

Citation of bioresources in journal articles: moving towards standards

Elena Bravo¹, Anne Cambon-Thomsen², Paola De Castro¹, Laurence Mabile², Federica Napolitani¹, Mariarosaria Napolitano¹, Anna Maria Rossi¹

¹ *Istituto Superiore di Sanità, Rome, Italy;*
annamaria.rossi@iss.it

² *UMR U 1027, Inserm, Université Toulouse III - Paul Sabatier, Toulouse, France*

Abstract Citability of data, including also results from studies utilizing biological samples, is becoming a prominent issue in scientific publishing. Data deriving from bioresources are important for the advancement of biomedical research. This paper aims at promoting the relevance of a good standardized citation in journal articles which will help in the creation of a system for evaluation of bioresources-based research impact.

Keywords: biobanks; journal editors; impact factor.

Introduction

Human biological samples and their derivatives (eg RNA, DNA, proteins), and information about them stored in biobanks or databases are important elements of research. Their use for improving human health research implies a complex set of competences and infrastructures (research biobanks) responsible for collecting, treating, keeping and distributing the biological samples.

Citability of data, including also results from studies utilizing biological samples, is becoming a prominent issue in scientific publishing and in scholarly communication because of the great amount of available data used for scientific research. Good data citation practice should follow the conventions and standardizations accepted by the scientific community. This means properly acknowledging the biobank and the biological sample management which include collectors, data creators, sample/data management at different levels of granularity, and requires the promotion of awareness of its benefits and value among researchers, editors, reviewers and other stakeholders.¹

The Bioresource Research Impact Factor (BRIF) is a European project aiming to develop an appropriate set of tools for the creation of a suitable identifier for biobanks to allow a standardized citation in journal article.

The value of bioresources for the advancement of research

An increasing proportion of biomedical research relies on biosamples and much of our medical knowledge is acquired with the aid of bioresources collections. Human research biobanks include both population biobanks and disease-oriented biobanks, which collect general population and pathological samples, respectively.

Population biobanks, for instance, contain large collections of well-documented, up-to-date epidemiological, clinical and biological samples, supplemented with genomic

information and annotated to epidemiological and health care information. These collections are at the basis of genetic epidemiology, which is a rapidly expanding field of research. Genetic epidemiology aims to clarify the nature of modifiable risk factors and to propose molecular genetic tests for personalized medical care.²

Bioresources, if well-collected, well-characterized and easily accessible, may serve a critical role for the advancement of biotechnology and disease-related activities world-wide. The value of biobanks, however, relates primarily to the individual donation, nation-wide sample collections and structured repositories, that are all aspects closely related to ethical issues.³ All these issues are equally applicable to high- and low-income countries, where building of human biobanks is in progress.⁴

Bioresources and the European context

The importance of high-quality, annotated biological specimens in medical research is increasingly acknowledged by the biomedical research community. In 2009, *TIME* magazine identified biobanks as one of the 10 ideas changing the world,⁵ and the European Strategy Forum on Research Infrastructures (ESFRI) recognized the strategic importance of research biobanking for Europe.⁶

Furthermore, a Pan-European Biobanking and Biomolecular Resources Research Infrastructure for biomedical and biological research in Europe was funded as one of the first projects on the ESFRI roadmap.^{7,8} Its preparatory phase ended in January 2011, and now BBMRI is a 54-member consortium with more than 225 associated organizations, mainly biobanks from more than 30 countries.

The mission of BBMRI is to build up a pan-European infrastructure, utilizing the existing resources and technologies, complemented with innovative approaches and embedded into European ethical, legal and societal backgrounds. Participants of BBMRI have to adopt standardized and shared procedures for biosamples collection, storage, analysis and distribution. This infrastructure is also intended to address the following problems: fragmented nature of biobank collections, heterogeneity of operating procedures, lack of a standardized catalogue, differences in informed consent practices, and variety of policies for accessing samples. These problems devalue potential of the data, which can be obtained from the analysis of the millions of currently stored samples.^{9,10}

In December 2011, 14 member states signed a Memorandum of Understanding to participate in BBMRI-ERIC (European Research Infrastructure Consortium). This is expected to start operations in the second half of 2013.⁸ BBMRI will be implemented in the ERIC legal framework.

