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Biomarkers in Cancer

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Melbourne Hospital

- not a cancer clinician
- research grants from industry
- honoraria from industry

“better ways to prevent, diagnose, treat and monitor disease, based on specific lifestyle, behavioural, environmental, clinical and **molecular** profiles”

“aims to improve health outcomes and increase the efficiency of healthcare by focusing health interventions on those individuals who are most likely to benefit”



University of Melbourne, Sep 2014

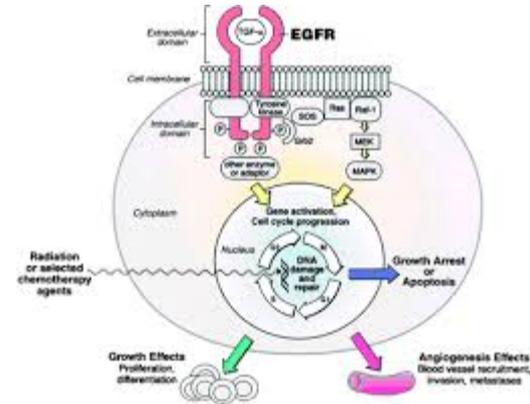


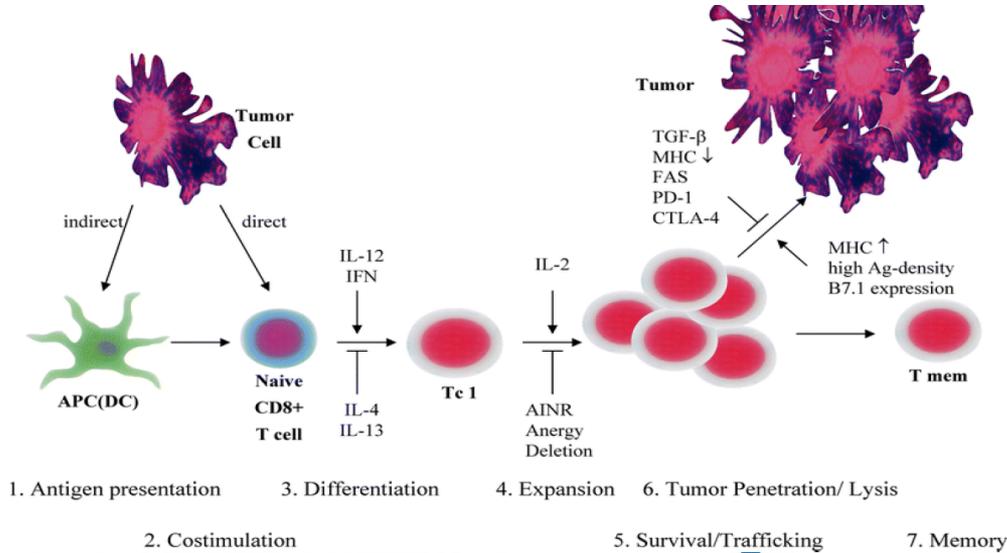
“A *biomarker (biological marker)*, generally refers to a measurable indicator of some biological state or condition.

... often measured ... to examine normal biological processes, pathogenic processes, or ... responses to a (health) intervention.”

