQs

What is an X-ray?

An X-ray is a quick and painless procedure commonly used to produce images of the inside of the body.

X-rays are a type of radiation that can pass through the body. They can't be seen by the naked eye and you can't feel them.

As they pass through the body, the energy from X-rays is absorbed at different rates by different parts of the body. A detector on the other side of the body picks up the X-rays after they've passed through and turns them into an image.

Dense parts of your body that X-rays find it more difficult to pass through, such as bone, show up as clear white areas on the image. Softer parts that X-rays can pass through more easily, such as your heart and lungs, show up as darker areas.

What is a CT scan?

The scan is carried out by a special type of x-ray machine. The images the machine produces are cross-sections of your body (think slices in a loaf of bread). The parts of your body can be shown in much greater detail than in standard x-ray films, and this helps the doctors diagnose your condition much more accurately.

Our scanner is shaped like a doughnut. You will lie on a moveable bed and pass through the 'doughnut.' A narrow, fan-shaped beam of x-rays is produced from inside the machine, which rotates 360 degrees around you. The x-rays pass through your body and are detected by electronic sensors on the other side of the machine. The information from the machine then passes to a computer which produces a picture of the structure of the inside of your body. The bed moves a small distance to position you for the next picture. It takes about a second to produce each slice. These pictures can then be reconstructed by the computer to form a complete image of the inside of your body.

What is a contrast?

A contrast is a dye used to make blood vessels and organs stand out in images.