



# Microarray and its Applications

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## Introduction

Microarray is one of the most recent advances being used for cancer research; it provides assistance in pharmacological approach to treat various diseases including oral lesions. Microarray helps in analyzing large amount of samples which have either been recorded previously or new samples; it even helps to test the incidence of a particular marker in tumors. Till recently, microarray's usage in dentistry has been very limited, but in future, as the technology becomes affordable, there may be increase in its usage. Here in this poster, a discussion will be made regarding the various techniques and applications of microarray or DNA chip.<sup>1</sup>

## Principle of Microarrays

The unknown DNA molecules are cut into fragments by restriction endonucleases; fluorescent markers are attached to these DNA fragments. These are then allowed to react with probes of the DNA chip. Then the target DNA fragments along with complementary sequences bind to the DNA probes. The remaining DNA fragments are washed away. The target DNA pieces can be identified by their fluorescence emission by passing a laser beam. A computer is used to record the pattern of fluorescence emission and DNA identification. This technique of employing DNA chips is very rapid, besides being sensitive and specific for the identification of several DNA fragments simultaneously.<sup>1</sup>

## Microarrays Applications

The application of microarray in the medical field can be categorized into four types:

**The discovery of target:** the microarray is used to compare diseased tissues/cells with healthy tissues/cells to find the characteristics of a particular disease.

**The discovery of drugs and leads:** after the target has been discovered, microarrays can be used to screen potential compounds and identify the toxicity of the lead compound that will help in deciding proper medication for the patient. The study of antibodies, microorganisms like bacteria and virus, also helps in the discovery of more effective antibiotics and vaccines.

**Diagnostics and prognostics:** the microarray is widely used to know the state of disease, type of tumor and other factors important for the patient. It is used to diagnose a number of diseases, most notably cancer.

**Pharmacogenomics and theragnostic:** this technique can be used to decide a patient's treatment and therapy on the basis of his/her genetic makeup. Thus, it helps in carrying out personalized treatments than using generalized ones.<sup>1,2</sup>

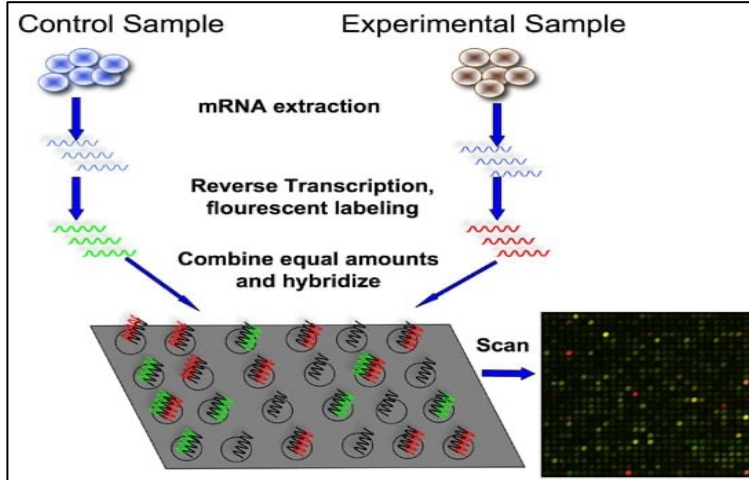


Figure (1) shows principle of microarray and its application<sup>3</sup>

## Advantage

Well defined protocols for hybridization

Well defined analysis pipelines

Standardized approaches for DATA submission

Relatively low cost

## Disadvantages

High variance of low expressed genes

Dynamic range limited by scanner

Analysis only for predefined sequences

Non specific hybridization

Table (1) shows advantage and disadvantage of microarray and its application

## Conclusion

Microarrays hold much promise for the analysis of diseases in the early stages particularly it might be helpful in predicting incidence of some tumors earlier than it happen which to remedy and giving appropriate strategies for treating such disease.

## References

1. Anon, Nature news. Available at: <https://www.nature.com/scitable/definition/microarray-202/> [Accessed February 1, 2022].
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