Application of Molecular Medicine towards personalised treatment in Oncology.

Dr Godfrey Grech

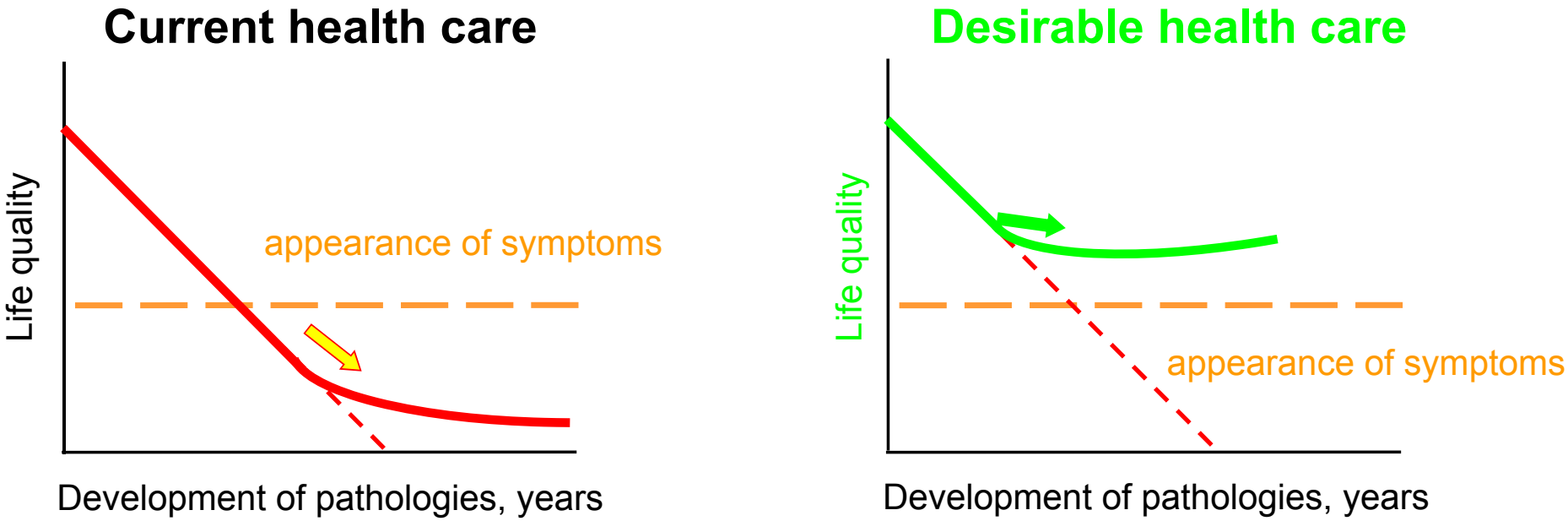
University of Malta

Editor of book (July 2015) entitled

“ Preventive and Predictive Genetics: Towards Personalised Medicine”

http://www.springer.com/us/book/9783319153438

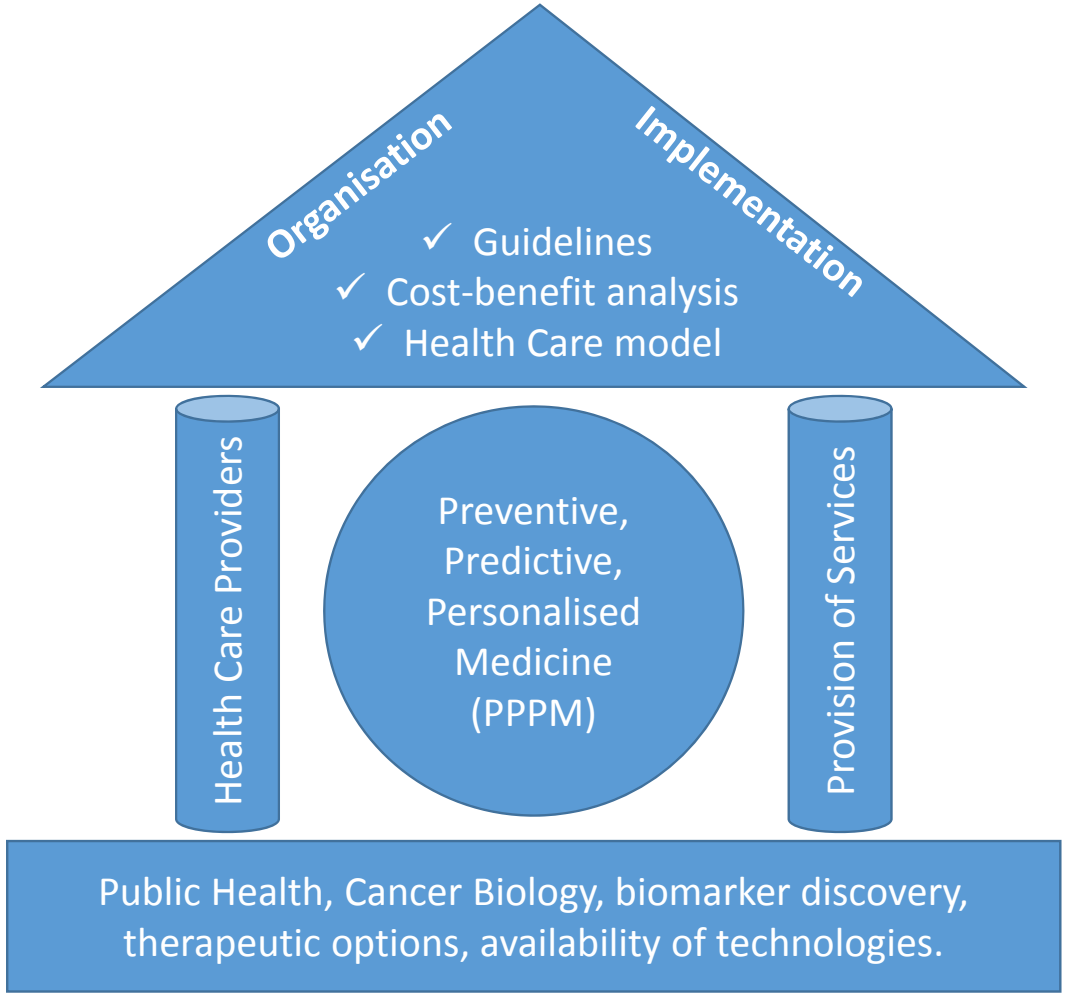
Application of Molecular Medicine towards personalised treatment in Oncology.



