Biobanks. A research infrastructure for the future of nutritional research

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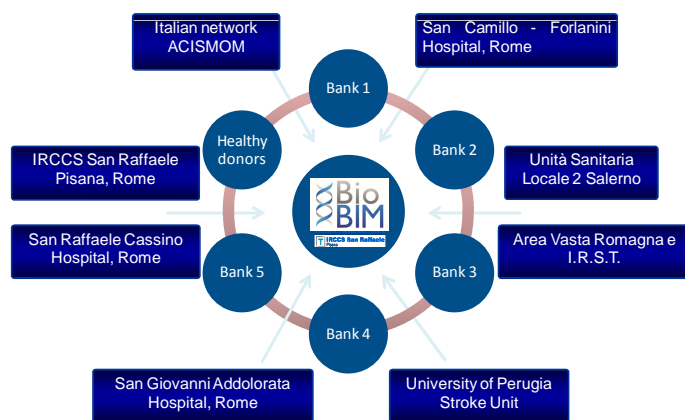
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Repository banks for biological samples are defined as operational units that provide a service for the storage and management of biological material and associated clinical data. These, if properly complemented with dietary assessment of food and nutrient intake, may offer unique opportunities to investigate the relationships between diet, nutritional status, lifestyle and environmental factors and the incidence of several diseases, as in the case of the EPIC study held within the framework of the European network of Biobanks BBMRI.

All these tasks, however, critically depend upon the availability of a large number of standardized specimens at the point that many research activities are seriously invalidated by the heterogeneous quality of the human specimens used. In particular, pre-analytical variations render the results derived from specimen of different biobanks and, often, within the same biobank, incomparable. Thus, the need to eliminate, as much as possible, all variables arising from specimen collection, preparation or storage, in order to guarantee that the distributed samples meet the required specifications. This would ultimately preserve the accuracy, reproducibility and compara-bility of results among different research groups.
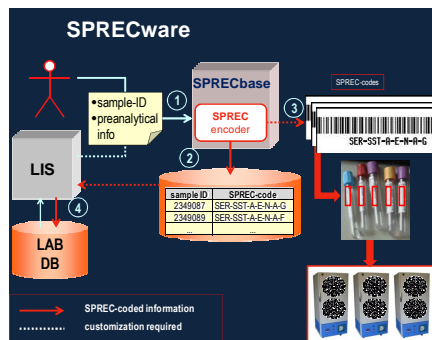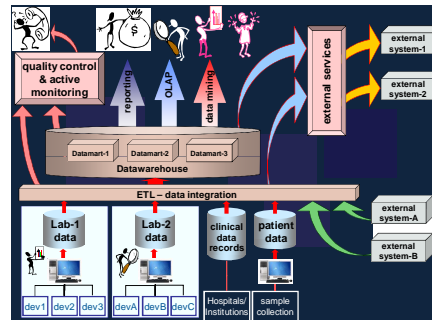
The BioBIM Project

The BioBIM (Interinstitutional Multidisciplinary Biobank, IRCCS San Raffaele Pisana, Rome) is an interinstitutional center that promotes participation of peripheral health structures that do not have biobanking infrastructures. The structural characteristics, organization and management of the BioBIM allows the development of its research potential in a shorter time than a single institution. Moreover, the participation of various centers with diversified health care expertise, determines the multidisciplinary nature of the collection and the ability to create/develop a network of multicentric and multidisciplinary Institutes.

In the BioBIM the possibility to gain exhaustive records on the whole life cycle of biobank stored samples and their quality has been achieved by means of RFID tag technology and of standard pre-analytical coding system (SPREC code). Moreover, thanks to a Business Intelligence platform and Service Oriented Architectures, the BioBIM is currently involved in a multi-institutional biobanking network of reference within the southern Italy aimed at defining common preanalytical procedures to standardize biospecimen collection and preservation, identifying a set of "key biomarkers" to be used in assessing sample quality and strengthening of the scientific value of biological collections within the network.

We developed a pilot study on a fragment of the life cycle, namely the storage between the end of the preanalytics and the beginning of the analytics, which is usually not traced by automated tools because it typically includes manual handling.

By adopting RFID devices we identified the possible critical time delays.

At 6, 12, 24 and 36 months RFID-tagged specimens cryopreserved at -80°C were successfully read.

5 different disease-based biorepositories have been structured:

1. *Cancer diseases*
2. *Cardiovascular and respiratory diseases*
3. *Neurodegenerative diseases*
4. *Developmental disabilities*
5. *Rare diseases*

Healthy volunteers are also recruited