Wikipedia, Nov 2014

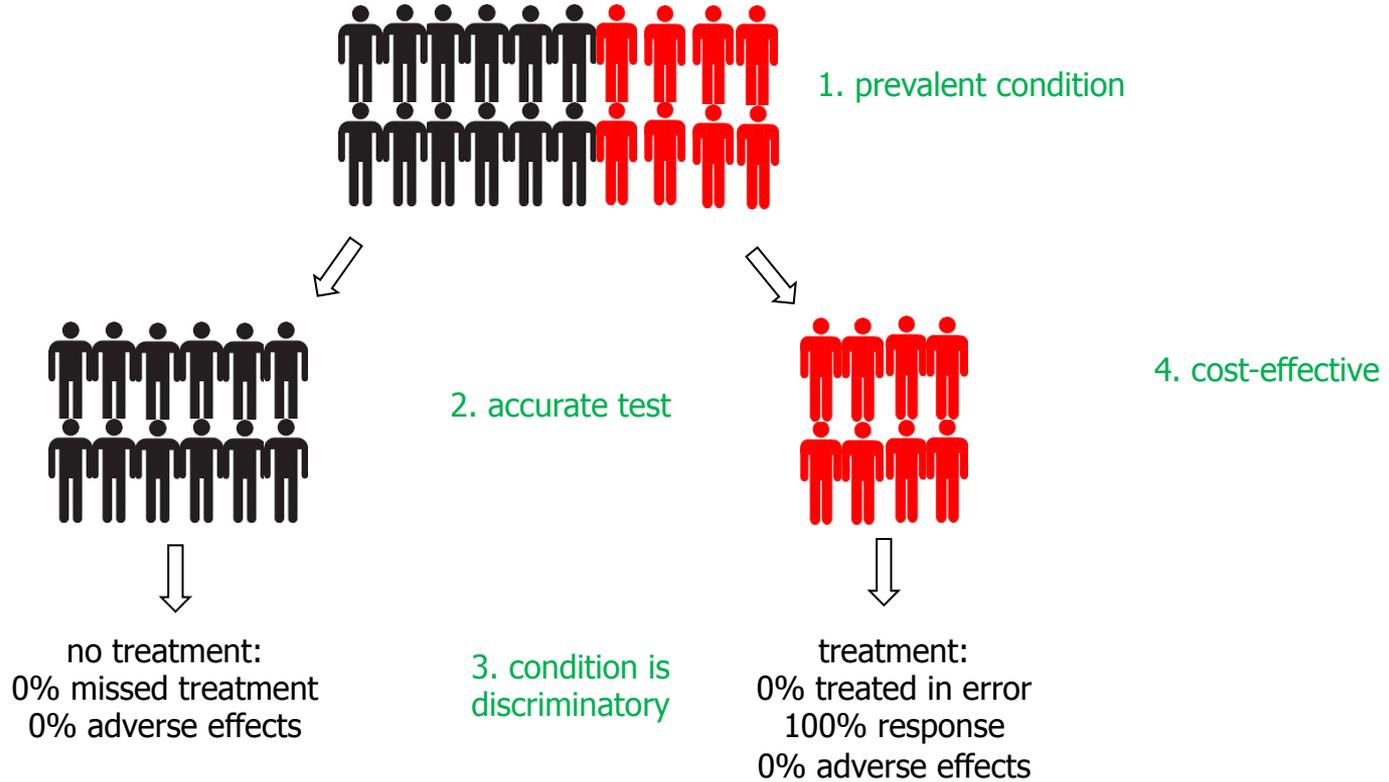
- uses: diagnosis, prediction of response to therapy, monitoring response to therapy, monitoring recurrence of cancer
- common examples: prostate specific antigen (PSA), estrogen receptor (ER) / progesterone receptor (PR), epidermal growth factor receptor (EGFR), cancer antigen 125 (CA-125)

