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BIORESOURCE PAPER

The SEARCHBreast Portal: A Virtual Bioresource to Facilitate the Sharing of Surplus Animal Materials Derived from Breast Cancer Studies

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The SEARCHBreast portal (<https://searchbreast.org/>) provides access to a virtual bioresource enabling researchers to access and share material derived from breast cancer related animal studies on a collaborative basis. By registering as members of SEARCHBreast, researchers can browse the SEARCHBreast platform for relevant tissue and models, and request access to these to help answer their specific biological question(s). SEARCHBreast mediates the collaborations formed from requests for these materials. As of July 2016, the virtual bioresource has received 8 requests for tissue and has sent hundreds of tissue samples saving approximately 400 animals. SEARCHBreast is currently developing a bioinformatics pipeline, enabling users to access and mine published data on animal models of breast cancer, potentially helping to reduce experimental redundancy further, prioritising new relevant research.

Keywords: Sharing animal models; breast cancer; virtual resource

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(1) Overview

Description of the initiative

SEARCHBreast (Sharing Experimental Animal Resources: Coordinating Holdings – Breast) is a virtual bioresource established in 2014, containing information on available material previously generated and archived during *in vivo* breast cancer studies. The information about the materials, including model type [xenograft, syngeneic and transgenic models, and patient-derived xenografts (PDX)] have been deposited directly by SEARCHBreast members, in the ethos of sharing their excess material and expertise with other researchers [1]. Many of these materials are ready to use either as histological slides, cell lines, or formalin-fixed, paraffin-embedded (FFPE) blocks. SEARCHBreast does not physically collect and store material; instead it remains with, and is under the control of the depositor until such time a request is made by a researcher. SEARCHBreast's role is to facilitate, free of charge, contact between depositors and requesters from the research community to expedite productive collaborations.

By encouraging the sharing of animal-derived archival material, the number of animals being used in breast cancer research will be reduced. This addresses one of the 3Rs (Replacement, Refinement, Reduction) in humane animal research [2]. Access to pre-existing samples may alleviate the need for researchers to unnecessarily design and establish additional animal models from inception, when appropriate tissue may have been generated previously. In the case of genetic models this not only reduces numbers of cohort animals, but could substantially lower numbers of breeding animals [3].

The SEARCHBreast initiative extends beyond that of a virtual bioresource portal. SEARCHBreast members are engaged in the uptake of new technologies that offer alternatives to animal-derived materials, such as using humanised breast tissue models [4]. A resource section on the website also offers refinement solutions to ensure researchers are using best practices in animal experimentation.

Classification (1)

Animal, Human.

Species

Mouse, *Mus musculus*.

Classification (2)

Biological samples.

Context**Spatial coverage**

The SEARCHBreast management is based at the Leeds Institute of Cancer and Pathology, University of Leeds, UK (Latitude: N 53° 48' 26.2656" Longitude: E -1° 31' 8.6802") and the database is maintained by Barts Cancer Institute, Queen Mary University of London, UK (Latitude: N 51° 31' 16.7262" Longitude: E -0° 5' 55.9386"). Researchers can access and upload information about resources that are available to share to this platform, from anywhere in the world. To date information about available materials has been deposited by researchers based in the UK, but SEARCHBreast members from any location can access the virtual bioresource to search for and deposit materials.

Temporal coverage for accessibility

The database opened for submission of models in December 2014 and remains open for depositing and searching.

(2) Methods**Steps**

SEARCHBreast is a virtual resource, storing only the information about the materials available. Researchers can become SEARCHBreast members via a simple registration process using a secure portal. SEARCHBreast members, with excess archival material that is available to share on a collaborative basis, can log into the database to enter descriptions of their material and update this as appropriate. This information is available to view immediately, but is monitored by SEARCHBreast administrators. Since the material remains with the depositor there is no physical collection of material by SEARCHBreast. It is normally available as ready-to-use samples, mainly as FFPE and frozen tissues, or histological slides.

SEARCHBreast members who are looking for material to use in their research can log into the database and look for relevant models. At this stage the name and affiliation of the depositor is not visible. Once an appropriate model has been identified, more information about it can be obtained via SEARCHBreast. Following a request, SEARCHBreast contacts the depositor of the material informing them that an expression of interest has been made, and the contact details of the requester are provided. It is then at the discretion of the owner of the material to make contact directly to pursue a collaboration. SEARCHBreast's role is as a no-cost facilitator of collaboration.

Stabilization/preservation

N/A as SEARCHBreast does not physically store material.

Type of long-term preservation

N/A as SEARCHBreast does not physically store material.

Storage temperature

N/A as SEARCHBreast does not physically store material.

Shipping temperature from patient/source to preservation or research use

N/A as SEARCHBreast does not physically store material.

Shipping temperature from storage to research use

N/A as SEARCHBreast does not physically store material.

