GENETIC TESTING IN GENERAL PRACTICE

Pointers and Pitfalls for GPs

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GP Expo 2024


Genetic testing
Genomics
Epigenetics
Nutrigenetics
CRISPR
‘Biohacking’
‘omics’
Precision medicine
Genome sequencing
Pharmaco-genetics
DNA wellness tests
Polygenic risk scores
Personalised medicine

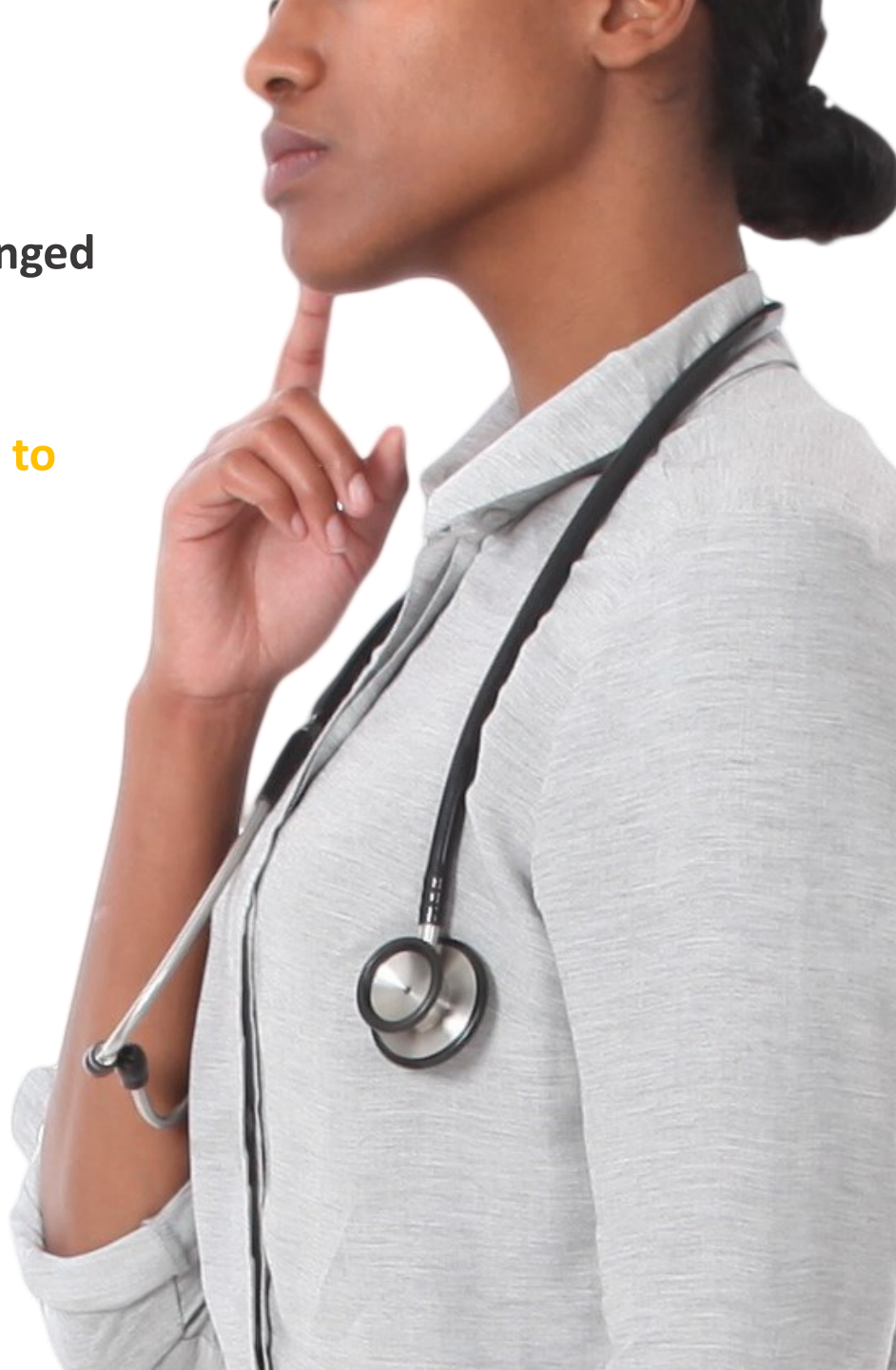
“My training never included anything on genetics, so much has changed and I feel left behind”

“My patients do direct-to-consumer genetic testing and then come to me to make sense of it but I don’t know what to tell them”

“What does this result mean for my patient and
Should I use it to inform their clinical treatment?”

“I’m not always sure who may benefit from genetic testing,
what options are available and who to refer to”

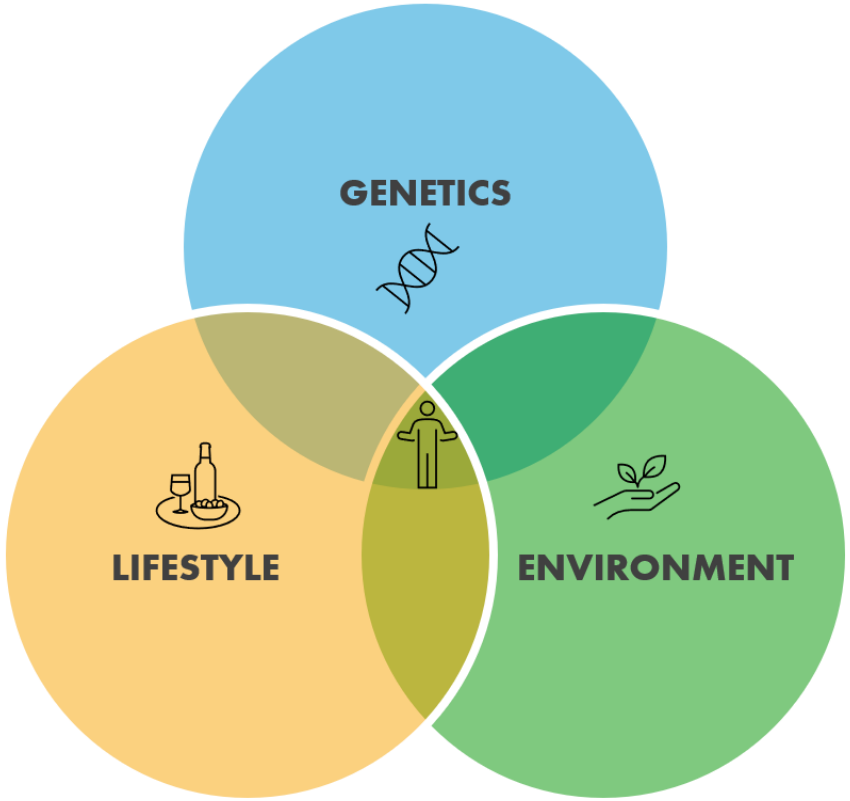
“How can I sensibly and responsibly introduce precision medicine in my practice? ”



