



## **Medical Applications of Biotechnology**

### **Diagnostic and Imaging Techniques**

1.

#### **Molecular Imaging**

Uses molecular probes to visualize and diagnose diseases at the molecular level, aiding in early detection.

3.

#### **Biosensors for Disease Markers**

Develops sensors for real-time detection of biomarkers, enhancing diagnostic accuracy and speed.

5.

2.

### **Pharmacogenomics**

**Customizes drug treatments based on patients genetic makeup, ensuring efficacy and minimizing adverse reactions.**

7.

### **Personalized Vaccines**

**Creates vaccines tailored to an individual s genetic profile, enhancing immune response and effectiveness.**

9.

### **Biomarker Discovery for Drug Trials**

**- Discovers biomarkers to assess drug efficacy and patient responses in clinical trials, facilitating drug approval processes.**

## **Treatment and Therapies**

11.

### **Cell Therapy and Regenerative Medicine**

- Uses stem cells or engineered tissues to repair or replace damaged organs, tissues, or cells, offering potential cures for various diseases.

13.

### **RNA Interference (RNAi) Therapy**

- Silences specific genes to treat diseases caused by genetic abnormalities, including some viral infections and genetic disorders.

15.

4.

## **Biocompatible Prosthetics**

- Develops prosthetic limbs and organs using biocompatible materials, enhancing mobility and quality of life for patients.

17.

## **Biomedical Sensors and Wearables**

- Integrates sensors into wearable devices for continuous health monitoring, providing real-time data for disease management.

19.

## **Smart Drug Delivery Systems**

- Develops nanoscale carriers for drugs, enabling precise drug delivery and controlled release, minimizing side effects.

## **Preventive Medicine and Public Health**

**21.**

### **Pathogen Genomics for Outbreak Analysis**

**- Sequences pathogens to understand disease transmission patterns, aiding in outbreak containment and prevention.**

**23.**

### **Environmental Genomics**

**- Studies the genetic composition of environmental samples to monitor microbial communities, predict disease outbreaks, and enhance public health efforts.**

**25.**

**6.**

## **Telemedicine and Remote Monitoring**

**- Utilizes biotech-powered devices and applications for remote consultations, monitoring patient vitals, and managing chronic diseases.**

**27.**

## **Biometric Patient Identification**

**- Uses biometric data such as fingerprints or facial recognition for accurate patient identification, reducing medical errors.**

**29.**

## **Blockchain in Healthcare**

**- Enhances data security and interoperability in healthcare systems, ensuring the integrity and privacy of patient information.**