The Paradigm Shift from Reactive to Predictive, Preventive and Personalized Medicine

Application of Molecular Medicine

Oncology



Position article and guidelines

Highly accessed Open Access

EPMA position paper in cancer: current overview and future perspectives

Godfrey Grech[1*], Xianquan Zhan[2], Byong Chul Yoo[3], Rostyslav Bubnov[4,5], Suzanne Hagan[6], Romano Danesi[7], Giorgio Vittadini[8] and Dominic M Desiderio[9]

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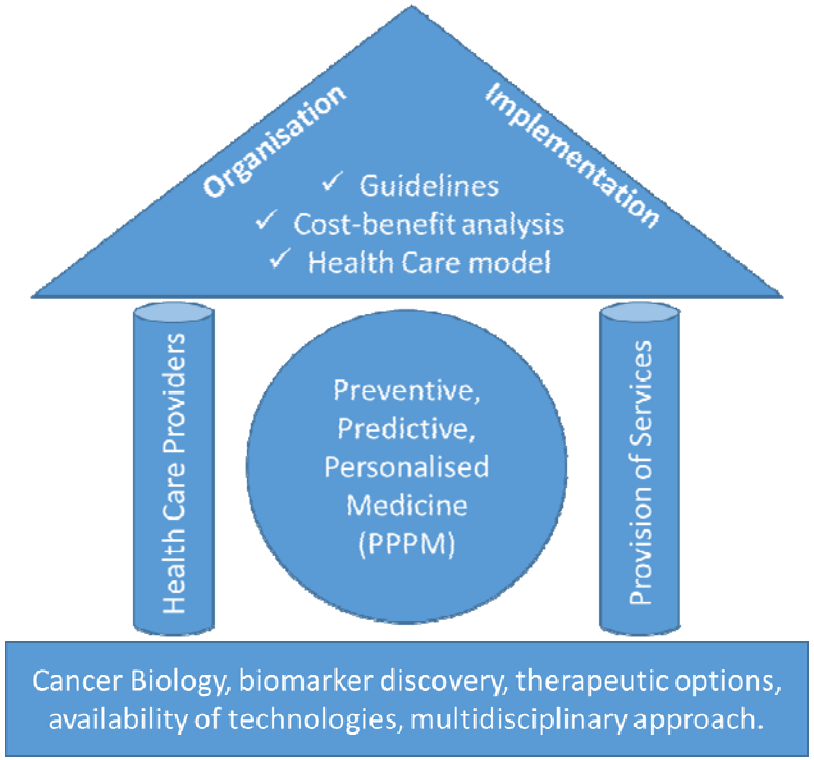
Risk assessment;
Expert recommendation;
Standardization;
Individual profile;
Disease modeling;
Multimodal diagnostics;
Screening;
Biomarker;
Biobank