LET'S TALK PRECISION MEDICINE

MEDICLINIC PRECISE

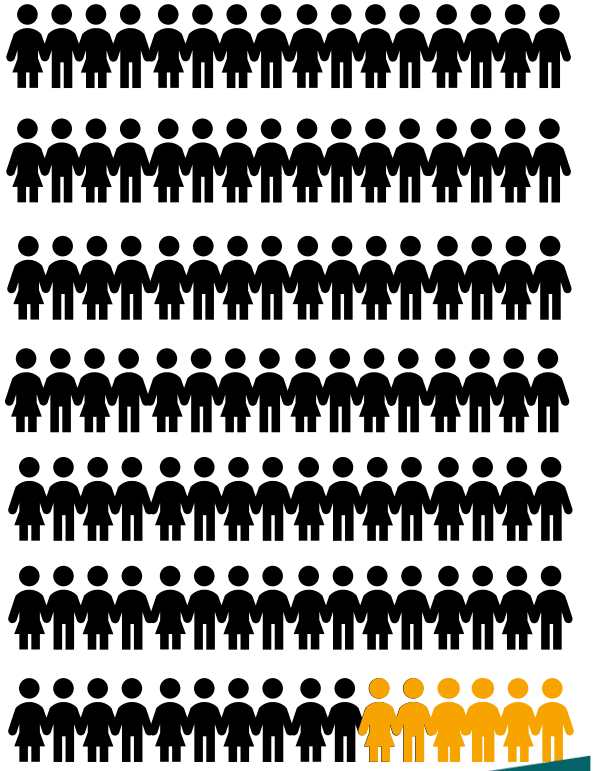
Emerging approach in healthcare
uses knowledge of the individual's **genetics** **environment** **lifestyle**
to guide decisions related to an individual's
medical management



Goal
is to provide a more **individualised and personalised approach** for the **prevention** **diagnosis** and **treatment** of disease

genome.gov, National Insitutes of Health (NIH)

GENETIC CONTRIBUTION TO DISEASE



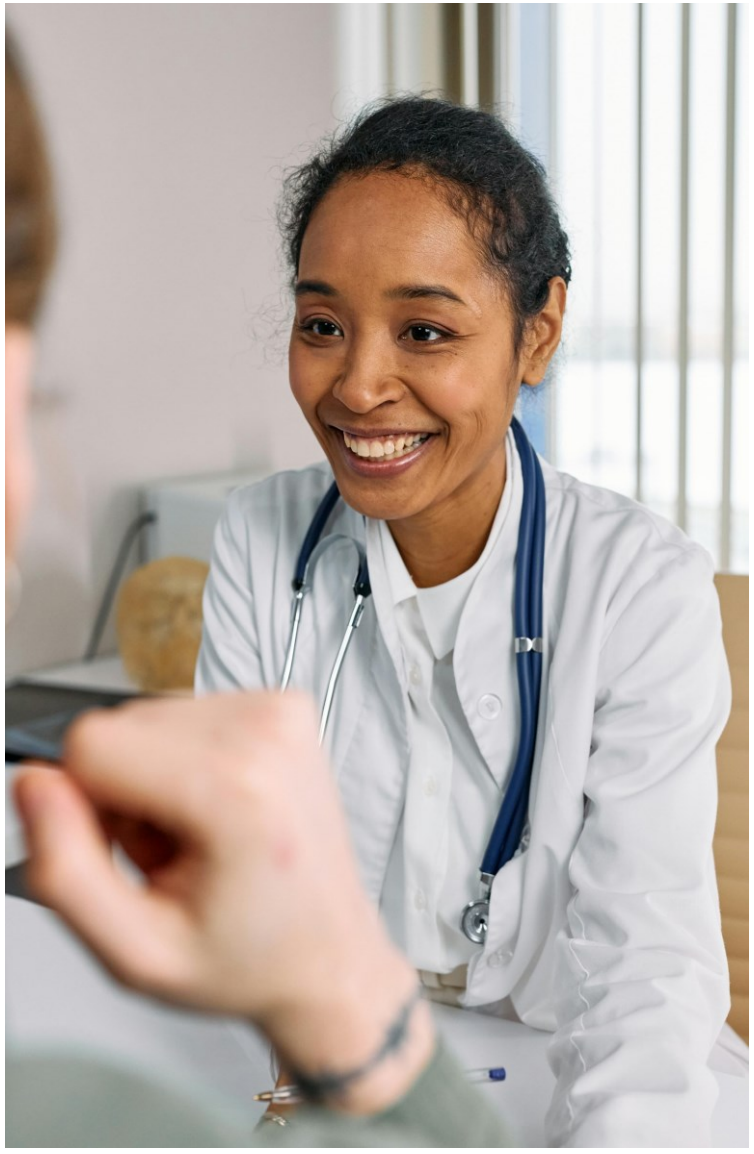
"Rare" genetic disease
5 - 7%

Genetic cause or contribution to disease
~65%

IS PRIMARY HEALTHCARE POSITIONED FOR PRECISION MEDICINE?

MEDICLINIC PRECISE

- Entry point into healthcare
- Holistic management
- Individuals and families
- Long term follow up
- Risk assessment and risk management
- Preventative health care
  - Lifestyle
  - Cancer
- Disease management
  - Chronic disease



BARRIERS TO PRECISION MEDICINE IN GP PRACTICE

MEDICLINIC PRECISE

Lack of **genomic education** during medical training

Limited **genetic professionals to support** primary health care

BARRIERS TO PRECISION MEDICINE IN GP PRACTICE (2)

- Limited knowledge about the **clinical application, integration** and **interpretation** of genetic testing (where are the guidelines?)

