Neoadjuvant Drug Treatment for Breast Cancer Response Prediction and Response Monitoring (Breast CARE)

Research Areas

- Tool Development
- Biomarker Research
  Diagnostic, Genomic Biomarker

At a Glance

- Status: Completed Consortium
- Year Launched: 2009
- Initiating Organization: Center for Translational Molecular Medicine (CTMM)
- Initiator Type: Government
- Location: Europe

Abstract

Breast CARE, a project of the Center for Translational Molecular Medicine, aims to develop assays and advanced imaging techniques for breast cancer. The research is firmly focused on the translational aspects of molecular medicine so that results can be applied quickly to patient care.

Mission

Because every woman’s breast cancer is different, it is desirable to base the choice of drugs on assays that determine which combination of drugs has the best chance of killing all tumor cells. In the first part of this project, novel data derived from genetics and proteomics are being used to develop assays for this purpose. In addition, genetically engineered mouse models of breast cancer are employed to discover biomarkers and to investigate mechanisms of drug resistance and sensitivity.

The second part of the project focuses on the development of advanced imaging techniques. These
include MRI combinations with PET/CT that monitor the effect of drug therapy and predict pathological complete remissions, as well as the design of methods for image-guided radiotherapy to the expected distribution of residual tumor cells.

**Consortium History**

Project start date: 2-1-2009  
Project end date: 1-31-2014

**Sensitivity tests**

Such sensitivity tests have been routine for decades in the selection of antibiotics to treat bacterial infections, but attempts to use similar straightforward techniques for cancer cells have been unsuccessful. In the first part of the project, oncologists, scientists, and their colleagues from the bio-industry will employ novel methods derived from genetics and protein technology to develop these sensitivity assays. The tools required for this undertaking are all available within the consortium. The methods will be applied in clinical trials, in which drug therapy is given before surgery and radiotherapy in breast cancer, a treatment strategy sometimes referred to as “preoperative” or “neoadjuvant therapy.”

In this setting, the effect of the drug combination on the primary tumor can be directly evaluated, and the properties of the tumor that are associated with response or resistance can be identified. These studies and the ways in which relevant properties of the tumor are detected and measured are based on an intensive interaction between the clinic and the basic research laboratories, employing the many new insights in cancer biology of the last few years.

**Imaging techniques**

The second part of the project involves imaging techniques (such as X-ray studies) that aim to monitor the effect of the drug therapy on the size and vitality of the tumor, even before surgery takes place. In theory, one would like to give a brief course of drug therapy to the patient and then measure the degree of shrinkage as a result of that. This could answer the question of whether the drug is sufficiently effective to eventually kill all cancer cells in the body. If not, a change in drug regimen could be advantageous, hoping to find the tumor’s weak spot in the second attempt. With the conventional imaging techniques, such as mammography or ultrasound, this has been shown to be impossible. There is realistic hope, however, that the combination of two newer methods, MRI (Magnetic
Resonance Imaging) and PET (Positron Emission Tomography), could realize this. A complication is that criteria to assess the quality of an early response must take the biological properties of the tumor into account. This is where the two parts of the project are expected to have major synergism. This project is unique in its bridging of the cleft between biology and imaging research.

An added advantage of the study design is that the imaging techniques to be developed may also allow a more precise planning of radiation therapy to the breast if breast-conserving surgery has been performed. This will not only further reduce the chances of a local relapse in the treated breast, but it will also benefit cosmesis, as a smaller part of the breast will require exposure to a high radiation dose. If successful, this project will contribute significantly to further improve the cure rate of breast cancer.

**Financing**

13.2 million euro provided by Dutch government, industry, and academia supporting 33 researchers in 2011. Breast CARE a project funded by the Center for Translational Molecular Medicine (CTMM).

**Intellectual Property**

Fundamentally, the three basic principles underlying the CTMM intellectual property (IP) rules and licensing agreements are, firstly, that IP ownership stays with the inventor, which is simply basic patent law. Secondly, organizations should pay the market rate for commercial use of inventions coming out of CTMM projects but should benefit from a discounted rate if they have contributed to the project. And finally, that mechanisms must exist to balance academia’s need to publish against industry’s need to protect IP.

Being experts in their particular field, partners entering a CTMM project consortium already bring with them a lot of existing IP. The important thing is that they can decide for themselves how much or how little of that IP they wish to contribute to the project. The pre-existing IP that partners decide to put into a project is termed “Background IP.” Use of their contributed IP is purely for carrying out the project and there is no obligation on their part to grant usage rights beyond the end of the project. It is also entirely for them to decide if they want patent protection for their IP before contributing it, and to obtain the necessary patents. This is of particular importance for subject matter experts, because their IP is often their core asset.
IP generated during the project – called “Foreground IP” – can be protected in the same way as any other IP (for example, by having it patented). Whenever a potential new invention arises within a CTMM project consortium, details are circulated among all the project members. Every member then has 45 days to declare whether they want the corresponding IP patented and whether they are interested in having a commercial license to use it. Interested project members are then invited to join a licensee group, and by joining, commit themselves to paying a share of the patent filing costs. Actual ownership of the IP is controlled by normal patent law – i.e., it’s owned by the organizations that employed the named inventor(s) when the invention was created.


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