Biospecimen Definition

According to the United States National Cancer Institute, biospecimens are "samples of material, such as urine, blood, tissue, cells, DNA, RNA, and protein from humans, animals, or plants."

These samples are typically stored in biobanks that collect precise clinical, macroscopic, patient-related data, that can be used for research. The most commonly found biospecimens are those from humans, collected from pathology laboratories for new cancer biomarkers research. Biospecimens can be stored in various forms, paraffin embedded after fixation in formalin (FFPE), frozen or at room temperature with newly developed technologies.

Biospecimens collection and storage

Biospecimens can be of different nature, however the most commonly used are the tumoral samples from pathology laboratories. These are stored embedded in paraffin blocks after fixation in a neutral buffered formalin and kept at room temperature. Biobanks collect these paraffin blocks and the detailed associated data from pathologists and medical files to have the most complete data. Some biobanks also freeze biospecimens, which allows an optimal DNA and RNA conservation but the samples are less convenient to store. Freezers or liquid nitrogen are needed, they cost money to sustain and the carrying is harder. Fresh biospecimens can also be stored at room temperature if these are living stocks or plants.

Ethical issues related to the associated data

Data are what makes biospecimens valuable to the research. Data collection can be done by the biobank itself by performing the needed analysis or given by the contributor. If entire biospecimens arrive, the biobank can also extract the interesting products if only DNA or RNA are stored, freeze the samples and only give away these extracted products. Another important thing to consider is the written consent that is mandatory in case of human samples, and everything that belongs to the sample must be de-identified: no name, contact nor birthdate. In order to collect and then export human biospecimens, a biobank has the obligation to ask for the authorizations from the national competent authorities.

Reference: Carrick, D.M., et al. (2015). The PLCO Biorepository: Creating, Maintaining, and Administering a Unique Biospecimen Resource. Reviews on Recent Clinical Trials 10 (3), 212-222.

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