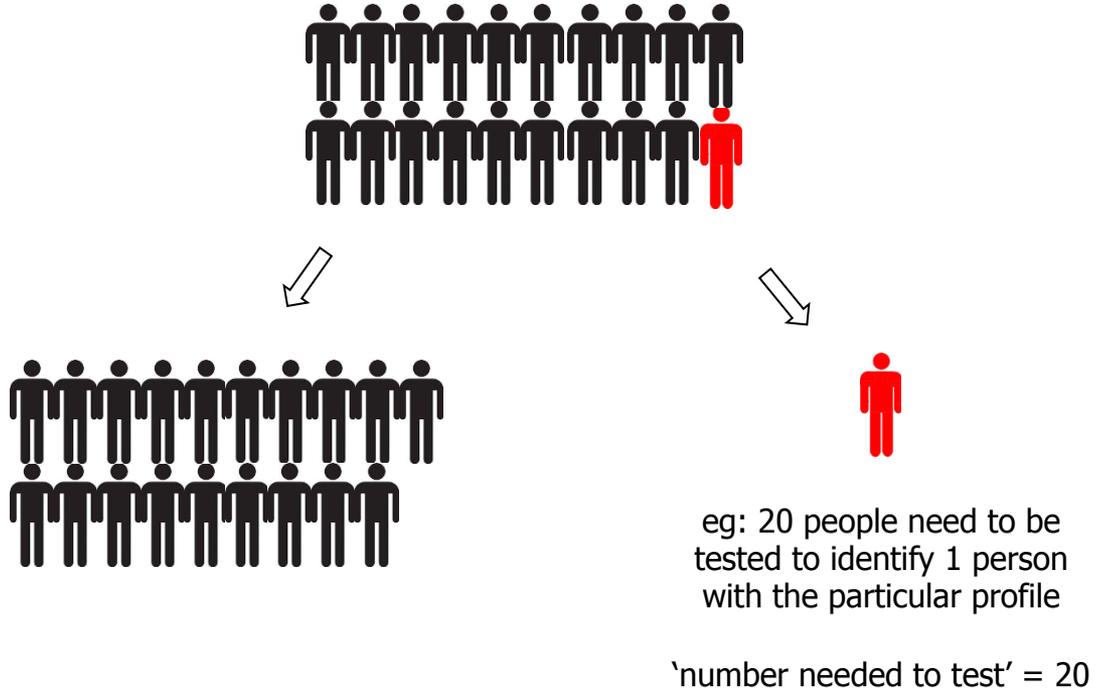


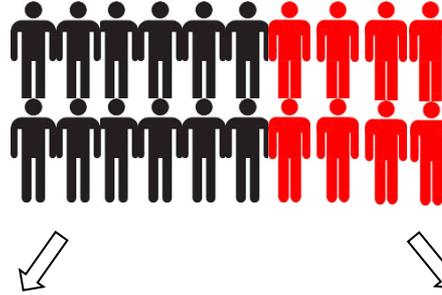


opportunities and challenges:

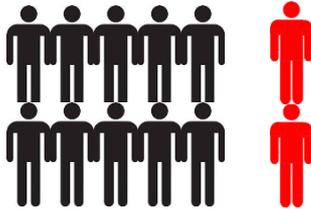
- multiple cells
- multiple pathways
- multiple organs
- genomics and proteomics







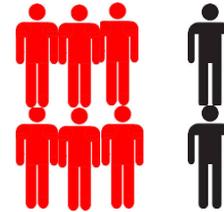
classified as negative



specificity: 83% (10/12)

