



3. The Main Actors Providing Biosamples To Industry

Robert Hewitt

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This is the third in a series of mini-articles on the theme of Biobanks and Industry. Here we look at the main actors providing human biosamples to industry (pharma, diagnostic and biotech companies), and give special attention to the different approaches in the USA and Europe. The role of commercial biobanks will be emphasised.

Most human biosamples originate in the public sector, for example in public hospitals and publicly-funded population biobanks. So some kind of public-private partnership is generally needed for biosamples to reach researchers in the private (industry) sector.

Public-Private Partnerships in Biobanking

A range of different models for biobank interaction with industry is shown in the table below, followed by a brief description of each.

Different Models for Biobank Interaction With Industry

1. Direct interaction

- a) Service-based agreement
- b) Research collaboration

2. Indirect interaction via a commercial intermediary

- a) Via commercial biobank
- b) Via virtual biobank (or broker)
- c) Via a clinical research organisation (CRO)

3. Indirect interaction via a non-commercial intermediary

- a) Lifandis model
- b) Expert centre model

(1) Direct interaction of the biobank with industry

Many biobanks around the world have service-based or supply agreements with industry, whereby the biobank provides a supply of biosamples to scientists in industry, in return for reimbursement for the work involved. For many biobanks the transfer of samples takes place in the context of a research collaboration which might be lab-based translational research or a clinical trial.

Direct interactions like this may sound simple, but they are often very difficult to arrange in practice. One major part of the problem is that industry requests are often highly specific, demanding and time-sensitive. For more on this topic see:

- [Hofman et al, 2013. Public–private relationships in biobanking: a still underestimated key component of open innovation.](#)
- [Puchois et al, 2013. The Cardinal Role of Biobanks and Human Biospecimen Collections in Biomarker Validation: Issues Impeding Impact of Biomarker Research Outcomes.](#)

(2) Indirect interaction via a commercial intermediary

There are perhaps 3 main types of commercial intermediary that facilitate the transfer of biosamples from public to private sector.

- **Commercial Biobanks:** these are generally companies whose primary function is to supply industry with biosamples for research to discover and develop new drugs and biomarkers. These companies partner with collection sites in various hospitals (which often involve biobanks) and may have networks that extend internationally. Sometimes they partner with other commercial biobanks for supply of biosamples. Examples of commercial biobanks include [BioIVT](#) and [Cureline](#).
- **Biobanking Brokers or 'Virtual Biobanks':** these are companies similar in function to commercial biobanks, but which do not own a physical biobank. These companies liaise between the supplier and the requester to find good matches and to make all necessary arrangements for transfer of biosamples. Examples of virtual biobanks include [iSpecimen](#) and [Tissue Solutions](#).

- **Contract Research Organisations:** these companies provide a variety of services to clients in the pharmaceutical, diagnostic and biotechnology industries which may include biosample procurement. Examples include [Covance](#) and [Trans-Hit Bio](#).

All these commercial intermediaries play a vital role in the provision of biosamples to industry. Despite this fact, very little has been written about them in the scientific literature. We need to study these important actors, before we can fully understand the '**Biobanking Ecosystem**'. By this term, I mean the interconnected system of biosample providers and users across both public and private sectors.

(3) Indirect interaction via a not-for-profit intermediary

- **The Lifandis Model:** [Lifandis](#) is a publicly-funded initiative in Norway that provides a trusted interface between industry and the biosamples and data collected as part of the publicly-funded HUNT study.
- **The Expert Centre model:** proposed by [BBMRI-ERIC](#), the Expert Centre is a not-for-profit company and a technology centre that acts as a trusted intermediary between the biobank and industry ([van Ommen, 2014](#)).

For more on this topic, see: [Lawlor and Scarpa, 2017. Models of Collaboration and Experiences between Bio-Industry and Academic Biobanks.](#)

The Emergence of Commercial Biobanks

As mentioned above, commercial biobanks and related organisations have not received much attention in the scientific literature, so here is a little more background information and history about them.

