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Review Article On Precision Medicine And Personalized Therapy

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ABSTRACT:

Percision medicine and Personalized therapy are really fascinating areas of healthcare . They focus on tailoring medical treatments to individual patients based on their unique genetic make up and lifestyle and other factors by analyzing a persons genetic information ,doctor can identify specific genetic variations that may impact their response to certain medications . This allows for more targeted and effective treatment .Especially for rare diseases or condition that may not have had many treatment options in the past .

It is an exciting field that has the potential to revolutionize healthcare .

It works on 4p priciple

- ✧ Predictive
- ✧ Preventive
- ✧ Personalized
- ✧ Participative

Archibald Edward Garrod he is the father of precisison medicine and personalized therapy and also called as father of human genetics . He is english physician. He consider disease is an agent of evolution .

He conclude that one drug dose not show same action on 2 different genes or on 2 different persons.

He concluded this in his book **“inborn errors of metabolism” .**

KEY WORDS: Precision medicine , Personalized therapy , Tailoring , Genetic makeup, Rare diseases , Genetic variations ,Persons genetic information.

PRECISION MEDICINE AND PERSONALIZED THERAPY :

It ami is to "Unlocking the Power of your Unique DNA" and to provide "Right treatment to Right patient at Right time in Right dosage form ".

PRECISION MEDICINE:

Its amis to tailor medical treatment or genomic medicine and health data from the patient to generate a treatment to treat illness or conditions .

It involves analyzing a persons genetic makeup ,life style , environmental factors etc… by considering these factors , doctor can provide more targated and effective treatment , improving patient outcomes

Its all about treating each person as a unique induvidual rather than using a "one -size- fits- all approach" .

Patients are categorised according to their biological charecterstics .

It is more "stratified" than personalized medicine .[1]

PERSONALIZED THERAPY:

Also known as individual therapy . By using personal helath information to make decisions on diagnosis and treatment and interventions to meet the specific needs of each person .

It takes into account various factors such as an individual genetic makeup , medical history ,lifestyle ,socioeconomic factors ,family history .

Personalized therapy aims to provide the most effective and personalized care possible .

Its all about treating each persons as a unique individual with their own specific needs .

Precision medicine is also known as personalized therapy . Both are having slight different focuses

Both aim to provide more effictive and individualized care to patient [2-3]

TYPES:

They are several types of precison medicine and personalized therapy . they are used to provide treatment based on individual unique charecteristics .

✧ **Targeted Therapy:**

This focus on treating specific genetic mutations or biomarkers that are driving the growth or progression of a disease . By targeting specific abnormality , targeted therapies can be more effective and reduce side effects .

For eg : 1.Tyrosine kinase inhibitors - inhibit the tyrosine kinase by blocking the signals that promote cancer cell growth .

2. Monoclonal antibodies

3.Hormone therapy

✧ **Immuno Therapy:**

This type of therpy harness the body's immune system to flight diseases , such as cancer . It involves using medications or treatments that boost the immune response against specific targets , such as tumor cell ,while sparing healthy cells .

For eg: Chech point inhibitors - which helps activate immune system to recognize and attack cancer cells

Car-T cell therapy where immune cells are genetically modified to better target and kill cancer cells .

✧ **Pharmacogenomics:**

This field combines genetics and pharmacology to determine how an individuals genetic makeup affects their response to medications . By understanding a persons genetic variation , doctor can prescribe medications that are more likely to be effective and safe for that individual .

✧ **Gene Therapy:**

Gene therapy involves introducing genetic material into a persons cells to treat or prevent a disease . This can be done by replacing a faulty gene , introducing a new gene or modifying existing gene to correct genetic abnormality

For eg : Used in disease like corner , genetic disease , infectious disease

2types of gene therapy products they are Plasmid DNA, Circular DNA .[4]

DIAGNOSTIC TESTS:

Several diagnostic tests are used to gather information like genetic make up , biomarkers and other factors .

Genetic Testing :

This involves analyzing a persons DNA to identify genetic variations or mutations that may contribute to certain disease or conditions.

