Building Genomic Medicine Capability

Challenges and opportunities of big data

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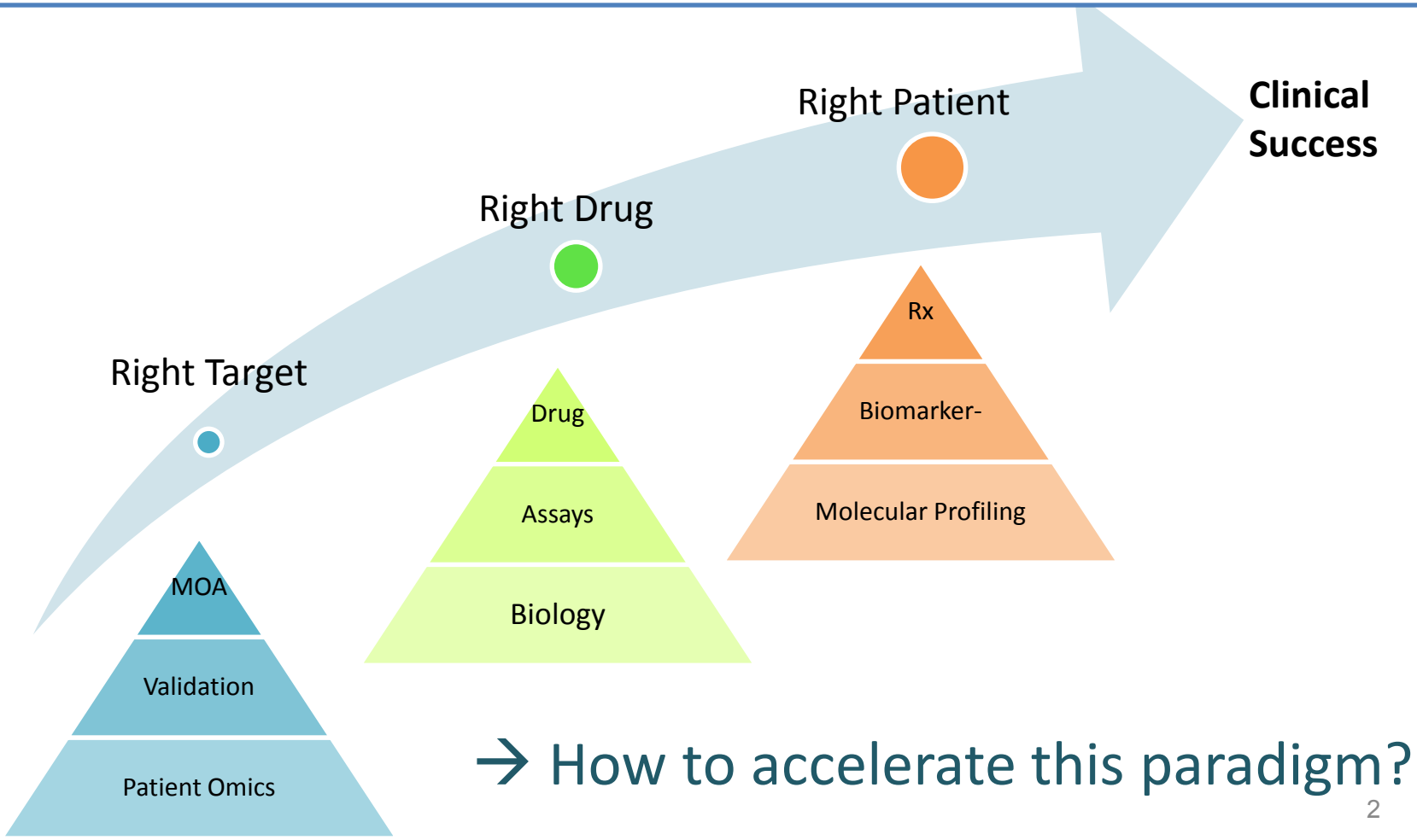
Personalised/Stratified/Precision Medicine for Cancer

Personalised medicine will enable the much needed paradigm shift in clinical care delivery, but we will need appropriate tools & know-how to realize the model and implement the vision



→ How to accelerate this paradigm?

Moonshots

- The selected cancers are:
- Triple Negative Breast Cancer
- High-grade Serous Ovarian Cancer
- Leukemia (AML/MDS)
- Leukemia (CLL)
- Lung
- Melanoma
- Prostate

- Focus on patient impact and reduction in mortality world-wide
- Comprehensive, spanning the cancer care continuum
- Collaborative, internal and external
- Innovative, in organizational constructs and technology

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Moonshot Platforms

- Center for Co-clinical trials
- Institute for Personalised Cancer therapy
- Cancer Control
- Early detection/Diagnostics
- Clinical Genomics
- Immunology
- Institute for Applied Cancer Sciences
- Translational Research Continuum
- Research Genomics/Informatics
- Big Data
- Adaptive Learning

