

Review of technical solutions and quality criteria

Introduction

High quality DNA banking is a prerequisite for modern genetic research. Until recently, fairly little emphasis have been put on technical applications for storage and distribution of DNA, and generally recognized principles for quality assessment. Constantly growing sample numbers, complexity of the existing DNA collections and the changing demands of biobank users have brought out a need to collect and review biobanking documents, methods, technical solutions and quality criteria used in DNA banking.

BBMRI presents a review of technical solutions and quality criteria for storage, retrieval and transfer of DNA samples in 5 different networking biobanks (Estonia, Finland, Germany, Netherlands and Norway). The review is based on the previous studies by the P3G observatory (<http://www.p3gobservatory.org>) as well as the procedures currently employed in the BBMRI's pilot networking biobanks.

General considerations for laboratory infrastructure

General considerations for repository laboratory infrastructure include first and foremost organizational requirements, appropriate premises, functional equipment and processes, quality control monitoring, documentation management, informatics, safety, and professional staff. Repositories containing biological material are expected to provide high quality service, consistent records and comply with the national and international legislations and ethical commitments. The best practices and guidelines for biological repositories such as OECD Best Practice address all infrastructural aspects of a biobank and provide the basis for management of repositories comprising human derived material.

General considerations for sample collection and transport

Though sample collection and processing practices vary according to the type of specimen being studied, the collection and retrieval practices have many elements in common. General considerations for sample collection and transport include informative pilot studies, timing (collection – processing), thorough temperature monitoring, stability assurance of specimens as well as appropriate equipment and procedures. The repositories collecting and storing biological material are stipulated to provide high and uniform quality samples to the scientific community. The best practices for repositories such as ISBER Best Practices presents effective and practical information on collection, storage, retrieval and distribution of biological materials for research purposes.

Sample processing, storage (blood, DNA), DNA measurement and normalization

Based on the studies made by the P3G observatory so far, (<http://www.p3gobservatory.org>) and the comparison table of processing, storage and quality control of DNA, commonly used biobanking methods can be summarized:

Blood samples are processed mostly fresh and are stored frozen for both short and long term usage. Mostly utilized **DNA extraction method** is salting out protocol, inorganic method containing no hazardous components. Automated DNA extraction is nearly as common as manual extraction.

Most commonly used **DNA diluent** is TE and the **storage condition** for DNA preferably either 4°C or -80°C or in liquid (and vapor) N₂. DNA is **quantified** mainly by UV-absorbance measurement performed by Nanodrop equipment. **Technical quality** assessment for DNA is most often done manually. DNA quality is checked by recording the absorbance ratios A260/A280 or by running the sample in agarose gel. Number of samples tested for quality varies between biobanks but most biobanks perform quality assessment for all processed samples.

For further details of the P3G questionnaire, participated projects/ biobanks and responses please visit <http://www.p3gobservatory.org/catalogs.htm>.

BBMRI's pilot networking biobanks

To motivate existing population biobanks to make their resources more available, BBMRI has formulated the concept of pilot network of biobanks. It aims to build a functional network of biobanks in practical level providing framework for training, testing and assessing proposed standards and exchanging data as well as specimens. Five biobanks of the pilot network from Estonia, Finland, Germany, Netherlands and Norway contributed to the review of technical solutions and quality criteria by offering their expertise and knowledge of commonly recognized methods in the field of population based DNA banking.

Pilot network DNA chart provides an overview of the details how DNA samples are stored, tracked and shipped as well as information of the types of LIMS and SOPs each biobank has to offer.