

# Locoregional endpoints in breast cancer research

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## Valorisation

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## Valorisation

Valorisation of knowledge means how we create meaningful information from the facts, by presenting it and making it applicable for societal and economic utilization, and by translating it to new business, products, services or processes.<sup>1</sup>

This valorisation chapter will explore how the world outside academia can benefit from this thesis and which new developments might evolve from the generated knowledge.

### Economic relevance and relevance to society

This thesis concerns breast cancer and breast cancer research. Breast cancer is the most common type of cancer in women and the incidence in the Netherlands is approximately 14.500 per annum in The Netherlands.<sup>2</sup> It is hard to estimate the total amount of funding invested in breast cancer research, but there are (fortunately) countless governmental and non-governmental foundations, charities, and societies supporting breast cancer research worldwide. Searching 'breast cancer' yields, as of August 2017, 346.174 hits on PubMed. This illustrates that achieving better, faster, and stronger results in breast cancer research is not only personally relevant for many, many women and their families confronted with breast cancer, but also for the thousands of citizens and governments investing in breast cancer research.

This issue has become more stressing over the past decade and will become more stressing in the future. The success of breast cancer research in the past few decades has led to few recurrences and very good survival for most breast cancer patients. This means that in the current era, large sample sizes and long follow up are necessary for reliable results. Critically reviewing how we can optimize research by using uniform endpoints and classifications, reconsidering follow up time and finding creative ways to produce reliable evidence with smaller sample sizes will be a necessity for sustainable future breast cancer research. This thesis provides steps towards that goal.

### Implications for new initiatives and innovation

This research can be applied in several ways. First, this thesis generated more detailed prognostic information (i.e. by breast cancer subtype). This information can be integrated in prognostic models that are used to advise individual patients about their treatment. An example is Adjuvant! online.<sup>3</sup> Integrating the new prognostic information provides patients with more tailored and therefore more accurate information.

Furthermore, this thesis contains new information on prognosis of metastases in contralateral lymph nodes and infraclavicular lymph nodes. This information may be

used to improve the next version of the TNM classification<sup>4</sup> of breast cancer, which is used by physicians and researchers throughout the world.

The knowledge generated in this thesis can also help make research easier, more efficient, and more transparent. The best way to achieve this, would be a uniform format for data collection on a nationwide or even worldwide level. A first step could be a mobile application or website which could be used by researchers, data managers and physicians to classify a breast cancer recurrence (for instance according to the standardized definitions from Chapter 2).

The next step (for which more knowledge, software, logistics, and commitment from stakeholders worldwide would be required) should, in my opinion, go towards a nationwide or worldwide, standardized database. This should safely store data with regard to privacy and sensitive information, be affordable and collect all the information that we need to move forward. Current cancer registries and clinical trial data management strategies hold an enormous wealth of information, but still have disadvantages, particularly the fact that they are not standardized (i.e. data are collected in a slightly different way) and can be inefficient, which all makes them are very costly. There are currently several web based and tablet based applications that safely store research data using standardized forms, and some of which can be linked to patient records. This is a huge step forward. However, these are more difficult to integrate and do not necessarily communicate. In the era of transparency and open access, I think uniform data collection (based on international consensus) and safe storage are the next step.

## Realisation

Implementation of new data in guidelines and classification systems works through publication in peer reviewed journals and presentation of results on international platforms. If the information is available and awareness is created, the data will be weighed to the total body of evidence and implemented as appropriate.

Implementation of uniform endpoint definitions particularly needs awareness among clinicians, researchers, but also providers of grants, trial registries and journals, which can demand certain definitions or at least specifications. Furthermore, use of definitions in a final paper also requires that specific data were collected. This means that endpoint definitions should optimally be chosen before initiating the study. This also means that if definitions are implemented today in all new research protocols, it may take several years before we can compare studies that used these standardized definitions.

Implementation of standardized data registration internationally or nationally is an extremely large and extremely costly project. Creating an application that would allow safe and standardized collection of patient data, preferably being able to extract

information directly from electronic patient's records as soon as they enter a study and/or give permission, and if possible specific for breast cancer research purposes and at a reasonable price would result in a dramatic improvement in efficiency.

In summary, improving efficiency of breast cancer research means anticipating on future challenges of trials requiring large sample sizes at high costs. Such efficiency will be beneficial to society: both for breast cancer patients and their families, as well as on an economic level. Furthermore, the generated knowledge can be implemented in guidelines and classification systems. In the future, applications that further standardize data collection based on international consensus, that allow more efficient pooling and exchange of results, would be a huge leap forward.

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