- Genetic **jargon,** complex reporting and lack of **transparency** about limitations of testing

BARRIERS TO PRECISION MEDICINE IN GP PRACTICE (3)

- **Cost** of testing and lack of medical aid reimbursement

- **Patient expectations, influence of media and celebrities**

  "Google doctors"

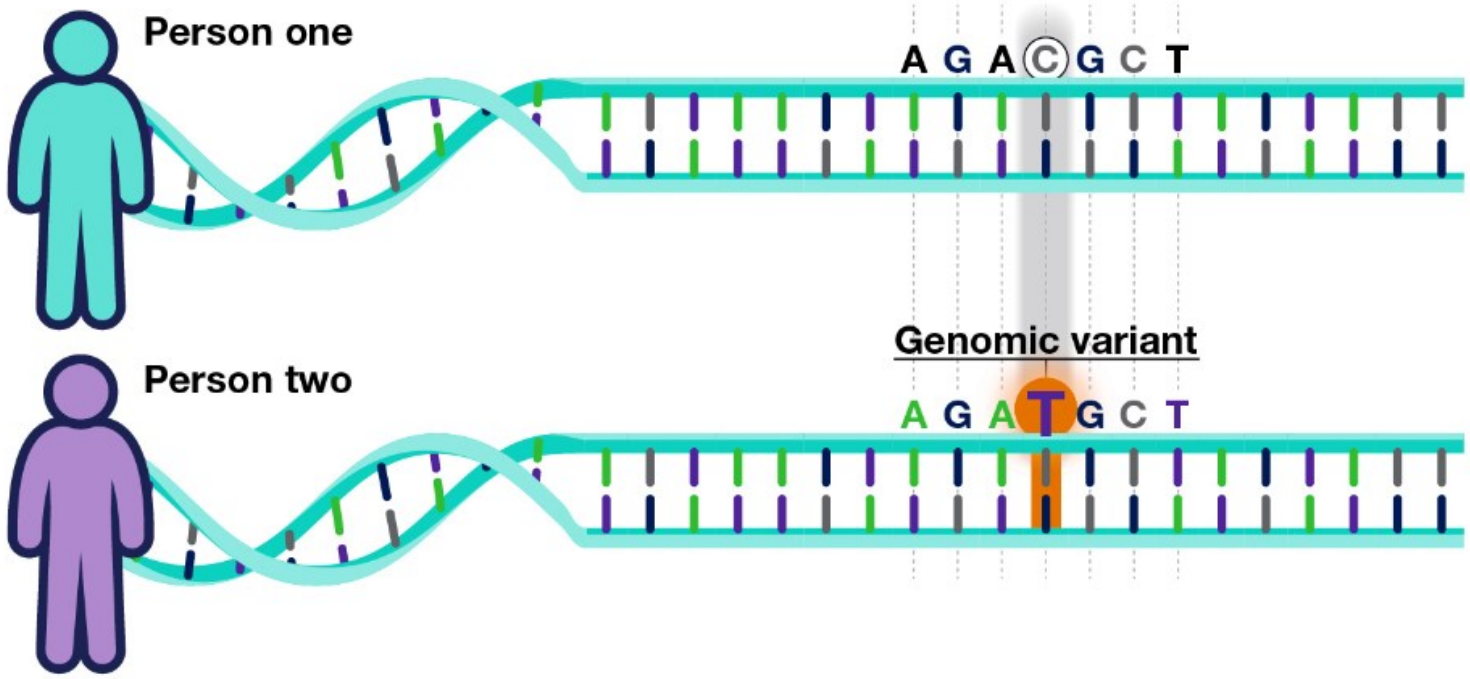
- **Ethical** concerns and psychosocial impact

MEDICLINIC PRECISE

WHAT SETS GENETIC TESTING APART

- Powerful
- Permanent
- Predictive
- Implications

LET'S UNDERSTAND GENETIC VARIATION

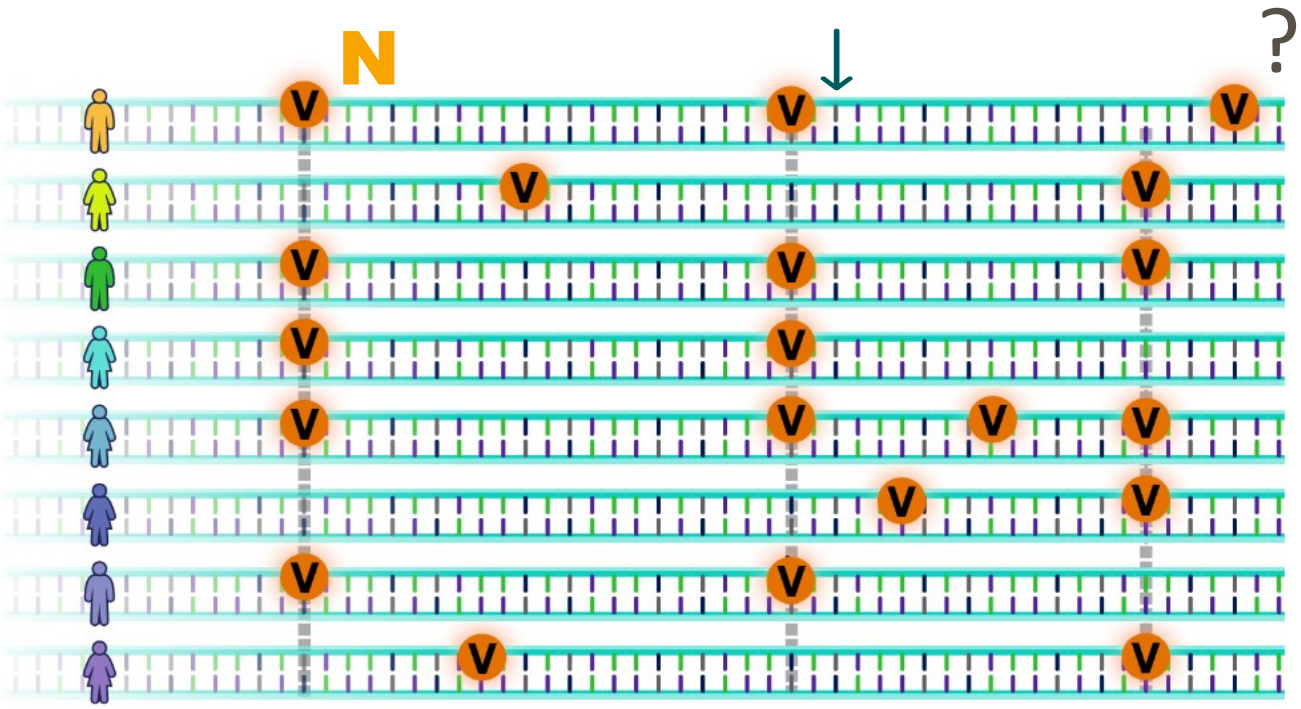


Variants

'SNPs' (Single nucleotide polymorphisms) / 'mutations'