Application of Molecular Medicine

Oncology



PPPM provides radical shift in cancer treatment

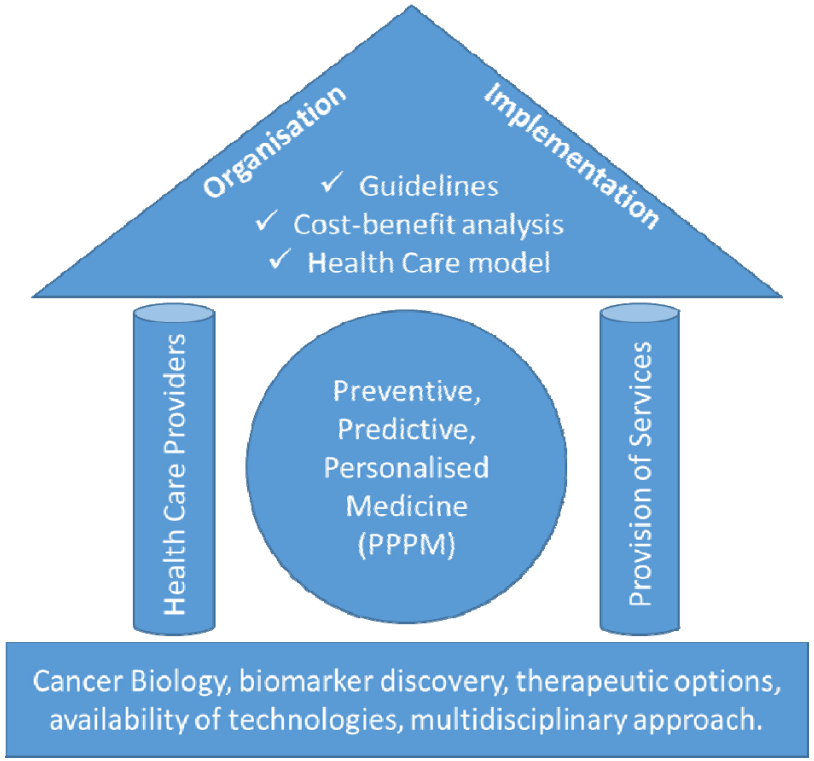
'I want to feel heard and understood. I want to know about my options, and I want to be supported to make a decision based on what matters to me.'

NHS England

"Ensure that every person with a long-term condition or disability has a personalised care plan supporting them to develop the knowledge, skills and confidence to manage their own health"…"develop and implement a best practice standard defining good, personalised, digital care plans in order to support GPs and health professionals"

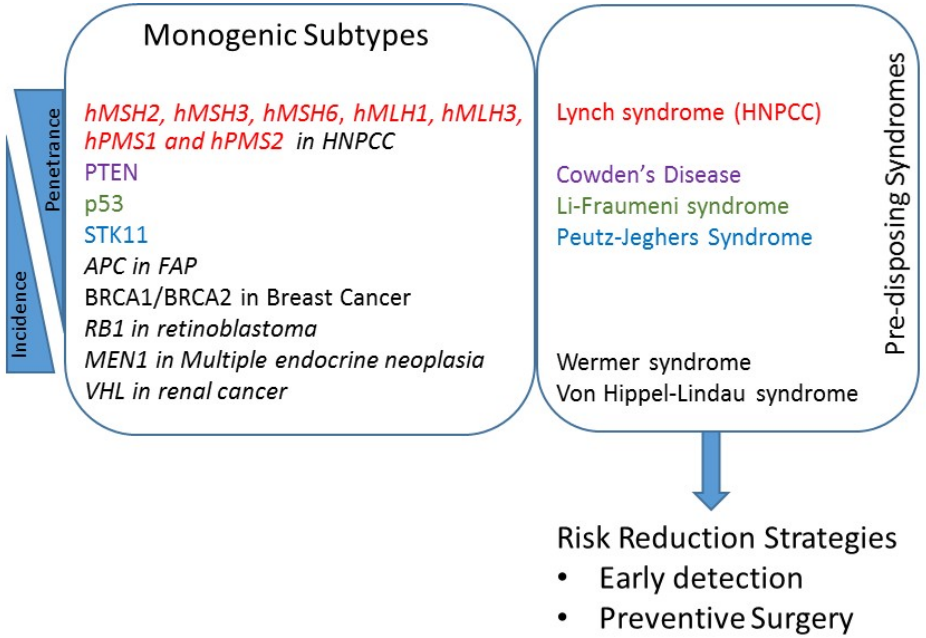
Application of Molecular Medicine

Oncology



Risk factors Predisposing to cancer progression

- ✓ Viruses and cancer risk
- ✓ Gut microbiota, inflammation and cancer
- ✓ Cancer predisposing syndromes