25% (2/8) missed treatment

classified as positive

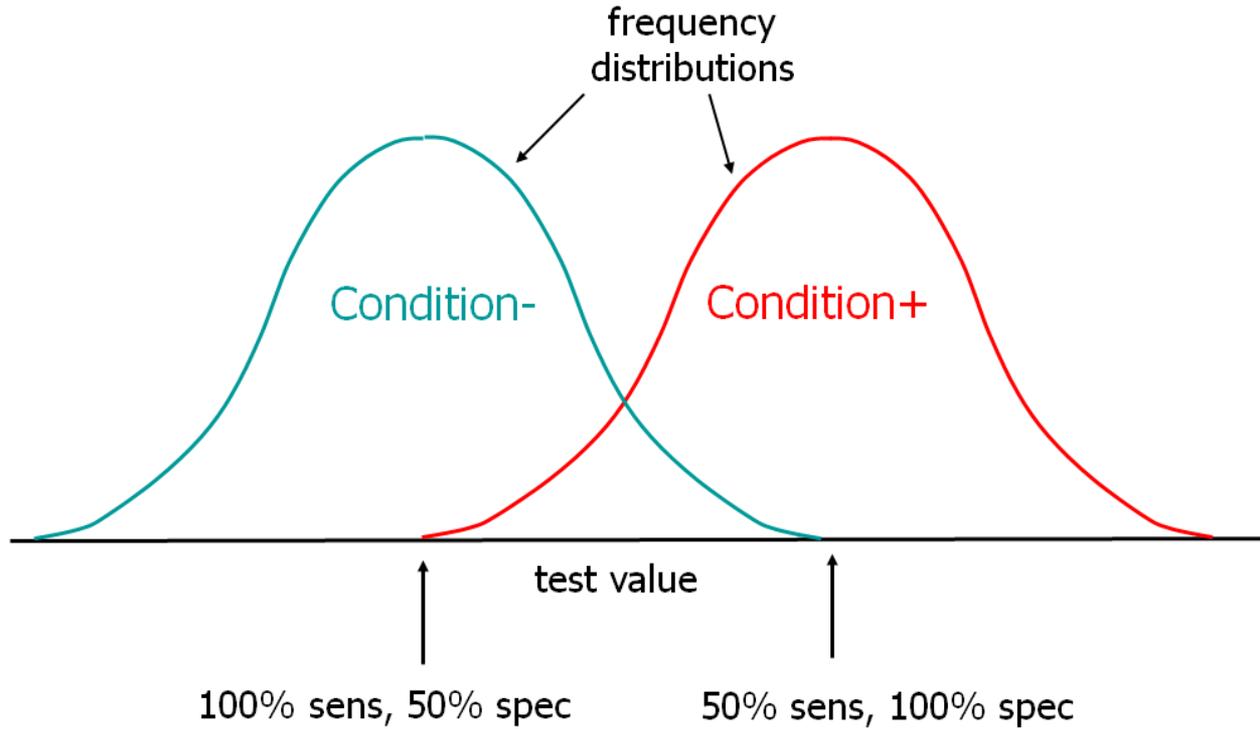


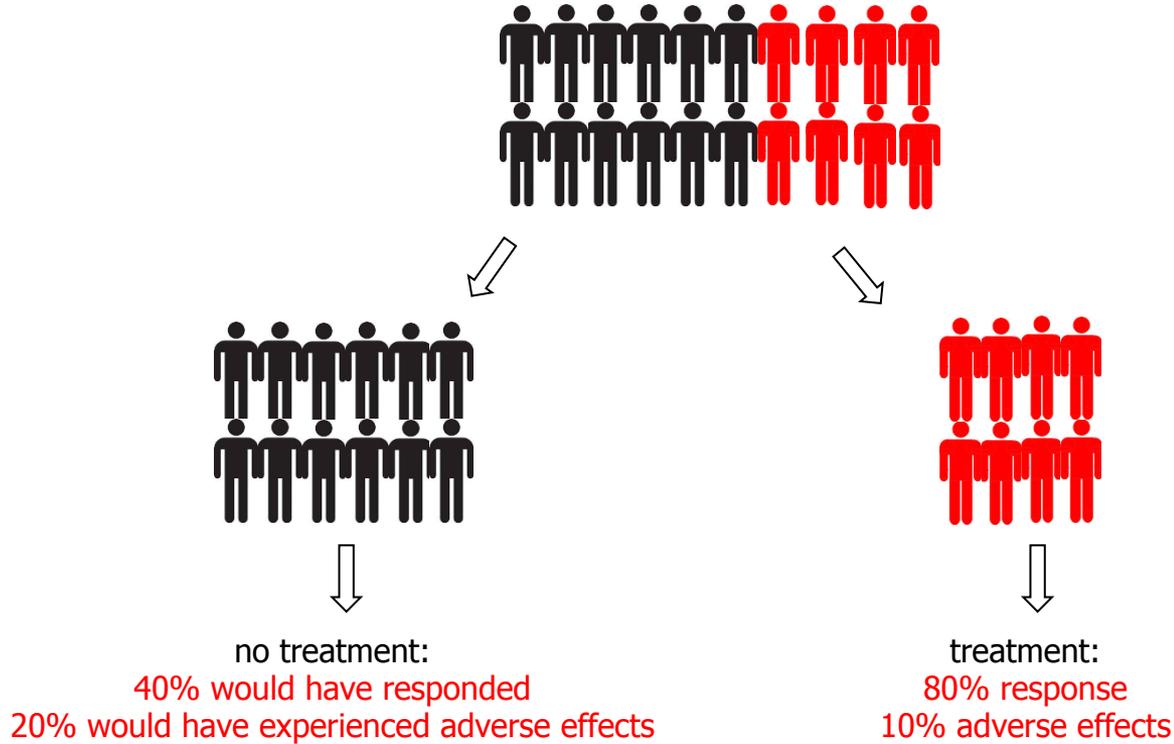
sensitivity: 75% (6/8)