genome.gov

LET'S UNDERSTAND GENETIC VARIATION



Common vs rare variants
Some variants affect disease risk

genome.gov

GENETIC SPECTRUM OF DISEASE

MEDICLINIC PRECISE

GENETIC CAUSE

ENVIRONMENTAL CAUSE

Chromosomal or single gene genetic disorders

Hereditary susceptibility to disease/cancer

Multifactorial or Polygenic "Complex" diseases

Trauma
Malnutrition

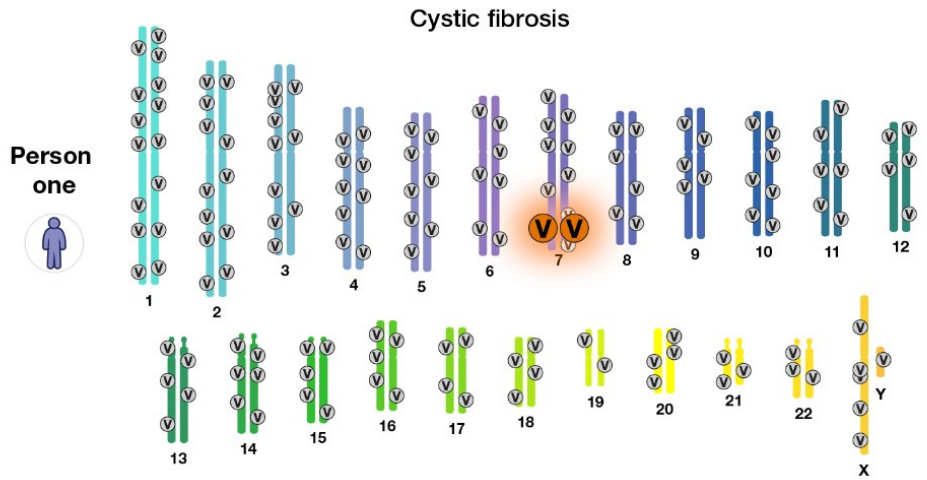
GENETIC SPECTRUM OF DISEASE

GENETIC CAUSE

ENVIRONMENTAL CAUSE

Chromosomal or single gene genetic disorders

Hereditary susceptibility to disease/cancer



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GENETIC SPECTRUM OF DISEASE

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ENVIRONMENTAL CAUSE

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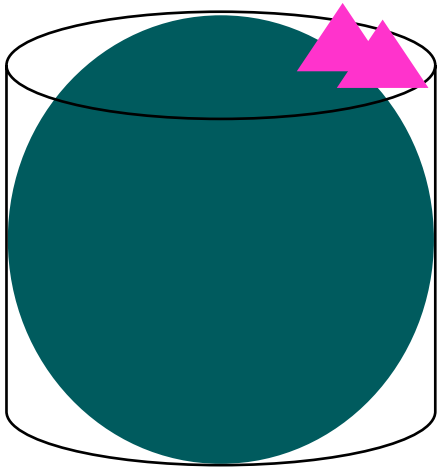