Quality assurance measures

The SEARCHBreast administration team regularly monitors the database ensuring the entries are genuine. There are no constraints on who can deposit or share material. When there is a member registration or a model deposited, the SEARCHBreast administrators are notified, and registrants and entries are vetted on a case-by-case basis. All other aspects of the portal are maintained/updated by the SEARCHBreast administrators.

Source of associated data

N/A.

Ethics Statement

Animal models available to share have been generated subject to the individual researcher's local ethics approval system.

Constraints

SEARCHBreast is happy to receive submission and requests from researchers anywhere in the world.

(3) Bioresource description**Object name**

Preserved animal tissues.

Bioresource name

SEARCHBreast; Sharing Experimental Animal Resources Coordinating Holdings – Breast.

Bioresource location

The SEARCHBreast management is based at the Leeds Institute of Cancer and Pathology, University of Leeds, UK (Latitude: N 53° 48' 26.2656" Longitude: E -1° 31' 8.6802") and the database is maintained by Barts Cancer Institute, Queen Mary University of London, UK (Latitude: N 51° 31' 16.7262" Longitude: E -0° 5' 55.9386"). Researchers can access and upload data to this platform from anywhere in the world.

Bioresource contact

help@searchbreast.org

Bioresource URL

https://www.searchbreast.org

Identifier used

N/A.

Bioresource type

Virtual online repository of archived material derived from preclinical models of breast cancer.

Type of sampling

Animal models of breast cancer (xenograft and syngeneic models, genetic models, PDX).

Anatomical site

Primary tumour (mammary gland); tumour transplant sites including mammary fat pad, intraductal, subcutaneous flank, subcutaneous neck fold. Metastatic sites include bone, brain, lung and liver.

Disease status of patients/source

Preclinical animal models of breast cancer and control normal tissue.

Clinical characteristics of patients/source

Treatment information for the samples is reported when available. Information regarding tumour volume, general histology, degree of tumour vascularization, immune infiltrate, apoptosis, proliferation, and gene expression is available for some of the models.

Size of the bioresource

The virtual bioresource contains an expanding number of models; at the time of writing (July 2016) it contains descriptions of over 70 different mouse models including genetic models, cell line xenografts and PDX models. Information such as GEM alleles, background strain, cell lines, metastatic and transplantation sites, penetrance, and hormone receptor status is also available. Conservatively this amounts to approximately 28,000 animals and close to 1 million samples in ready to use format such as FFPE blocks and histological slides. Other more bespoke resources include hollow fibre assays and conditionally immortal mouse mammary epithelial cells derived from mid-pregnant mice. The virtual bioresource is growing with more models expected to be submitted into the database over time.

Vital state of patients/source

N/A.

Clinical diagnosis of patients/source

N/A.

Pathology diagnosis

N/A.

Control samples

N/A.

Biospecimen type

Many different types of tissues are available including tumour material, mammary fat pads (tumour and normal), purified mammary epithelial cells, lymph node, heart,

skull, long bones, vertebrae, liver, brain, spleen and lung metastases, serum and circulating DNA.

Release date

The database opened to the research community in December 2014.

Access criteria

Registered users can log on to the SEARCHBreast database and search for material that may best answer their biological question. Material of interest can then be requested *via* SEARCHBreast. A SEARCHBreast administrator then contacts the owner of the material informing them of the inquiry. The holder can then contact the applicant to pursue any collaborative possibilities. The role of SEARCHBreast is in making the connections between parties, and as such does not take part in any MTA's or provide funding for tissue transfer which is at the discretion of the contributor and requester.

(4) Reuse potential

The focus of SEARCHBreast is to encourage the sharing of surplus animal tissue, which offers a significant reuse potential. SEARCHBreast is free of charge and all exchange of material occurs between the submitter and requester.

Sharing material from the SEARCHBreast database has the potential to save time, money, and animals in scientific research.

For example, in one single typical *in vivo* experiment:

- 40 animals are used (4 groups of 10 mice).
- One tumour and one normal sample are generated from each animal yielding 80 sample blocks.
- From each block approximately 50 tissue sections can be obtained, yielding 4,000 slides.
- A scientist may only need 200 slides for the original study, which means a surplus of 3,800 slides per experiment are available to share.

For each mouse model created, a researcher may perform approximately 10 different *in vivo* experiments, each requiring 40 animals. This equates to 400 animals per model. As the SEARCHBreast database contains descriptions of 70 different mouse models, this virtual bioresource represents over 28,000 animals. If each animal generates approximately 3,800 excess slides, the SEARCHBreast database has around 1 million samples available for immediate use, mainly as slices or blocks.

SEARCHBreast has considerable re-use potential while actively addressing the 3Rs (Replacement, Reduction and Refinement), in breast cancer research.

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Competing Interests

The authors declare that they have no competing interests.

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