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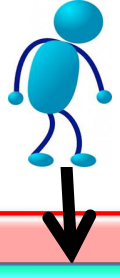
Adaptive Learning in Genomic Medicine



Consent, Biospecimen Collection, QC, Banking , Biomolecule Processing

Clinical information and tests

Treatment Decisions & Response Assessment

Integrated Patient Data Warehouse

Research Data:

Omic profiling;
Systems Pharm;
Preclinical Rx- TRC;

Big-Data Analytics

- TCGA/ICGC
- Pubmed
- Patent db
- Social media
- Other

Learning

Decision Support

Research & Operations

Big Data Environment

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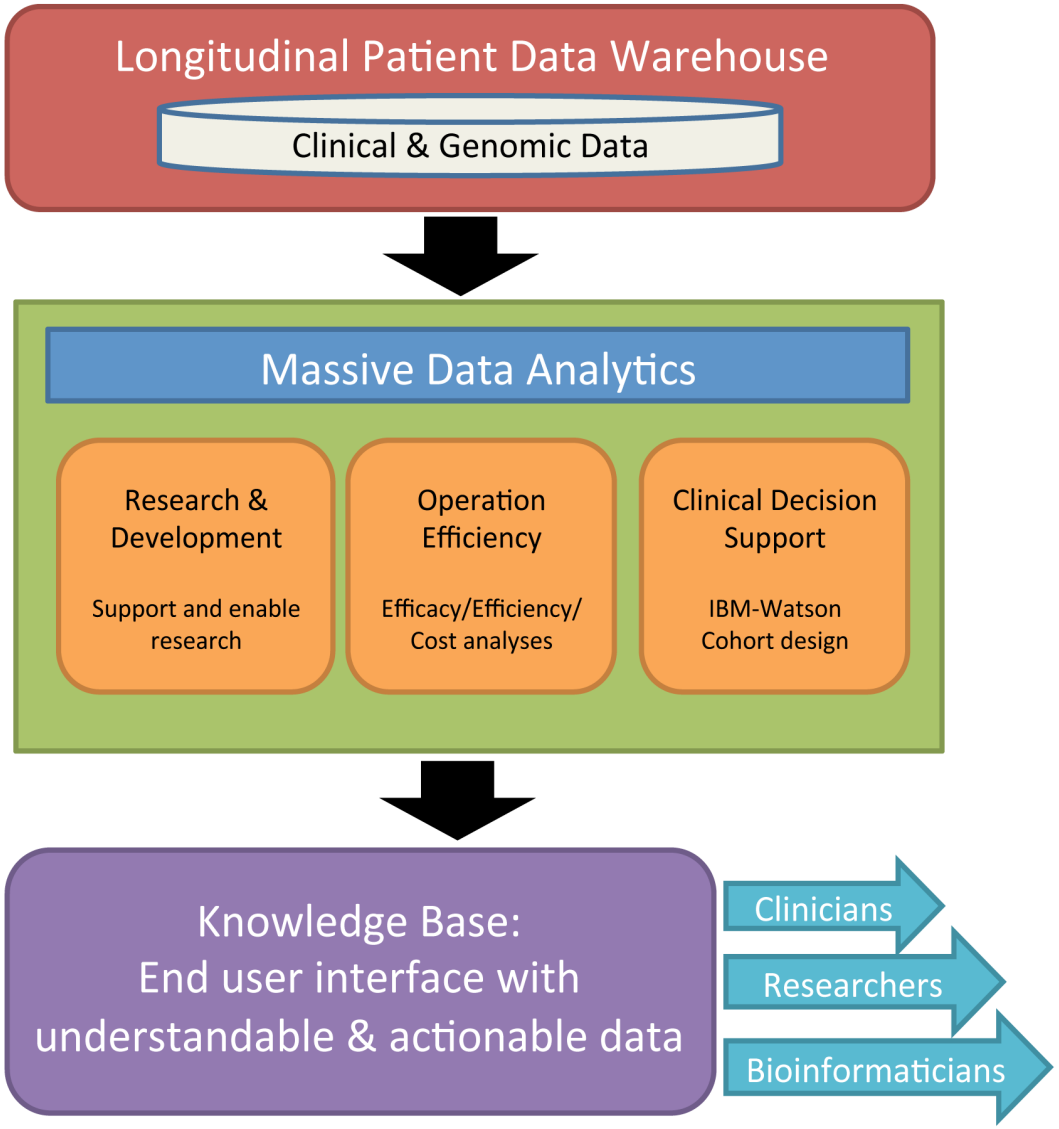
Big (well, it is Texas after all) Data Analytics



Leukemia Project

- 1000 leukemia patients by fall 2013– MDS/AML/CLL focus
- Focused on but not limited to newly diagnosed patients
- Samples taken at diagnoses/presentation and thereafter at each patient visit.
- Saliva/buccal for normal, bone marrow and/or peripheral blood
- Bone marrow/bloods accessed in context of normal clinical workup/care
- All samples collected and held in CLIA compliant chain of custody