According to the BBMRI-ERIC draft statutes, each member state has a BBMRI national node to coordinate the activities of the national biobanks and to interface with the European central coordination quarter. The Italian National Institute of Health (Istituto Superiore di Sanità, ISS), for example, established the Italian national node of BBMRI in July 2010, based on a mandate of the Minister of Health.¹¹

Journal editors subgroup of BRIF

Sharing bioresources has been recognized as an important tool for the advancement of biomedical research, particularly in Europe. Along with some technical and ethical issues, a major obstacle for sharing bioresources is the lack of acknowledgements of efforts directed at establishing and maintaining such resources.¹²

Recently, major international funders of public health research introduced a policy promoting the availability of the data from funded research, which may help advance health care.¹³ Many biomedical publications are now based on the data from diverse collections of samples, often from heterogeneous sources and health databases. Therefore, the quality of research depends largely on the quality of bioresources (samples, data and databases) and an appropriate set of tools is needed to measure their impact. To address this issue, a scientific initiative led by Anne Cambon-Thomsen (INSERM, Toulouse, France) is developing BRIF, establishing a bridge between the initiators/implementers of bioresources and the impact of scientific research. The idea is to construct a quantitative parameter, similar to the well-known journal Impact Factor (IF), that will recognize the most influential bioresources for the biomedical scientific community.

Supported by GEN2PHEN and BBMRI projects, an international workshop was held in Toulouse in January 2011. Biobank partners, computational biologists, geneticists, epidemiologists, publishers, experts in scientometrics, lawyers, bioethicists, philosophers, and sociologists from across the world gathered to discuss standards for assessing and optimizing the use of bioresources. Discussions and presentations at the workshop focused on two fundamental issues: whether the concept of Impact Factor is applicable to bioresources and, if so, what kind of identifier should be assigned to facilitate the traceability. The discussions raised concerns over what exactly should be assessed and at what level of granularity. Legal and ethical concerns were also touched on. During the workshop a number of subgroups were launched to explore different aspects of BRIF. Each subgroup included international experts with specific tasks.¹²

BRIF should process the literature on the use of bioresources, considering the controversies surrounding this issue. Correct tracking of the data is thus a prime necessity, which relates to the standards of correct citations of bioresources in journal articles, with links allowing retrieval through bibliographic databases. These issues are specifically addressed by the journal editors subgroup of BRIF that is originally a joint initiative of the researchers from the ISS Department of Haematology, Oncology and Molecular Medicine, already involved in BBMRI project, and a group of technical and managing editors working at the Publishing Unit of ISS. A collaboration with the ISS Bioethics Unit was also established. The subgroup has its own plan of actions, and is committed to address the problems of citations of bioresources and to raise awareness of these problems amongst editors, relevant associations and institutions.

As there are no specific standards for citing bioresources, the subgroup promotes correct citations and proposes amendments of editorial guidelines. In fact, the subgroup contacted the International Committee of Medical Journal

Editors (ICMJE) to introduce standards for citations of bioresources in an updated version of the Uniform Requirements for Manuscripts Submitted to Biomedical Journals (URM). The ICMJE considered the proposal but refused to revise the URM because the document could never grow to be a reporting guideline adequate to all scientific study situations and design. Yet, the Committee reviewed all the materials received from the BRIF editorial subgroup and was thus sensitized to the issues of proper reporting and sharing of bioresources. Additionally, ICMJE advised to post the group proposal to the EQUATOR network of reporting guidelines.

Also, the subgroup approached the Committee on Publication Ethics (COPE) with a suggestion to address the problems of biobanks and bioresources in relevant guidelines. As a result, COPE agreed to provide a website link to BRIF papers, and was open to further discuss the topic. The same issues were discussed within the European Association of Science Editors (EASE). In 2012, EASE agreed to incorporate in the “EASE Guidelines for Authors and Translators of Scientific Articles to be Published in English” statements on biobanks in the “Method” section.¹⁴ The initiative by the subgroup was also promoted in presentations at the EASE 2012 Conference,¹⁵ the Fifth Belgrade International Open Access Conference,¹⁶ and as a short paper addressed to Italian health professionals, academic and research institutions, and policy-makers.¹⁷

The subgroup of BRIF will continue working with other learned associations and stakeholders of the scientific community to eventually develop the standards of citation of bioresources in journal articles. Accordingly, a survey addressed to journal editors will be launched in April 2013 to assess their attitude towards bioresources citation. This will help recognize the relevance of research biobanks for providing quality material based on optimized research procedures.¹⁸

Acknowledgements

Elena Bravo, Anne Cambon-Thomsen, Paola De Castro, Laurence Mabile, Federica Napolitani and Anna Maria Rossi are part of the “Bioresource Research Impact Factor” (BRIF) initiative (<http://www.gen2phen.org/groups/brif-bio-resource-impact-factor>). The work here reported was partially supported by collaborative projects of the European Commission FP7 GEN2PHEN (Genotype-to-Phenotype Databases: A Holistic Solution), grant agreement 200754, and BioSHaRE-EU (Biobank Standardisation and Harmonisation for Research Excellence in the European Union), grant agreement 261433.

