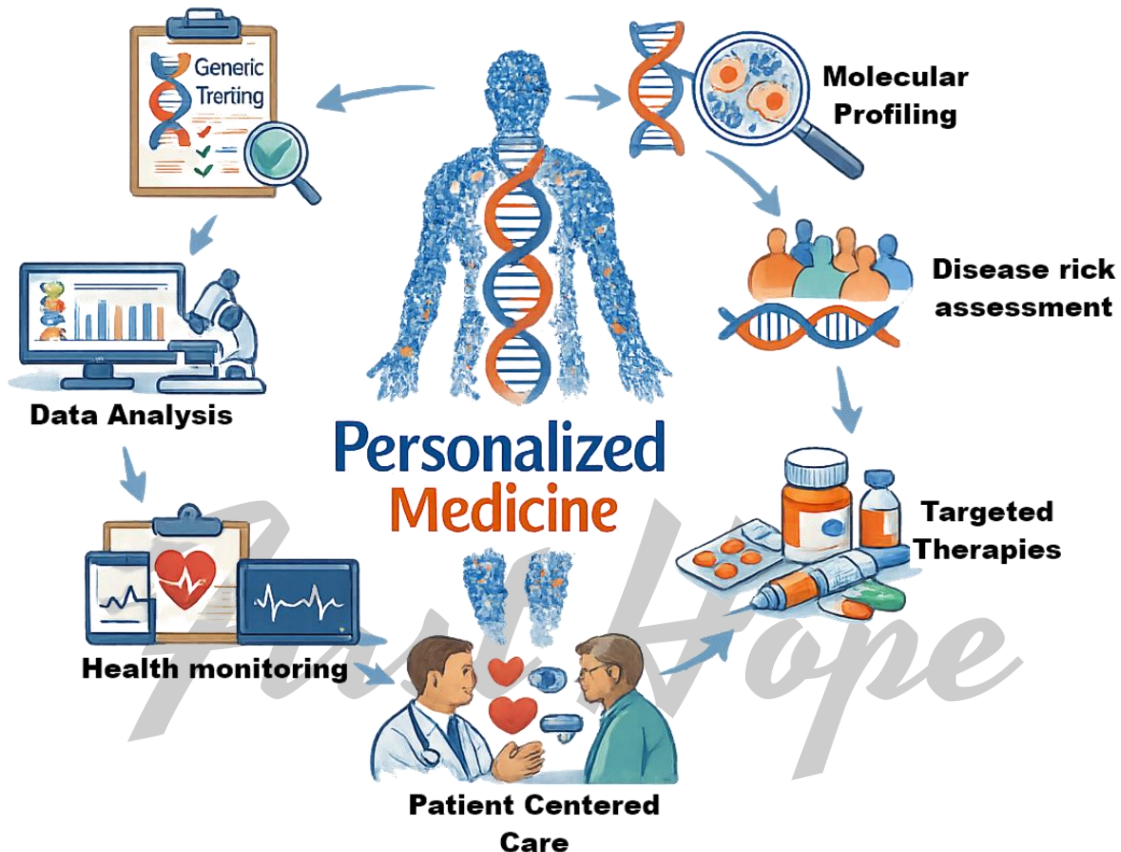


New trends for Personalized Medicine

New Trends for Personalized Medicine – Introduction

Definition

- Personalized medicine is a modern healthcare approach where **treatment is tailored to an individual patient's characteristics** rather than using the same treatment for everyone.



Basic Idea

- Traditional medicine follows a “one-size-fits-all” approach
- Personalized medicine considers:**
 - Genetic makeup
 - Age
 - Lifestyle and diet
 - Environment
 - Disease condition and characteristics

Traditional vs Personalized Approach

A. Traditional Medicine

- Same drug and dose for all patients
- Based on average population response

B. Personalized Medicine

- Treatment customized for each patient
- **Based on:**
 - Genetics
 - Metabolism
 - Disease variability

Why Personalized Medicine is Needed

- **Different patients respond differently to the same drug:**
 - Some respond well
 - Some show no effect
 - Some develop severe side effects
- **Reasons for Variation**
 - Genetic differences
 - Differences in metabolism
 - Environmental factors
 - Lifestyle and diet
 - Presence of other diseases

Role of Technology in New Trends

- **Advancements in:**
 - Genomics (study of genes)
 - Biotechnology
 - Artificial intelligence (AI)
 - Data analysis (big data)
- **These technologies help in:**
 - Designing individualized therapies
 - Predicting drug response
 - Improving treatment outcomes

Key Goals of Personalized Medicine

- Right drug for the right patient
- Right dose
- Right time

- Maximum effectiveness
- Minimum side effects

Areas Involved

- Drug development
- Diagnostics (biomarker-based)
- Drug delivery systems
- Patient monitoring

Examples

- Cancer treatment based on tumor genetics
- Dose adjustment using genetic testing
- Targeted therapies using biomarkers

Impact on Drug Delivery Systems

- Shift from general to patient-specific delivery systems
- **Development of:**
 - Targeted delivery systems
 - Controlled-release systems
 - Smart drug delivery devices
- **Benefits:**
 - Improved drug selection
 - Better dose optimization
 - Enhanced therapeutic outcomes

Definition of Personalized Medicine

Standard Definition

- Personalized medicine is a medical approach in which diagnostic, therapeutic, and preventive strategies are tailored to the individual characteristics of each patient, especially based on genetic information.

Simple Definition

- It means providing the most suitable treatment to a specific individual based on their unique biological profile.

Key Elements of Personalized Medicine

Key Elements of Personalized Medicine

Individual Variability

Use of Genetic Information

Targeted Therapy

Predictive and Preventive Approach

Integration of Data

1. Individual Variability

- Every person is biologically different
- **Variations occur in:**
 - Genes
 - Proteins
 - Metabolism

2. Use of Genetic Information

- **DNA analysis helps in:**
 - Predicting disease risk
 - Selecting appropriate drugs
 - Predicting drug response

3. Targeted Therapy

- Drugs are designed to act on specific biological targets
- Improves effectiveness and reduces side effects

4. Predictive and Preventive Approach

- Identifies disease risk early
- Focuses on prevention rather than only treatment

5. Integration of Data

- **Combines multiple data sources:**
 - Genetic data
 - Clinical data
 - Lifestyle and environmental data

Related Terms

- **Precision Medicine**

- Often used interchangeably
- Focuses on accurate targeting of therapy
- **Stratified Medicine**
 - Patients are divided into **subgroups** based on shared characteristics

Components Involved

1. Diagnosis

- Genetic testing
- Biomarker identification

2. Treatment Selection

- Choosing the most effective drug
- Target-specific therapy

3. Dose Optimization

- Adjusted based on patient metabolism

4. Monitoring

- Evaluating response
- Modifying therapy as needed

5. Drug Delivery

- Targeted drug delivery systems
- Patient-specific formulations

Difference from Traditional Medicine

Traditional Medicine	Personalized Medicine
Same treatment for all	Individual-specific treatment
Trial-and-error approach	Predictive approach
Focus on symptoms	Focus on root cause

Example

- A cancer patient receives treatment based on their **tumor genetic profile** rather than general chemotherapy

Pharmacogenetics



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