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Commentary

Patient-oriented Biobanking for Cancer Research

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Research studies aimed at advancing cancer prevention, diagnosis, and treatment depend on a number of key resources, including a ready supply of high-quality annotated biospecimens that can be used to test new drugs, assess the validity of prognostic biomarkers, and develop tailor-made therapies. The development of more effective interventions against cancer requires a better understanding of its molecular basis and a more rapid translation of laboratory findings into improved patient care. One of the most precious resources for patient-directed cancer research is the collection of biospecimens that are appropriately stored in a biobank or biorepository. When donated with informed consent, thereby respecting patient confidentiality and privacy, such samples enable examination of the molecular basis of disease in addition to the identification of novel biological targets. In order to achieve essential added value, research data must be correlated to clinic-pathological and survival data. As the area of molecular diagnostics and personalized medicine is rapidly increasing and is central to identifying new targeted therapies for lung cancer patients, the participation of patients in the biobanking process is of important significance. This broad definition therefore includes all collections that are associated with research projects, studies, clinical trials or formal infrastructure projects. Patients and the general public are both key to the success of such initiatives. Patients consent to the use of biological samples on which current and future research is based, and importantly play at key role in relation to influencing public and government opinions. Therefore, one of the essential roles of a biobank is to ensure that people understand how their contributions, together with the development of research excellence, will be of benefit to them and future generations.

Biospecimens are obtained through biobanking which can encompass many steps including patient enrolment and consent, biospecimen collection, processing, annotation, storage, and distribution. The ways in which these are conducted continue to change as research advances and new assays and technologies become available [1]. However, advances in technology have meant that the value of biospecimens, such as frozen tissue, are diminishing, in contrast to access of formalin-fixed and paraffin-embedded cell and tissue blocks in pathology archives which are growing [2]. Pathology archives themselves are becoming a highly valued biobank resource for discovery phase research in addition to other phases. A current and novel theme in translational phase research for example, is the exploration of blood plasma factors such as circulating tumor DNA in gene mutation analysis and targeted therapies [3].

More personalized decisions together with greater access to targeted therapies which are guided by more informative biomarkers, have brought the era of personalised medicine to the forefront of cancer medicine in which biobanks have played, and continue to play, a role in this process [4]. In a study by Castillo-Pelayo *et al* [5], grants received (2010–2011) by investigators from the Cancer Research Society (CRS), a Canadian organization that funds studies across the spectrum of cancer research were selected. Publications arising from these grants between 2010 and 2014 were analysed and categorized by a number of factors such as research area, the acknowledged source of funding, specific scientific focus and the presence of any data that involved specific indicators. These incorporated human biospecimens, cell lines, animal models, advanced microscopy, flow cell sorters, and next generation sequencing. Publications involving biobanking were classified by biospecimen provenance and the type of biospecimen used. The authors reported that biorepositories that coordinate the activity of biobanking rank amongst the most important of established health research infrastructures as contributors to research publications. Furthermore, the study suggested that biospecimen-derived data was obtained directly from biorepositories in approximately 30% of publications. Of interest, biorepositories that coordinated the use of biobanks, as indicated by the use of human biospecimens, ranked second only to cell culture facilities and had a similar level of importance to the use of animal care facilities when considered relative to these and other better recognized forms of health research infrastructures. The Biobanking and BioMolecular Resources Research Infrastructure-European Research Infrastructure (BBMRI-ERIC) consortium provides fair access to quality-controlled human biological samples and associated biomedical and biomolecular data, thereby enabling the investigation of basic mechanisms underlying diseases such as cancer. Such consortia are indispensable for the development of new biomarkers and drugs.

In the last decade, the importance of biobanks in the field of cancer research has increased with the emergence of big data collection [6]. Maintaining privacy and confidentiality while protecting and conserving personal data are all fundamental duties of a biobank. Impacting on biobanks within Europe is the European General Data Protection Regulation (GDPR) which came into force in May 2018.

While this directive aspires to providing a high level of protection to safeguard individuals' personal data, this in turn has the potential to incur considerable constraints on scientific and clinical research involving biobanks. Some of the more restrictive impositions of local regulations in specific European countries are the issues surrounding re-consenting, which in the long term, could pose a serious threat to health research progression and subsequent treatments for patients affected by a wide variety of health conditions such as cancer [7].

If human biospecimens are as commonly used and important to the generation of data in translational cancer research as are animal models and cell lines, one would envisage biobanking to be governed in such a way that facilitates improved access, utilization, standardization and quality of samples while biorepositories should become a central component of the health research infrastructure across all medical and research institutions.

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