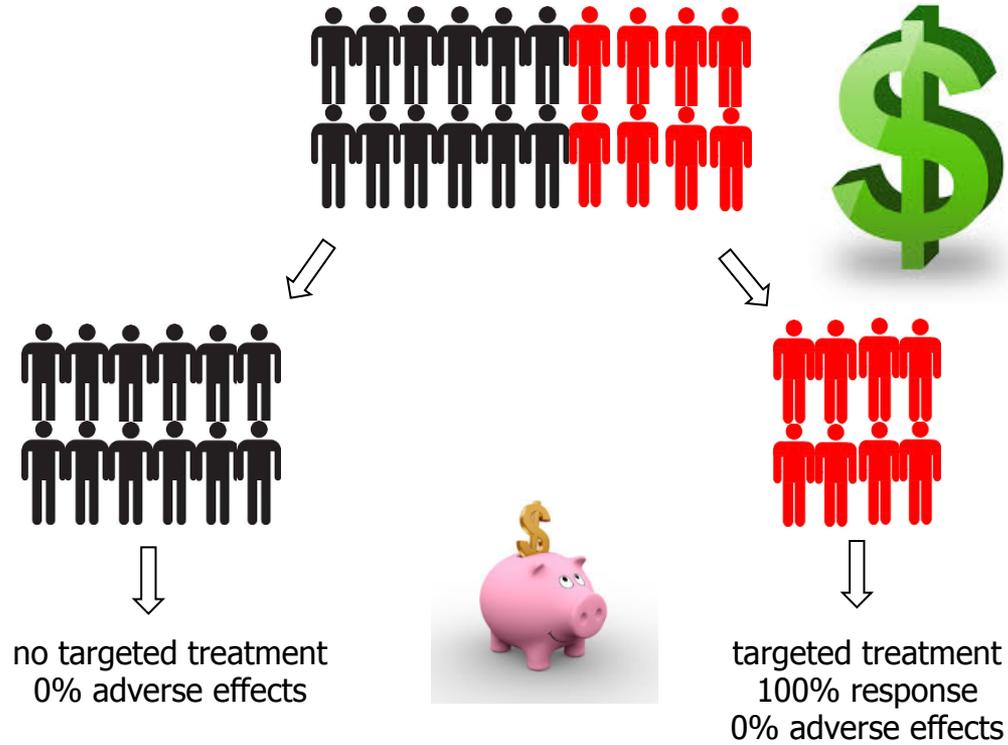
17% (2/12) 'treated in error'

reliable reproducible

- many biomarkers are measured on a continuous scale, and *arbitrary thresholds* are used to define presence or absence of a condition (eg, PSA)
- lower threshold: \uparrow sensitivity, \downarrow specificity
- higher threshold: \downarrow sensitivity, \uparrow specificity







- test 'ownership'
- need for rebiopsies
- delays to treatment
- issues with access and equity
- regulatory and administrative burden
- theory vs practical reality

OPEN ACCESS Freely available online

 PLOS ONE

Real-World Efficiency of Pharmacogenetic Screening for Carbamazepine-Induced Severe Cutaneous Adverse Reactions

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- precision medicine: potential for safe, effective and efficient healthcare
- example: biomarkers in cancer
- however, need to overcome key limitations
- an exciting area of research and practice!



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