Biomarker Testing:

Biomarkers are measurable indicators in the body that can provide information about a persons health or responses to treatment . testing for specific biomarkers can help guide treatment decisions .

Imagining Tests:

Imaging technique such as MRI ,CT scans or PET scan can provide detailed images of the body .helping doctors to identify and monitor specific conditions .

Liquid biopsy:

This non invasive test analyses circulating tumor DNA or other biomarkes in the blood to detect and monitor cancer or other diseases.

Pharmacogenetic Testing :

This test examines how an individula genetic makeup affects their response to certain medications, helping doctors choose the most effective and sfae treatment options .[5]

TOOLS FOE DETECTION AND TREATMENT :

They are 2 tools used for detection or diagnosis and for treatment. They are

✧ Genetic variation

✧ Biomarkers

Genetic variation:

Genetic variation is the difference in DNA among individuals or difference between populations among the same species

Genome- group of genetic material in a cell or organism factors which contribute to genetic variation :

✧ Mutations

✧ Mutations in homologus chromosomes

Genetic variation is benificial but harmful in some cases

Types of Mutations:

✧ Single Nucleotide Polymorphism [SNPs]:

These are the most common type of genetic variation and involve a single base change in the DNA sequence .SNPs can occur through out the genome and can influence traits ,disease susceotibilty and drug response .

✧ Insertions and Deletions [INDELS]:

These variations involve the insertion or deletion of a small number of nucleotides in the DNA sequence . indels can cause frame shift mutations ,altering the reading frame of genes and potentially affecting protein function .

✧ Copy Number Variations[CNVs]:

CNVs are large -scale variations in the number of copies of a particular DNA segment they can involve the duplications or deletions of genetic material and can impact gene expression levels or contribute to disease susceptibility

✧ Structural Variations :

These variations involve large rearrangements in the DNA such as inversions ,treanslocations or chromosomal rearrangement .structural variation can have significant effects on gene function and can be associated with genetic disorders .

Genetic variation is studied to understand its impact on human biology , disease susceptibility .

Biomarkers:

Biomarker also called as biological marker is an objective measure that captures what is happening in a cell or an organism at a given moment . biomarkers can serve as early warning systems for your health .

Biomarkers present at every where in our body . biomarkers have molecular , histological ,radiological or physiological factors

Types:

These can be divided into several groups each group can tell about something :

✧ Diagnostic biomarkers

These specific molecules or genetic markers that can indicate the presence of a particular disease or conditions

✧ Monitoring biomarkers :

These are used to monitor the disease progression

✧ Predictive :

These are used to finding the presence or change in the biomarker predicts

✧ Susceptibility/risk biomarker :

These used to access a risk of a patient getting a disease a disease or condition in patient without any clinical manifestation of the target .

✧ Prognostic :

These are used for the measurements in patient with a disease diagnosis that can analyze the probability of a particular clinical event ,disease reccurence or progression

✧ Response or Pharmacodynamic :

Measures a change in response to a therapy or environmental exposure .

- Safety :

Measure the probability thet a mediacl intervention may ledad to an ADR.

Methods to detect biomarkers :

They are various methods to detect specific biomarkers and the purpose of the detection

- Blood test
- Imagining tests
- Biopsies
- Urine and saliva test [6]

PROCEDURE:

- Assessment : first step to gather information
- Biomarker : identify the specific biomarkers
- Treatment selection : By the help of biomarker analysis use different types of treatment to underlying the disease .
- Monitoring and adjustment : By monitoring and evaluating of the crucial step to control disease progression rapidly evolving field.
- Research and advancements :for new treatment options .[7]

ADVANTAGES:

- Targated Treatment
- Improved Treatment outcomes
- Reduced side effects
- Early disease detection[8]

DISADVANTAGES:

- Accessibility
- Data Privacy
- Ethical Consederations
- Limited Evidence

FACTORS INFLUENCE:

- Genetic Variations
- Biomarkers identification
- Data availability

CHALLENGES:

- The large amount of data availabile poses a big challenge
- Security
- Cost [9]

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