

## PHOTODYNAMIC THERAPY

Photodynamic therapy (PDT) is a cancer treatment, that involves a photosensitizing agent being injected into the bloodstream. The agent is absorbed by cells all over the body but stays in cancer cells longer than it does in normal cells. The tumour is exposed to light. The photosensitizer in the tumour absorbs the light and produces an active form of oxygen that destroys nearby cancer cells.

In addition to directly killing cancer cells, PDT appears to shrink or destroy tumours in two other ways. The photosensitizer can damage blood vessels in the tumour, thereby preventing the cancer from receiving necessary nutrients. PDT also may activate the immune system to attack the tumour cells.

The Royal Free London is the first hospital in the world to conduct a clinical trial to establish whether PDT can be used to treat primary breast cancer.

Currently the Royal Free London is at the first stage of this clinical trial, therefore we are only offering this treatment as an additional therapy to patients who are going to undergo a



mastectomy. In the future we hope to treat breast cancer patients with this technology as an alternative to surgery if the results of this trial are successful.

For further information about participation in the study please contact Professor Keshtgar's PA: christine.williams13@nhs.net

“We are very pleased that a number of cutting edge technologies in management of breast cancer are pioneered at the Royal Free. Some of these projects are translated into clinical practice and others are in various stages of clinical trials. We have become the first centre in the world to trial the use of photodynamic therapy in primary breast cancer and I am grateful to all our patients that have assisted us in conducting this research. We will soon commence our clinical trial on Breast PET, so there are exciting times ahead...”

**Professor Mohammed Keshtgar**  
BSc, MB, BS, FRCSI, FRCS(Gen), PhD

Professor of Cancer Surgery and Surgical Oncology

“I feel proud that I am associated with the Royal Free Breast unit, we are fortunate that we are able to deliver all possible treatments for breast cancer currently available to patients worldwide. We as a team pride ourselves in delivering treatment that is evidence based and we are able to provide this with compassion and care.”

**Mr Debashis B. Ghosh**

M.S, FRCS(Edin), FRCS(Intercollegiate), FEBS(Breast), FEBS(Surgical Oncology)  
Consultant Breast and Oncoplastic Surgeon

“Breast care is now a highly specialised field and it is recognised that breast surgery should be undertaken in approved units and by accredited specialists. The Royal Free provides all the necessary diagnostic, supportive and treatment modalities expected in a modern breast unit and delivers state-of-the-art investigations and treatment, both to those women with benign breast conditions and to those with breast cancer.”

**Mr Tim Davidson**

ChM, MRCP, FRCS  
Consultant Oncoplastic Surgeon and Clinical Lead for Breast Surgery

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# Breast Services

## BREAST SERVICES

The Royal Free provides a full range of breast surgery procedures and the world-class unit has all the facilities on site for the diagnosis and treatment of benign and malignant breast conditions.



Our dedicated breast clinic is staffed by three highly experienced consultant breast surgeons, Mr Tim Davidson, Professor Mohammed Keshtgar and Mr Debashis Ghosh, who are part of a multidisciplinary team which includes medical and clinical oncologists, radiologists, nuclear medicine, a genetic counsellor, breast pathologists and clinical nurse specialists. The breast surgeons, who work both privately and in the NHS, have special interests in breast reconstruction, breast imaging and diagnosis, risk-reducing breast surgery and multidisciplinary treatment for early stage and locally-advanced breast cancer.

The breast surgeons are all members of the Association of Breast Surgery (ABS) and regularly attend and present work at national and international meetings. The breast unit is acclaimed as a specialist training centre for surgeons from the UK and abroad and is highly rated for teaching and research in addition to its clinical excellence.

All appropriate NHS and Private patients are discussed with regard to the optimal treatment recommendations at our regular breast

Multidisciplinary Team Meetings at the Royal Free, and so can benefit from the input of a cohort of leading specialists.

The Royal Free has been pioneering in the use of new breast cancer treatments and diagnostic procedures. In 2013 we became the first hospital in the UK and the third in the world to introduce a new imaging technology for breast cancer called breast PET (positron emission tomography). We were among the first hospitals to offer electrochemotherapy, which uses electrical pulses to make cells more receptive to cancer-killing drugs.

Together with University College London (UCL), we have conducted research into keyhole mastectomy, nipple endoscopy, photodynamic therapy and new computer software to aid clinicians in decision making. The Royal Free has been a leading centre in the use of sentinel lymph node biopsy, a minimally-invasive procedure used to identify whether cancer has spread to the lymph node and rapid intra-operative testing of the node during surgery to avoid the need for a second anaesthetic.

The Royal Free is part of an international clinical trial (TARGIT) into intra-operative radiotherapy, which involves giving selected breast cancer patients a single dose of radiation at the time of surgery rather than needing multiple post-operative visits, so saving time and reducing side effects. In 2011, the TARGIT Academy was founded at the Royal Free to train new users of the equipment from around the world.



### ELECTROCHEMOTHERAPY

Electrochemotherapy is used to treat cancers that have spread to the skin or just below the skin's surface (metastasised) from breast cancer recurrence.

