

# Oral Biobank a Future Perspective in Dentistry

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## ABSTRACT

**Background:** The biobank is known and established, a capital asset for the process of precision medicine, for supporting and improving research clinically and biomedically. Vast evolution in the tract of biomedical research manifolds the situation for requirement and lasting difficulty of acquirement, preservation, and analysis of human samples.

**Objective:** On the other side the biobanking in terms of dentistry could represent an expeditious means for effective advanced research and transnational values about oral and systemic diseases. It will even lead to bringing forth therapeutic profit and a primal measure to the individualized practice of medicine.

**Conclusion:** To assure high-quality and standardized diagnosing and therapeutic ways all over the country, various territorial biobanks must be adjoining extensive national oral and oral cancer biobanks.

**Keywords:** Biobanking, oral biobank, biomedical research

## INTRODUCTION

The biobank is timely and well-thought-out, a primary asset for the process of precision medicine, for supporting and improving research clinically and biomedically. Vast evolution in the tract of biomedical research manifolds the situation for requirement and lasting difficulty of acquirement, preservation, and analysis of human samples. Moreover, the prospect of gathering biological material regularly from professionals was the induction to bring off it in a structured mode of preserving them. These banks are multipurpose not even for particular research project purposes, but also can be used for data and sample sharing across countries, in big collaborative research, which will be most essential with rare diseases and studies related to genetics. Hospital-based pathology units have constricted storage for ample figures of preserved sampling. Primarily, they are made for diagnostic purposes and the received specimens, which are implied as limited samples' legally also state limitation only in analyses for diagnostic purposes, and not meant for research. Thus, the idea of a biobank as a novel solution was taught.

Generally, sample types stored go on to the biobanks operation. The common biobanks are of Blood and DNA, and many more various specimens could be gathered too, such as biological fluids, and tissues. The pathological depository is the one commonly seen in biobanks, but even bio-specimens from healthy volunteers and their data can also be stored. The acceleration in requirement and need for research in the field of dentistry, particularly in the tract of oral oncology, OPMD, and the developing grounds regarding the linkage with oral and systemic disorders, has made the need for biobanking in the field of oral health. The common biobank oral specimens

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now are saliva, adult and deciduous teeth, dental pulp stem cells, various oral biopsies, buccal swabs, and oral washes worldwide<sup>1</sup>. Data from self-reports, questionnaire studies, and clinically examined data can be with or without sample collection. DNA or molecular biobanks with data inclusive of clinical parameters of physical investigation, demographics, laboratory test reports, general questionnaire data, etc. The molecular details include the patient's genomic data, epigenome, transcriptome, and other reports regarding genetics<sup>2</sup>. The types of sample in biobanks depends upon the need of the research and can be generally divided into oral biobanks of pathological samples and biobanks of healthy samples and biobanks with only data collection ( Table 1).

### Challenges in establishing and maintaining biobanks:

The acquisition, preservation, standardization, and quality maintenance of the biological samples are a few major challenges faced in establishing the biobanks which are required for long-term utilization<sup>3</sup>. The standard operating pro-

cedures should be followed, especially for quality control of the specimens and for the researchers to handle the specimen. The ISO has already been permitted regarding the legal aspects in 2018 (ISO 20387:2018) and regulations in operating biobanks<sup>4</sup>. To follow all the protocols, recommendations with advisory committees that render valued function on ethical, technical, scientific, and structural aspects of biobanks should be formed<sup>5</sup>. The advisory committees are vast and formed by national and international experts and professionals for smooth functioning biobanks<sup>5</sup>.

The extended literature and extensive debate on the subject of biobanking, especially on the ethical and regulative perplexity, in developed countries, is seen barely in the case in developing countries. The major responsibility for biobanks requires the governance of all donor's informed consent to the particular project or for multiple usages for various research following General Data Protection Regulations (GDPR 679 2016) ahead of whatever medical process, and about pseudonymization of biological samples gathered for the preservation of donors' privacy<sup>6</sup>. Activities in the range of a biobank admit: storing specimens as early as, harvesting at the required point, and combining the clinical, epidemiologic, and general data. Furthermore, gathered samples are pseudonymized and then processed, principally analysed, and properly preserved for

future use with the wider scientific centers. They have to provide information regarding the acquirement, management, and retention of each sample<sup>3</sup>. For the communication and availability of Data, functioning, to the researchers the biobanks should be connected to websites. The strong implementation of the information technology (IT) department for managing and maintaining data is essential to biobanks that follow a protocol and policies on the storage and security of data. The mechanism for accessing the data should be preserving privacy and even consent from the researcher is required to not misuse the data<sup>7,8</sup>. Most importantly, the collaboration between biobanks and major organizations or networks of biobanks ensures the biospecimens' consistent quality.