Leukemia Project

- Exome sequencing, low-pass WGS
- Data generated on normal/tumor (presentation) and from relapse sample(s)
- All clinical data currently collected in Departmental database plus extraction from patient records
- A few early potential questions –
  - MDS to AML progression
  - risk of death during induction chemotherapy
  - subclonality and risk of relapse/progression

- Other Opportunities (some of them)
  - Genetic/genomic heterogeneity
  - Comprehensive cancer patient genomics –
    - Interplay of germline and somatic genomics in the same patient
  - Impact of genomics on outcomes
    - adverse events
    - survivorship

The H word

- Genetic heterogeneity is a key determinate of variation in outcomes
  - What are the cancer genes operative?
  - What is the level of intra-tumor heterogeneity?
  - What are the germline/somatic sequence variants that are influencing factors including:
    - Drug metablolism
    - Immune response
    - Cancer susceptiblity
    - Toxicity
  - How do these factors interact and influence outcomes?

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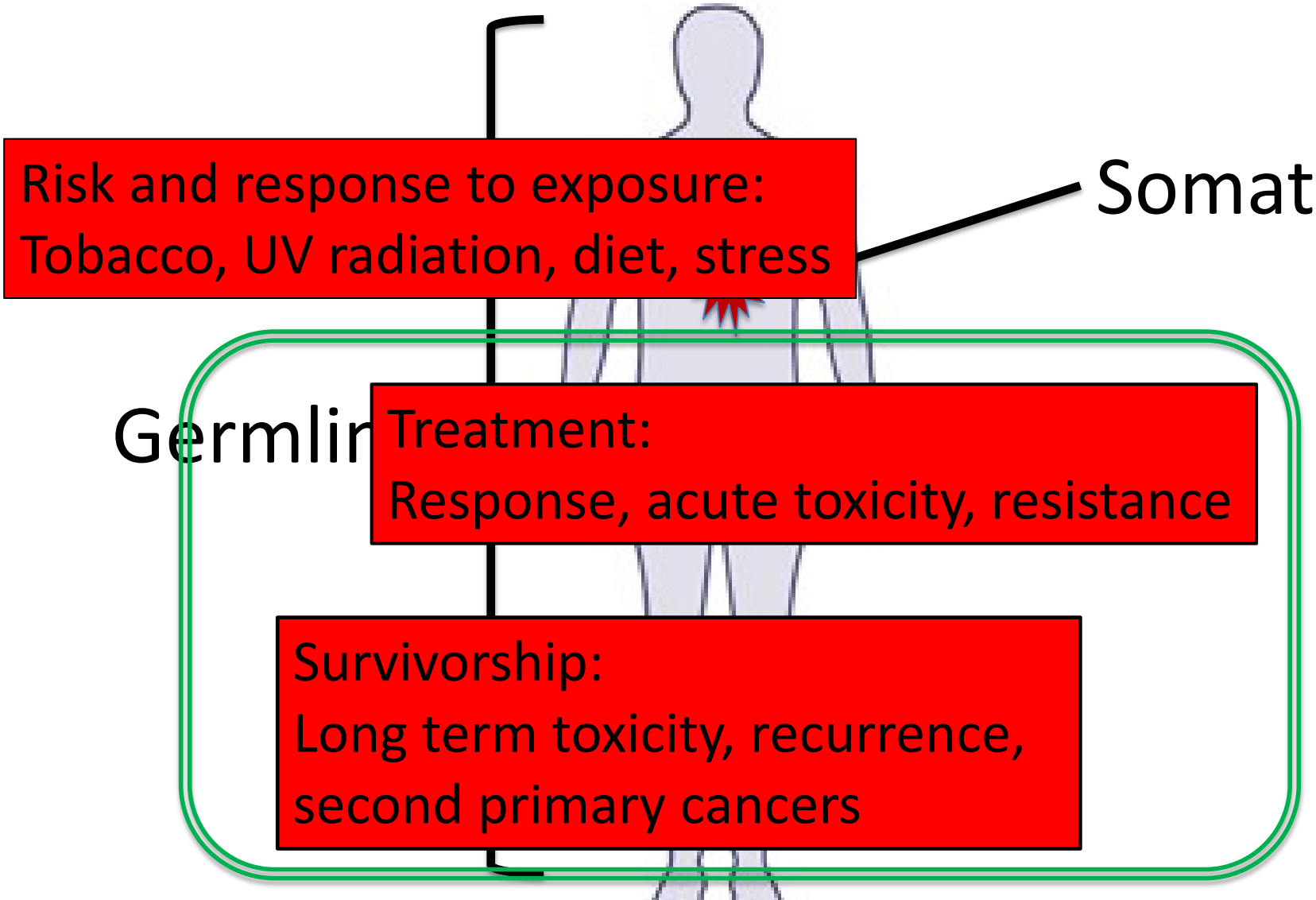
Comprehensive Cancer Patient genomics
a tale of (at least!) two genomes



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