It is a treatment combining a low dose of a chemotherapy drug and an electrical pulse (electroporation) applied directly to the cancer cells using an electrode. This low level dose of chemotherapy drug is not normally effective against the cancer, as it is difficult to get inside the cells. When the electric pulse is applied, the

cells form pores allowing the drug to enter and be active against the cancer.

Electrochemotherapy has the advantage of preserving healthy tissue when compared to other treatment options. It can also be used to shrink large cancers making them easier to remove surgically.

It has been well established as a technology and has now been approved by The National Institute of Clinical Excellence (NICE, UK) as a standard of care.

### INTRAOPERATIVE RADIOTHERAPY TREATMENT (IORT)

This revolutionary treatment delivers a concentrated dose of radiation therapy to a tumour bed during surgery. This advanced technology may help kill microscopic disease, reduce radiation treatment times or provide an added radiation "boost".

The results of the world wide clinical trial lead by University College London which has tested the effectiveness and side-effects of this treatment has established this treatment to be as effective as conventional radiotherapy. Eligible patients benefit from the following advantages:

- **Maximum effect.** IORT delivers a concentrated dose of radiation to a tumour site immediately after a tumour is removed, helping to destroy the microscopic tumour cells that may be left behind. The tumour site is typically at high risk for recurrence and traditional radiation therapy requires a

recovery period after surgery, which leaves microscopic disease in the body for longer.

- **Saves healthy tissues and organs.** During IORT, a precise radiation dose is applied while shielding healthy tissues or structures, such as the skin, that could be damaged using other techniques. This allows a higher radiation dose to be delivered to the tumour bed, while sparing normal surrounding tissues. Critical organs within the radiation field, such as the lungs or heart, can also be protected.
- **Shortened treatment times.** IORT may help some patients finish treatment and get back to their lives quicker by reducing the need for additional radiation therapy.

Royal Free London can offer this treatment to eligible patients as participants in a clinical trial. In some cases patients may be suitable for off-trial treatment.

### RISK-REDUCING MASTECTOMY

Patients who are established to carry the genes associated with increased risk of breast cancer may opt to reduce their risk of developing breast cancer in the future by undergoing a risk-reducing mastectomy. The operation

removes all of the breast tissue while aiming to spare the skin and nipple. This is performed allowing immediate reconstruction with implants or with the patient's own tissues with acceptable cosmetic results.

### PET MAMMI

The Nuclear Medicine department has acquired in, collaboration with Professor Mohammed Keshtgar (Professor of Cancer Surgery and Surgical Oncology), a dedicated high resolution breast PET imaging camera (PET MAMMI) which may allow more accurate characterisation of breast lesions, pre-surgical staging, detection of

multiple foci of cancer and early assessment of response to chemotherapy. Research is currently being conducted to determine the potential role of this exciting new technique in patients with breast cancer. This diagnostic could be offered to eligible patients as participants in the current clinical trial.

### GENETIC TESTING

**Both my mother and grandmother had breast cancer, will I get it? What can I do to reduce my risk?**

Having a family history of cancer can be worrying and leave you feeling vulnerable. Part of the role of the cancer genetics clinic is to assess risk and offer advice about managing this risk.

We know that cancer is common and in most cases due to a combination of factors such as diet and lifestyle. However around 5–10% of all cases are likely to be due to an alteration (mutation) in a single gene.

Genes are instructions that tell our bodies how to grow and develop. Many of the genes associated with an increased risk of cancer, in fact, work to protect us from cancer. So if these genes are disrupted by a change or alteration then we lose some of our protection and are at increased risk for developing certain types of cancer usually at a younger age.

There have been several genes identified, that if disrupted can result in an increased risk of breast cancer. The most well known of these are the Breast Cancer Gene (BRCA1) and Breast Cancer Gene 2 (BRCA2). Women with an altered copy of BRCA1/2 have a significant risk of developing breast cancer as well as ovarian cancer. Men may have an increased risk of prostate cancer as well as breast cancer. BRCA2 carriers are also at increased risk of other cancers such as melanoma and pancreatic cancer.

**Genetic counselling and genetic testing may be helpful for you if:**

- there are several members of your family who have had breast cancer, particularly at younger ages (below age 50)
- you or your close relative has had ovarian cancer
- you or a close relative has had bilateral breast cancer (cancer in both breasts)
- there is breast and ovarian cancer in your family
- your family is Jewish and you have a family history of breast or ovarian cancer
- you have a relative who has been shown to carry a BRCA gene mutation
- you have had triple negative breast cancer under the age of 50 years.

The results of genetic testing may help healthcare providers and their patients make more informed healthcare decisions. For example, a woman who knows she carries a BRCA mutation can start cancer screening at an earlier age and could consider risk reducing surgery to lower her risks.

Not everyone with a personal and/or family history of breast cancer needs to have a genetic test so it is important you understand the implications as well as the limitations of undergoing testing before deciding if it is the best option for you.

Even those not undergoing testing may benefit from seeing a genetic counsellor as they will still be advised about managing their risk of developing certain cancers.