In 1996 a drug discovery company called Pharmagene was founded just north of London in Royston, Hertfordshire. This innovative company obtained human biosamples from a nearby district general hospital ([Gray et al, 1999](#)) and used the samples to conduct studies on behalf of clients in the pharmaceutical industry. In 2006 Pharmagene merged with a US company called Asterand (founded 2000) to form the well known commercial biobank, Asterand Bioscience ([PharmaTimes, 2005](#)). In 2017, Asterand Bioscience was acquired by Bioreclamation IVT, now called [BioIVT](#) which today offers a range of services including access to their biorepository and tissue procurement.

Another early development in the commercial biobanking field took place in 1998, when a functional genomics company called Genomics Collaborative Inc (GCI) was founded in Cambridge, Massachusetts, USA. GCI had a dual business model: it had a fee-for-service side providing biosamples to the pharmaceutical industry. It also had collaborative research side in which it provided access to its database of functional genomics data ([Eiseman, 2003](#)). In 2007, Genomics Collaborative was acquired by BioServe. Today [BioServe](#) offers access to their biobank, to a partner biobank network and a tissue procurement service.

Other companies with a commercial biobanking function, founded around the same time include DNA Sciences Inc (1998), Ardaïs (1999) and First Genetic Trust (2000). All these examples were founded in the USA.

Since the turn of the century the demand for human biosamples has increased steadily and the overall number of biobanks has grown in line with this. One contributing factor was the 2004 publication of a white paper by the US FDA, entitled '**Challenge and Opportunity on the Critical Path to New Medical Technologies**'. This report emphasised the need to improve the efficiency of the drug development process (in industry) and highlighted the need for use of biomarkers (which depend on biosamples) to guide the development process more efficiently.

In an article by **Somiari and Somiari (2015)**, the following table showing the number of biobanks per country was presented, including breakdown by biobank type (university, commercial, non-profit and networked). This 2015 article is one of the very few published articles that gives information about commercial biobanks.

Table 2.1 Biobanks per country with their classification

Country	Total	University	Commercial	Non-profit	Networked ^a
Austria	3	2	1	0	0
Belgium	2	1	0	1	0
Switzerland	5	1	3	1	3
Cyprus	1	0	1	0	1
Germany	5	0	0	5	4
Estonia	1	1	0	0	0
Spain	4	0	0	4	2
Finland	2	0	0	2	1
France	6	0	0	6	3
Greece	1	0	1	0	0
Hungary	1	0	0	1	1
Ireland	5	2	1	2	1
Italy	6	0	1	5	4
Latvia	1	0	0	1	1
Netherlands	3	1	0	2	0
Norway	2	2	0	0	0
Sweden	5	2	0	3	1
UK	25	17	3	5	0
Canada	13	5	0	8	2
United States	151	65	29	57	6
China	3	1	1	1	0
India	5	1	1	3	0
Japan	4	1	0	3	0
Korea	2	0	1	1	0
Malaysia	3	1	1	1	0
Singapore	3	1	1	1	0
Taiwan	1	0	0	1	0
Thailand	2	0	0	2	1
Australia ^b	13	2	0	11	1
Iran	1	0	0	1	0
Israel	3	1	1	1	0
Total	282	107	46	129	32

Data adapted from www.specimencentral.com
^aIndicates how many of the biobanks are made up of Biobanking networks. This number is not part of the Total
^bAustralia though listed under Country, is a Continent

For the USA, 29 commercial biobanks are listed for 2015. The next highest number were for the UK and Switzerland (3 in both cases). This table of information is based on the online biobank directory at **SpecimenCentral.com**.

Please note that the contribution of commercial biobanks to industry research cannot be judged by their number alone. This is for the following reasons:

- Unlike academic biobanks, commercial biobanks provide the majority of their samples to industry.
- Unlike academic biobanks they cannot rely on institutional or grant funding, so they are highly motivated to supply samples to industry.
- Commercial biobanks may operate on an industrial scale with industrial efficiency.

Some Questions Arising

Why is there a big difference in the number of commercial biobanks in the USA and Europe? What are the advantages and disadvantages of commercial / non-commercial approaches to supplying biosamples to industry. These are questions that will be addressed in future articles in this series.

Disclaimer: the author of this article works independently and any views expressed are his own.

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