**PROSPECTS FOR THE FUTURE**

Now it is most necessary of an hour for considering biobanks as a major functioning unit and not to reckon them as an inactive compendium of samples and data. They are now a dynamic asset, endlessly germinating, rising, and pioneering, leading towards newer proficiency and delivery of new knowledge domains necessitate. More informative goals for the future in respect of developing biobanks must consider, due to the ever-growing international communication system and mutuality of data and samples. A Minimum Information About Biobank Data Sharing (MIABIS) nomenclature is es-

**Table 1:** Types of oral biobank

	Type of sample	
	Liquid	Solid-Biopsy tissue
<b>Biobanks, which store pathological oral samples</b>	<ul style="list-style-type: none"> <li>➤ Saliva</li> <li>➤ Blood</li> <li>➤ Oral rinses</li> <li>➤ Gingival crevicular fluid</li> <li>➤ Oral swabs stored in liquid</li> <li>➤ Cell lysates of various pathologies</li> </ul>	<ul style="list-style-type: none"> <li>➤ Formalin-fixed archives</li> <li>➤ Frozen tissue</li> <li>➤ Tooth specimens, both deciduous and adult (periodontally compromised and decayed)</li> <li>➤ Dental stem cells (from dental pulp, periodontal ligament, apical papillae, follicles)</li> <li>➤ Dental plaque</li> </ul>
<b>Biobanks, which store healthy oral samples</b>	<ul style="list-style-type: none"> <li>➤ Saliva</li> <li>➤ Blood</li> <li>➤ Oral rinses</li> <li>➤ Gingival crevicular fluid</li> <li>➤ Oral swabs stored in liquid</li> <li>➤ Cell lysates of normal oral mucosa.</li> </ul>	<ul style="list-style-type: none"> <li>➤ Formalin-fixed archives and frozen normal tissue</li> <li>➤ Tooth specimens, both deciduous and adult</li> <li>➤ Dental stem cells (from dental pulp, periodontal ligament, apical papillae, follicles)</li> </ul>
<b>Biobanks, which store only data oral diseases</b>	clinical parameters of <ul style="list-style-type: none"> <li>➤ physical investigation</li> <li>➤ demographics</li> <li>➤ laboratory test reports</li> <li>➤ general questionnaire data</li> <li>➤ patient's genomic data</li> <li>➤ epigenome</li> <li>➤ transcriptome</li> </ul>	



established for describing samples, sample donors, and events<sup>9</sup>. Generally, in respect of biobanking in the field of dentistry and orofacial aspects, some facet is required which can be further discovered. All the biological materials that are retrievable in dentistry are not utilized and are considered for storage in a depository. The unusual biospecimens, of the periodontal ligament, alveolar bone, normal tissue specimen procured during certain procedures, gingival tissues, buccal mucosa from which oral fibroblasts can be differentiated, certain pathological tissue of OPMDs (OSF, oral lichen planus, erythroplakia, etc.) has not been stored for research point of view. The possibility of recovering further data and precious sample storage can be enhanced by the development of new biobanks for such oral tissues. Cells derivable from such specimens might stipulate the prospect for future concern and used not only in a regenerating particular tissue, but even can be utilized in the treatment of respective systemic diseases<sup>10</sup>.

The widespread information and importance of biological tissues and their utilization in the field of research should be propagated to all private practitioners, hospitals, and institutions. It is also worth commenting on whether the collecting or usage of oral samples through biobanks in routine clinical dentistry is quiet and not executable, as some protocols and problems have still not been amply addressed. It may be regarding the period, method, and many detailed procedures for storing oral samples, and even the ethical rules and regulations that are yet required on the usage of biospecimens. Even though biobanking is qualified for preserving samples for the long term, their properties might alter with time, and the analyses may vary accordingly. This problem is faced especially in the case of stem cells which are cryopreserved for longer periods and their efficacy, which, is still not addressed completely.

## CONCLUSION

Biobanking in terms of dentistry could represent an expeditious means for effective advanced research and transnational values about oral and systemic diseases. It will even lead to bringing forth therapeutic profit and a primal measure to the

individualized practice of medicine. To assure high-quality and standardized diagnosing and therapeutic ways all over the country, various territorial biobanks must be adjoining extensive national oral and oral cancer biobanks.

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