References

- Kotarski R, Reilly S, Schrimpf S, Smit E, Walshe K. *Report on best practices for citability of data and on evolving roles in scholarly communication – Executive Summary*. 21 June 2012. *Opportunity for Data Exchange (ODE)*. Grant agreement no. 261530. Available from: www.ode-project.eu/ode-outputs (accessed 22 February 2013)
- Davey Smith G, Ebrahim S, Lewis S, Hansell AL, Palmer LJ, Burton PR. Genetic epidemiology and public health: hope, hype, and future prospects. *The Lancet* 2005;366(9495):1484-1498. doi: 10.1016/S0140-6736(05)67601-5
- Budimir D, Polasek O, Marusić A, Kolčić I, Zemunik T, Boraska V, Jerončić A, Boban M, Campbell H, Rudan I. Ethical aspects of human biobanks: a systematic review. *Croatian Medical Journal* 2011;52(3):262-279. doi: 10.3325/cmj.2011.52.262
- Rudan I, Marušić A, Campbell H. Developing biobanks in developing countries. *Journal of Global Health* 2011;1(1):2-4.
- Park A. Biobanks. In: 10 ideas changing the world right now. *TIME*, March 12, 2009. Available from: http://www.time.com/time/specials/packages/article/0,28804,1884779_1884782_1884766,00.html (accessed 22 February 2013)
- European Commission. *Biobanks for Europe. A challenge for governance*. Brussels: Directorate-General for Research and Innovation; 2012. 63 p. Available from: http://ec.europa.eu/research/science-society/document_library/pdf_06/biobanks-for-europe_en.pdf (accessed 22 February 2013)
- www.bbmri.eu (accessed 22 February 2013)
- Roazzi P, Di Benedetto C, Bravo E, D’Agnolo G. Biobank Networking: The European Network Initiative and the Italian Participation. *Biopreservation and Biobanking* 2011;9:175-179. doi: 10.1089/bio.2011.0004
- Petrini C. “Broad” consent, exceptions to consent and the question of using biological samples for research purposes different from the initial collection purpose. *Social Science & Medicine* 2010;70(2):217-220. doi:10.1016/j.socscimed.2009.10.004
- Johnsson L, Hansson MG, Eriksson S, Helgesson G. Patients’ refusal to consent to storage and use of samples in Swedish biobanks: cross sectional study. *BMJ* 2008;337:a345. doi: 10.1136/bmj.a345
- www.bbmri-eric.it (accessed 22 February 2013)
- Cambon-Thomsen A, Gudmundur A, Thorisson GA, Mabile L for the BRIF workshop group. The role of a bioresource research impact factor as an incentive to share human bioresources. [correspondence] *Nature Genetics* 2011;43(6):503-504. doi:10.1038/ng.831
- www.wellcome.ac.uk/publichealthdata (accessed 22 February 2013)
- www.ease.org.uk/publications/author-guidelines (accessed 22 February 2013)
- De Castro P, Napolitani F, Rossi AM, Petrini C, Cambon-Thomsen A, Bravo E. Standardizing citations of research biobanks for a possible evaluation of bioresource research impact factor. 11th EASE General Assembly and Conference “Editing in the Digital World”. Tallinn (Estonia), June 8-10, 2012. Available from: <http://www.ease.org.uk/ease-events/triennial-conference/editing-digital-world-tallinn/poster-abstracts/standardizing-citati> (accessed 22 February 2013)
- Cambon-Thomsen A, Mabile L, De Castro P, Napolitani F, Rossi AM, Bravo E. on behalf of the BRIF working group. BRIF (Bioresource Research Impact Factor). A tool proposed for tracing and promoting the access and use of bioresources in publications. Fifth Belgrade International Open Access Conference 2012. Belgrade (Serbia), May 18-19, 2012. Available from: <http://boac.ceon.rs/public/site/Thomsen.pdf> (accessed 22 February 2013)
- Bravo E, De Castro P, Napolitani F, Napolitano M, Rossi AM. La standardizzazione delle citazioni delle biobanche di ricerca: il contributo dell’Istituto Superiore di Sanità. *Notiziario dell’Istituto Superiore di Sanità* 2012;25(3):11-14. [in Italian] Available from: <http://www.iss.it/binary/publ/cont/ONLINEnewmar.pdf> (accessed 22 February 2013)
- Baust JG. ISBER: Best practices for repositories and trends at the Institute for Problems of Cryobiology and Medicine. *Cell Preservation Technology* 2008;6(1):1. doi: 10.1089/cpt.2008.9996