A Message from our Chairman

Most cancer research in the UK and in Europe and the USA is concentrated on 'finding the cure'. Genesis Breast Cancer Prevention is different because it believes that 'prevention is better than cure' and so concentrates its efforts on trying to prevent cancer from ever starting. Breast cancer is caused by a mixture of genetic, environmental and western lifestyle factors, and not by one single thing. Thus our research grants fund various projects investigating the genetic causes of breast cancer, environmental factors, diet, lifestyle, methods of screening for breast cancer, cancer prevention drugs, and better surgery.

Our plan is to enable top-quality research into breast cancer prevention through carefully targeted grants to top class investigators. We support their best ideas, provide seed funding for promising avenues of research, encourage them to work collaboratively with other groups in joint research projects, and provide support for some of the most important studies into breast cancer prevention currently being undertaken anywhere in the world.

A particular area of excitement for us is an area of research known as 'breast density'. Breast density has turned out to be a strong risk factor for breast cancer. Density is measured as the proportion of gland (tissue that makes milk) to fat within the breast, and this varies greatly from one individual to another. Women with denser breasts at breast screening age have a higher risk of breast cancer – in fact, women with more than 75% dense breasts have a five times stronger risk of developing breast cancer. Two factors influence breast density – environmental and genetic factors. Some researchers consider breast density to be second only to genetic predisposition in terms of breast cancer risk. It may not be that the density directly leads to breast cancer, but rather that the increased density reflects damaging changes occurring within the breast from other things which are harmful to the breast. An added dimension to the problem is that breast screening and mammography is much less accurate in dense breast tissue, when of course these are the very women at higher risk of breast cancer who need the most accurate scanning tools.

3D Mammography (Tomosynthesis) is an exciting new technology which allows us to see the breast tissue in three dimensions. It has come about as a result of the development of digital mammography, similar to digital photography used in modern cameras and phones. This has opened up new ways of computer processing of the images. In tomosynthesis, several low dose x-rays are taken of the breast at slightly different angles, and these are then formed into a 3-dimensional image consisting of a stack of thin slices. Traditional mammograms can be difficult to interpret in dense breast tissue, and cancers can be difficult or impossible to see. These problems are more marked in younger women who have relatively more dense glandular tissue in their breasts. One of our main goals is to detect breast cancers when they are very small, as that gives the woman the best chance of a good long term outcome. We have been sponsoring a study that uses tomosynthesis for screening women in their forties who are at increased risk of breast cancer. These are generally women who have one or more close relatives who have developed the disease, usually at an early age, and who are being screened through a family history clinic with yearly mammograms. Our study is designed to see whether the use of tomosynthesis in addition to standard mammography reduces the 'false alarm' rate, and whether it allows us to pick up cancers at an earlier stage. The study is being conducted initially at two sites (the Nightingale Centre and Genesis Prevention Centre in Manchester and King's College Hospital in London).

Another current project is examining the molecular basis of breast density. Based on our current data, we suspect that breast density correlates with variations in the manner in which collagen (the fibrous supporting elements of breast tissue) is organised at a molecular level. This supporting collagen acts as a scaffold for breast cells, and hence may influence cells to behave in ways that predispose to cancer initiation. Our research is comparing areas of dense and low-dense breast tissue from post-menopausal ladies to examine the alignment and structure of the collagen proteins. We hope that this will assist in progressing our understanding of the causes of increased breast density and how high breast density can encourage breast cancer development. Another avenue of research is that cells called 'Fibroblasts' from dense breasts show increased inflammation, a potential promoter of harmful changes.

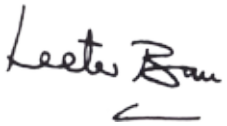
We are also researching the genetic factors that might lead to breast density. SNP's are small variations in DNA some of which can increase the risk of breast cancer, and it looks as if a proportion of those SNPs are linked to increased levels of breast density. We have identified a group of women with high breast density who have now had DNA samples taken for 'exome sequencing'. This will allow us to look for genetic variants that contribute to high breast density in these women who are at most risk of developing breast cancer.

A very practical reason for our interest in breast density is that it could allow us to reach one of our very specific goals; namely to allow early PREDICTION of who is at risk of breast cancer. By combining a gene test to search for high risk genes and for lower risk SNPs, together with a study of an individual's mammographic breast density, and perhaps an analysis of certain lifestyle factors, it may be possible to predict women at high risk and equally women who are at a moderate and very low risk of breast cancer. Mammographic screening could be tailored to an individual, therefore increasing the efficacy. This means that some women may need to be screened less often as they have a lower risk of breast cancer and some women may need to be screened more often due to a higher risk, perhaps with 3D techniques or other scans. This tailored screening could increase the detection rate in the early stages of cancer for those at higher risk, leading to a better outcome for the patient.

Another practical outcome of our research into breast density could be in developing drugs that reduce breast density and hence reduce breast cancer risk. A good example is the drug Tamoxifen, which seems to do both in some individuals. One current study is trying to predict whether the risk-reducing effect of Tamoxifen is working in a particular individual by assessing the degree of lowered breast density at one year of treatment. This simple technique could help us evaluate other potential risk-lowering drugs in the future. And not just drugs – it could help evaluate the effect of diet and lifestyle interventions, another key element of Genesis funded research.

As you can see, this depth and breadth of research into breast density supported by Genesis funding represents a really exciting time for Genesis. An understanding of breast density provides an opportunity for prediction, early diagnosis and even prevention of breast cancer. It will remain the focus of much of our collaborative work in the year ahead, for which we need your continuing support.

Together we can make breast cancer a preventable disease for the next generation.



Lester Barr