Genetic Predisposition

Environmental factors

GENETIC SPECTRUM OF DISEASE

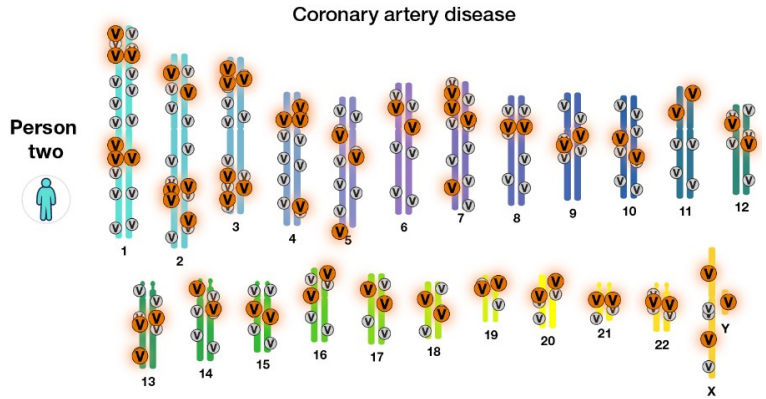
GENETIC CAUSE

ENVIRONMENTAL CAUSE

GENETIC SPECTRUM OF DISEASE

Multifactorial / Polygenic
“Complex” diseases

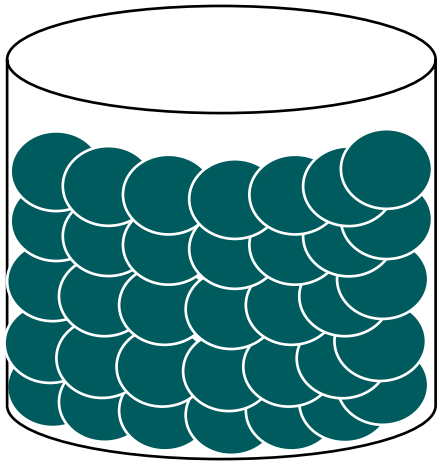
GENETIC SPECTRUM OF DISEASE



Multifactorial / Polygenic
"Complex" diseases

genome.gov

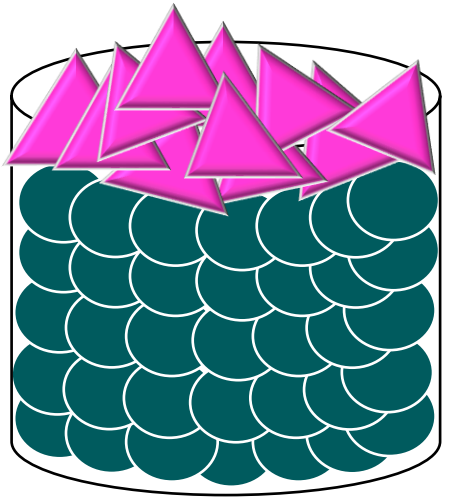
GENETIC SPECTRUM OF DISEASE



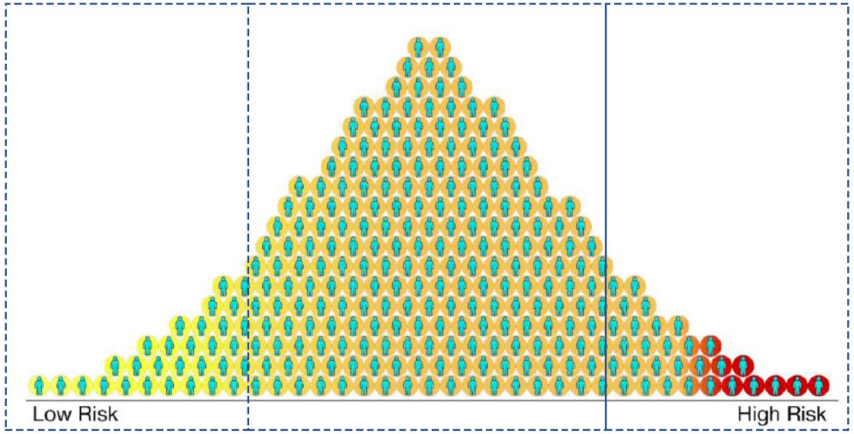
Multifactorial / Polygenic
"Complex" diseases

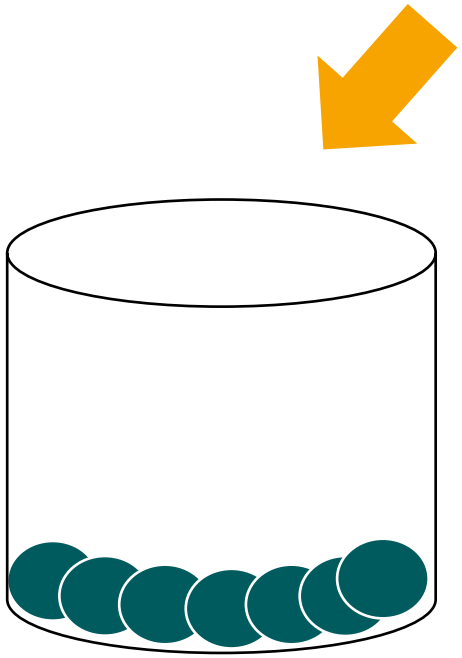
Genetic Predisposition

Environmental factors

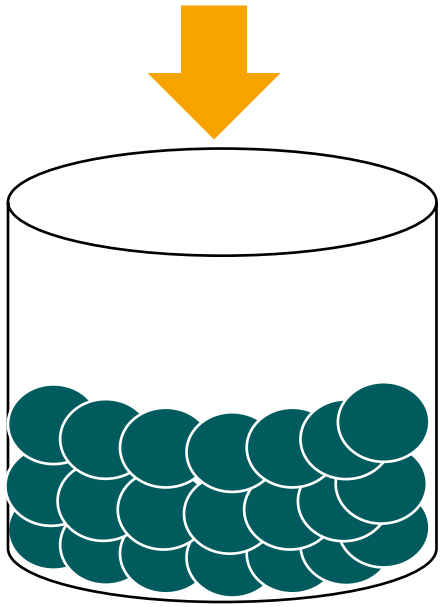


GENETIC SPECTRUM OF DISEASE

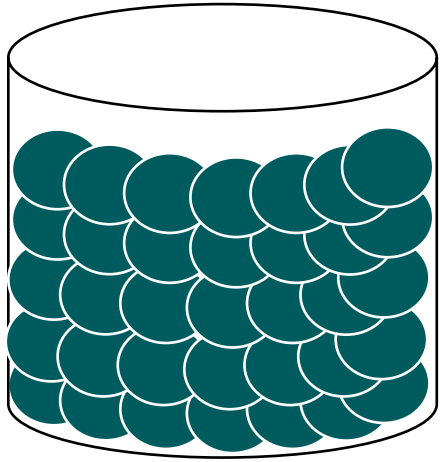




LOW GENETIC RISK



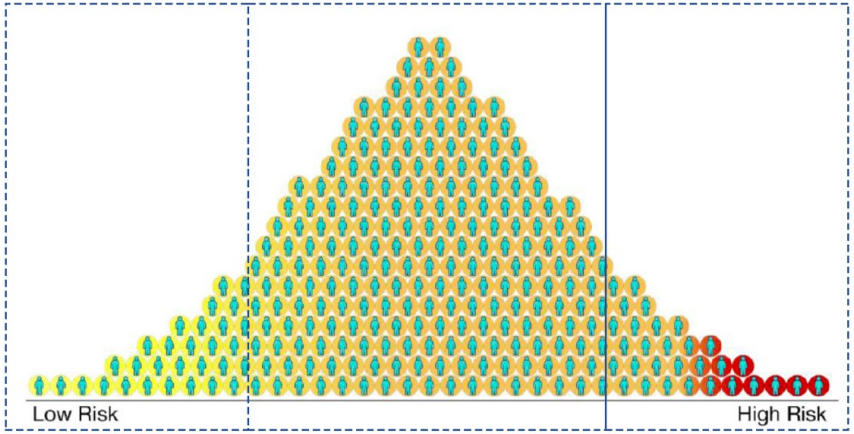
MODERATE/ POPULATION GENETIC RISK

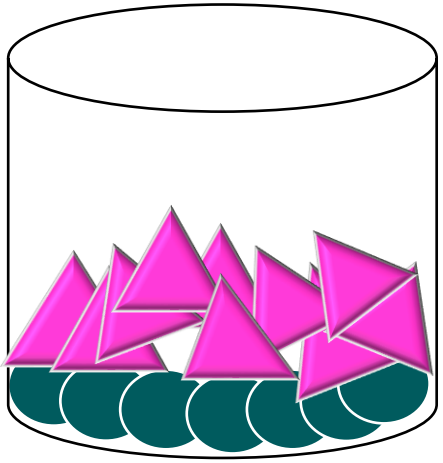


HIGH GENETIC RISK

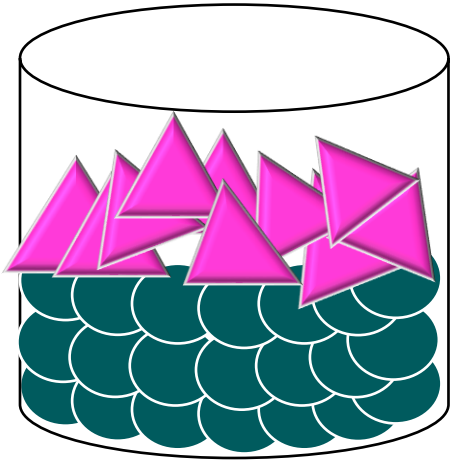
https://www.genome.gov/Health/Genomics-and-Medicine/Polygenic-risk-scores.

GENETIC SPECTRUM OF DISEASE

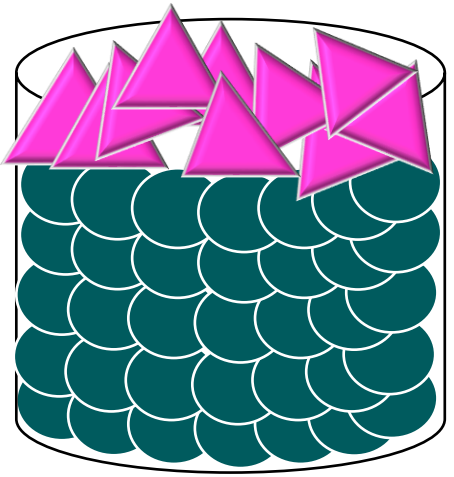




LOW DISEASE RISK



MODERATE/ POPULATION DISEASE RISK



HIGH DISEASE RISK

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GENETIC SPECTRUM OF DISEASE

GENETIC CAUSE

ENVIRONMENTAL CAUSE

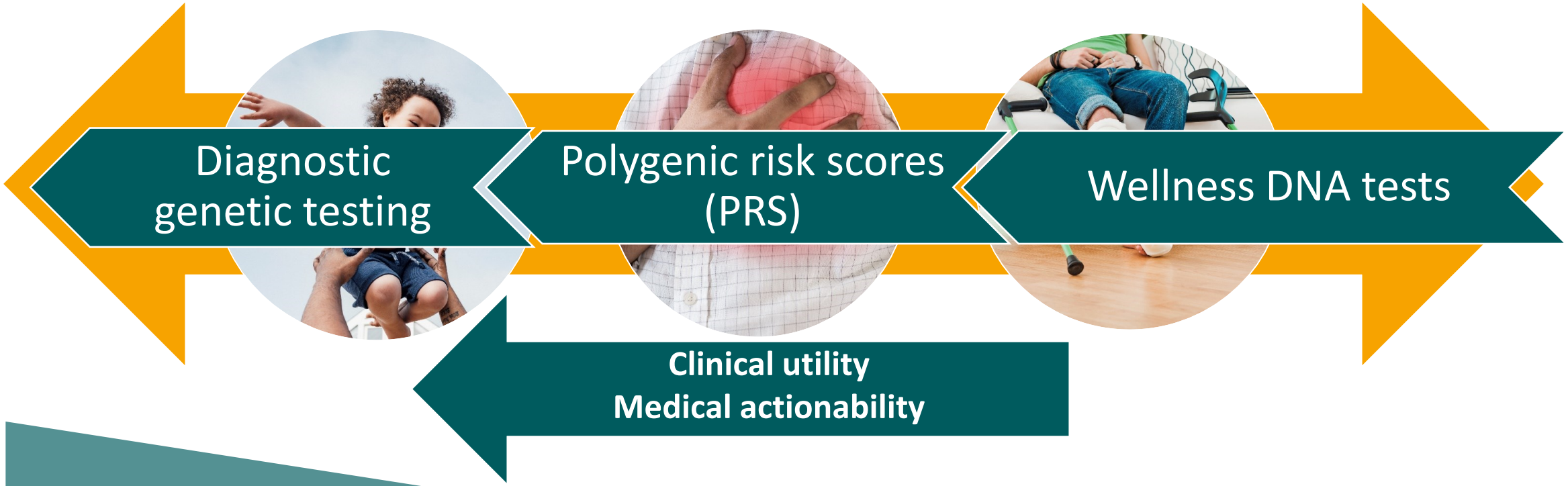
DIAGNOSIS AND DISEASE
PREDICTION WITH GENETIC TESTING

HIGH

LOW

GENETIC TESTING

Know the difference
Manage expectations



DIAGNOSIS AND DISEASE PREDICTION WITH GENETIC TESTING

HIGH — LOW

Case example 1

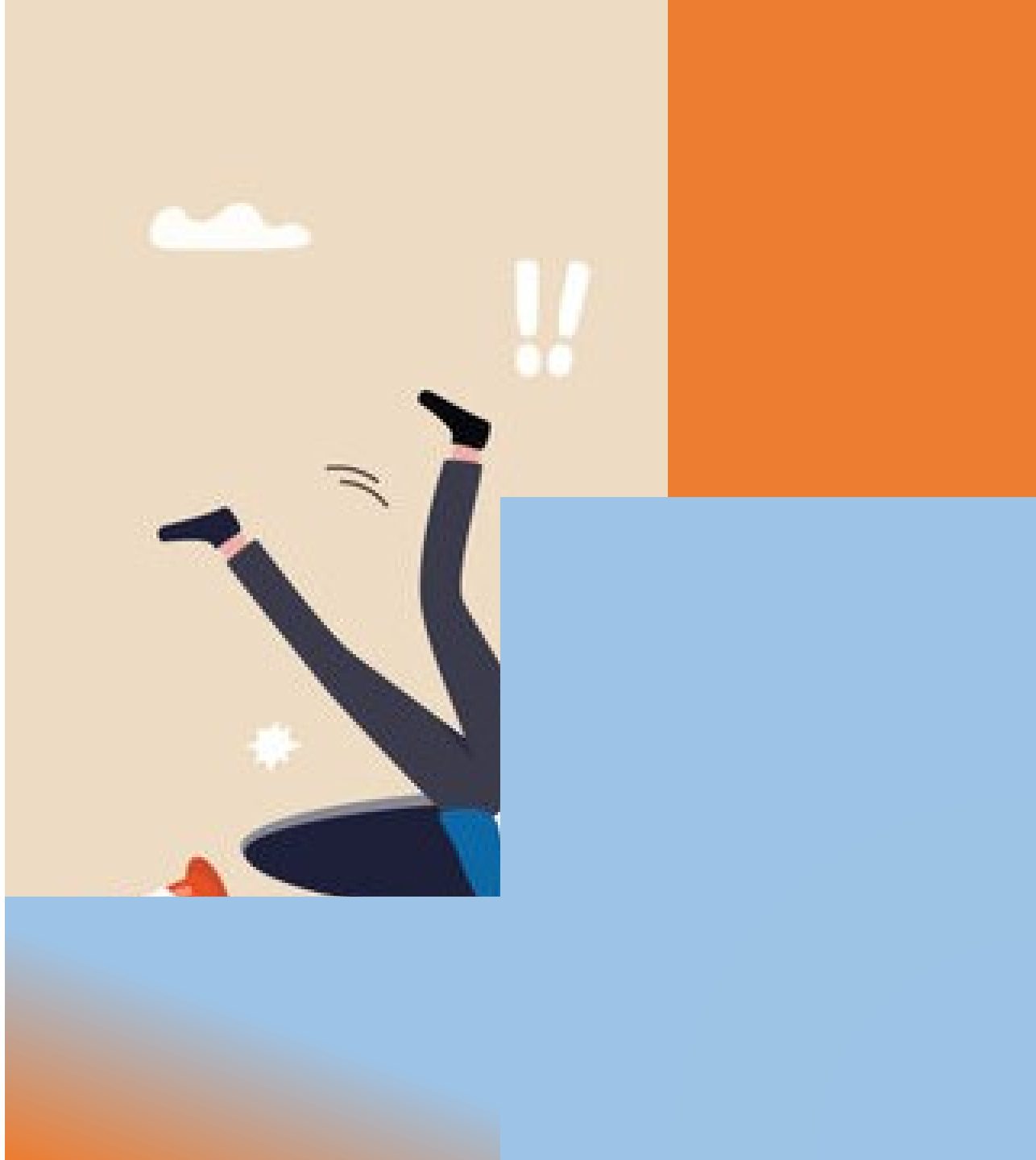
A 30-year-old woman comes for routine papsmear.

She mentions her father's sisters had breast cancer at age 42 and 38 years. Her father has never had cancer, he is 65.

" I've seen a genetic test being advertised that can assess my ancestry and also tests the BRCA1 and BRCA2 genes. I'm worried about my aunts who had breast cancer and that I may also get breast cancer in my 30's. Do you think, should do this test?"

Pitfalls

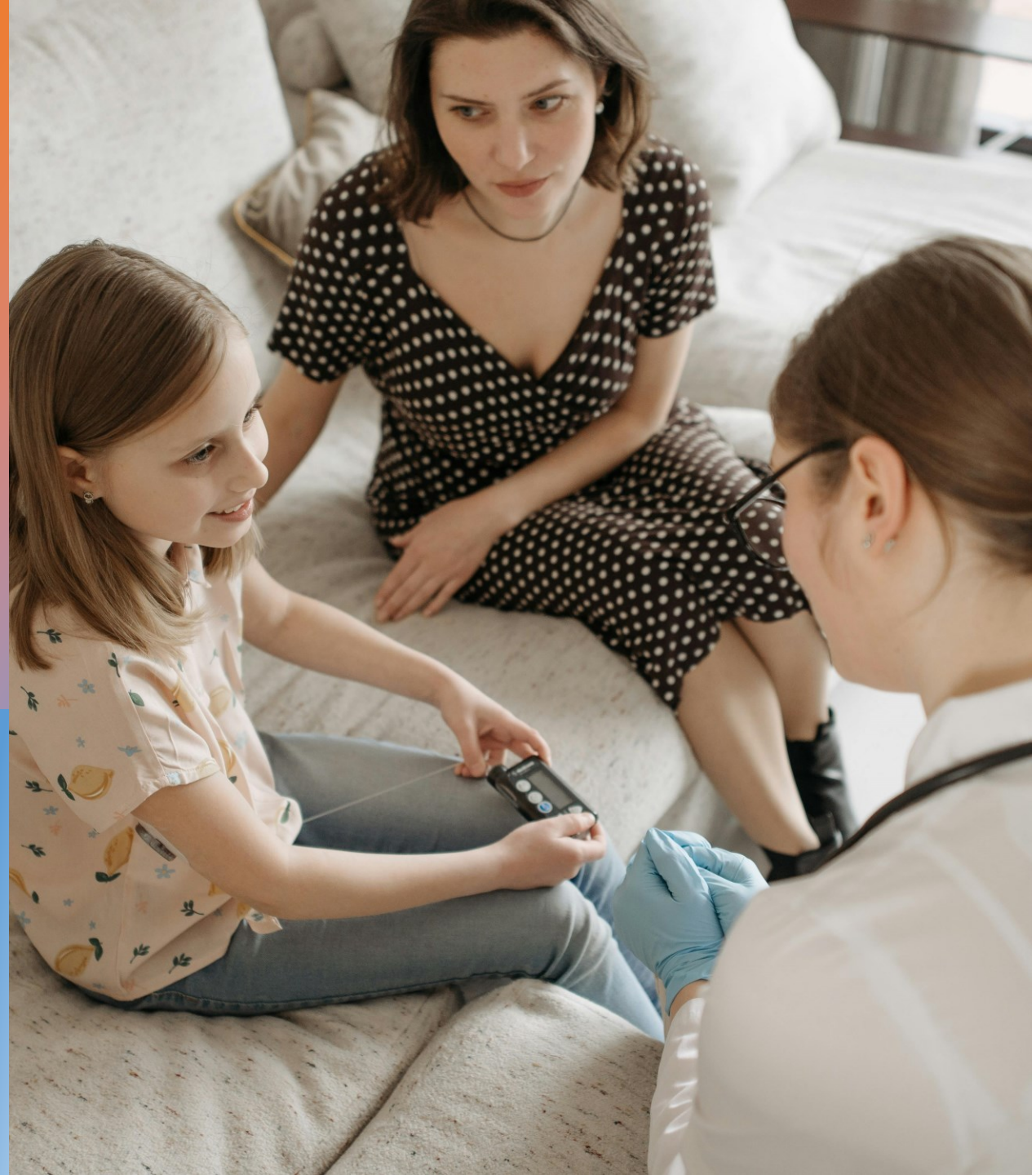
- All genetic tests are not created equally
- Blurring the lines between diagnostic vs lifestyle testing
- Limited cancer genetic screening not appropriate or reassuring
- Doing predictive genetic testing without pre- test counselling



MEDICLINIC PRECISE

Pearls

- Refer to a genetics professional
- Test an affected individual first
- Do not do any predictive genetic testing without pre-test counselling
- Consider ethical and psychosocial and insurance implications



MEDICLINIC PRECISE

Case Example 2:

A patient visits with her daughter. The patient's father has just been diagnosed with Alzheimer's disease at the age of 70.

Your patient is very anxious and has done a lot of research.

She wants to know if you can do APOE genetic testing for both her and her 10 year old daughter.

Case example 2: Pitfalls

- Genetic testing for neurodegenerative conditions
- Limited clinical utility and medical actionability
- Genetic testing in minors, especially for adult onset conditions
  - Do no harm
  - Autonomy

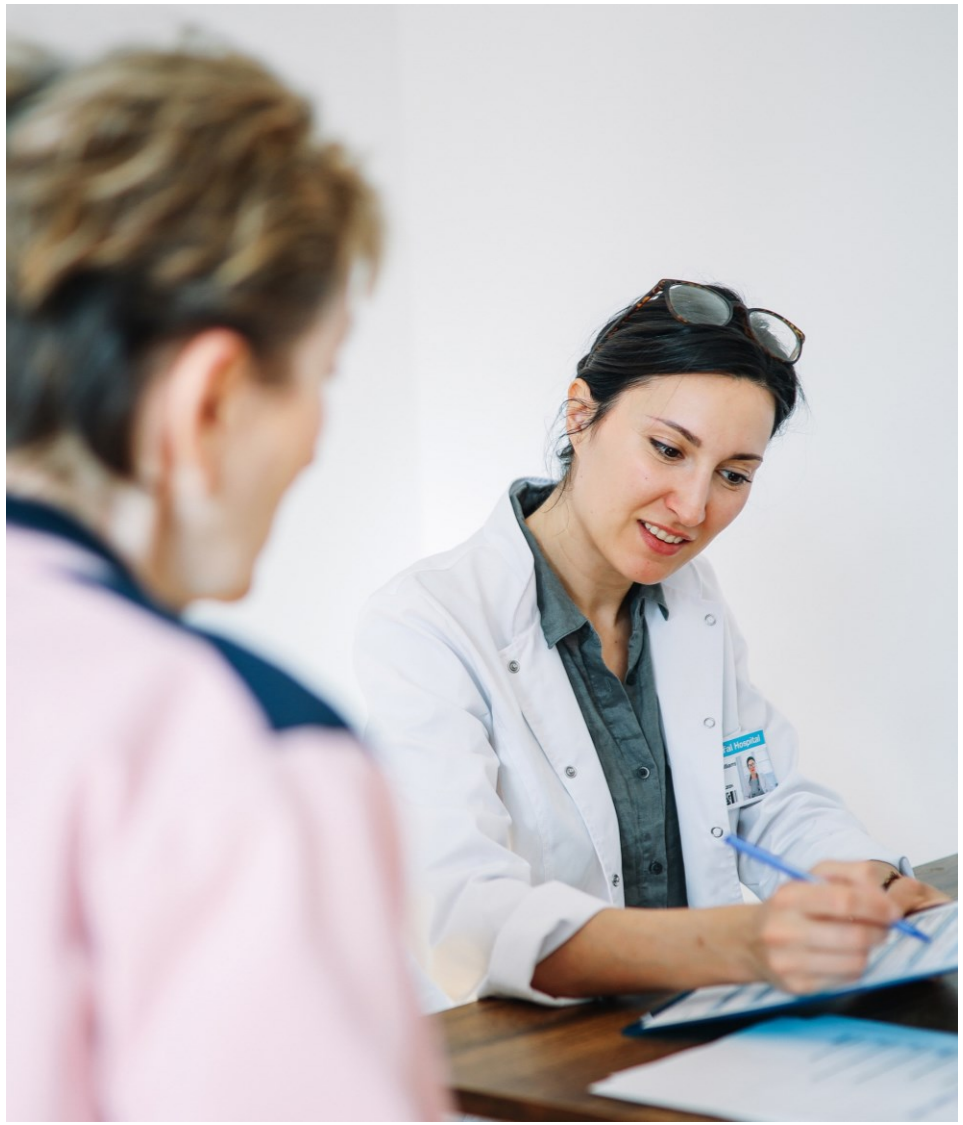
MEDICLINIC PRECISE

Pearls

- Be cautious of any form of predictive testing without involving a genetic professional
- Involve genetics professional whenever considering genetic testing in minors
- Educate and advocate
- Consider benefit vs harm of testing

WHAT IS GENETIC COUNSELLING?

- Medical and family history
- Inform and educate - genetic condition causes, prognosis, management
- Inheritance
- Risk calculation or estimation
- Genetic testing options and limitations
- Facilitate informed decision-making process
- Explore coping mechanisms and psychosocial issues
- Referral to medical and social support systems
- Advanced genetic variant interpretation skills and clinical correlation



Role of the GP in genetic testing

- **Recognize** who may benefit
- If you feel uncomfortable or unsure: refer to or consult with an **expert**
- Educate and advocate for the difference between diagnostic genetic testing and wellness-type genetic testing in terms of **clinical utility** and **medical actionability**

Thank you!

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