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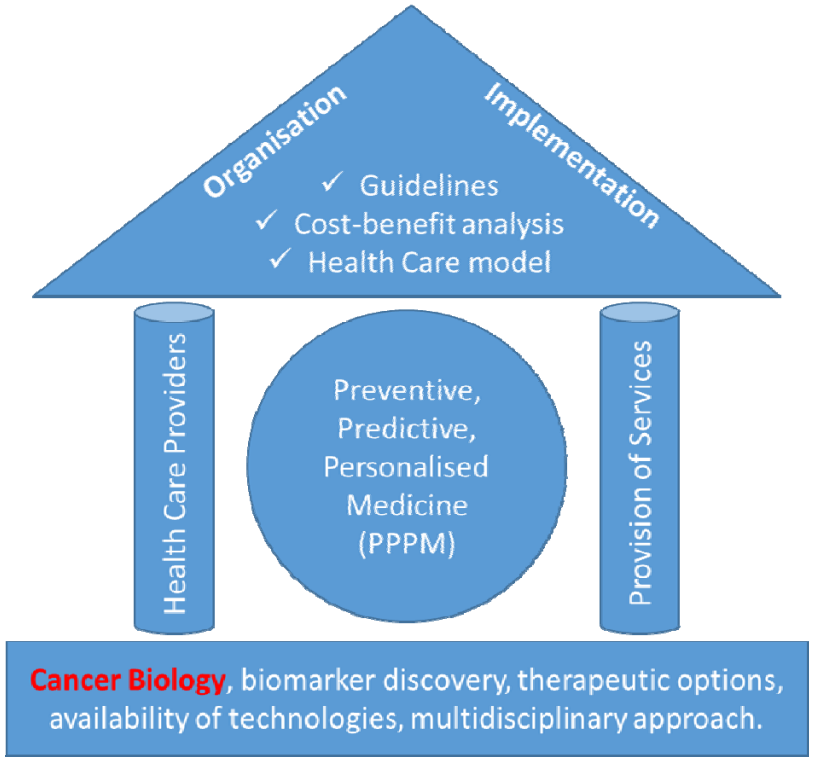
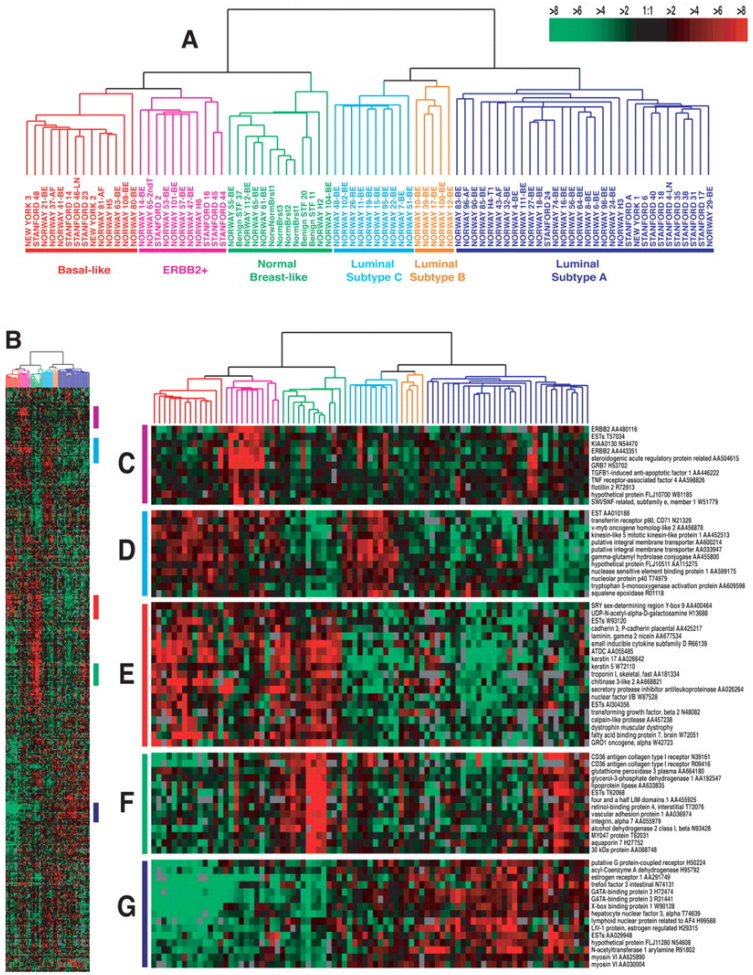


Understanding cancer at a molecular level

- **Genetic level**
  - Genetic mutations eg PPP1R3
  - Aberrant copy number
  - Microsatellite instability
  - Promoter hypermethylation
  - mRNA and miRNA

- **Protein Level**
  - Dysfunction in enzyme activity
  - Mislocalisation of proteins
  - Alternative splicing
  - Metabolites

Omic Prognosis Prediction: A “Classic” Question First Explored in Breast Cancer

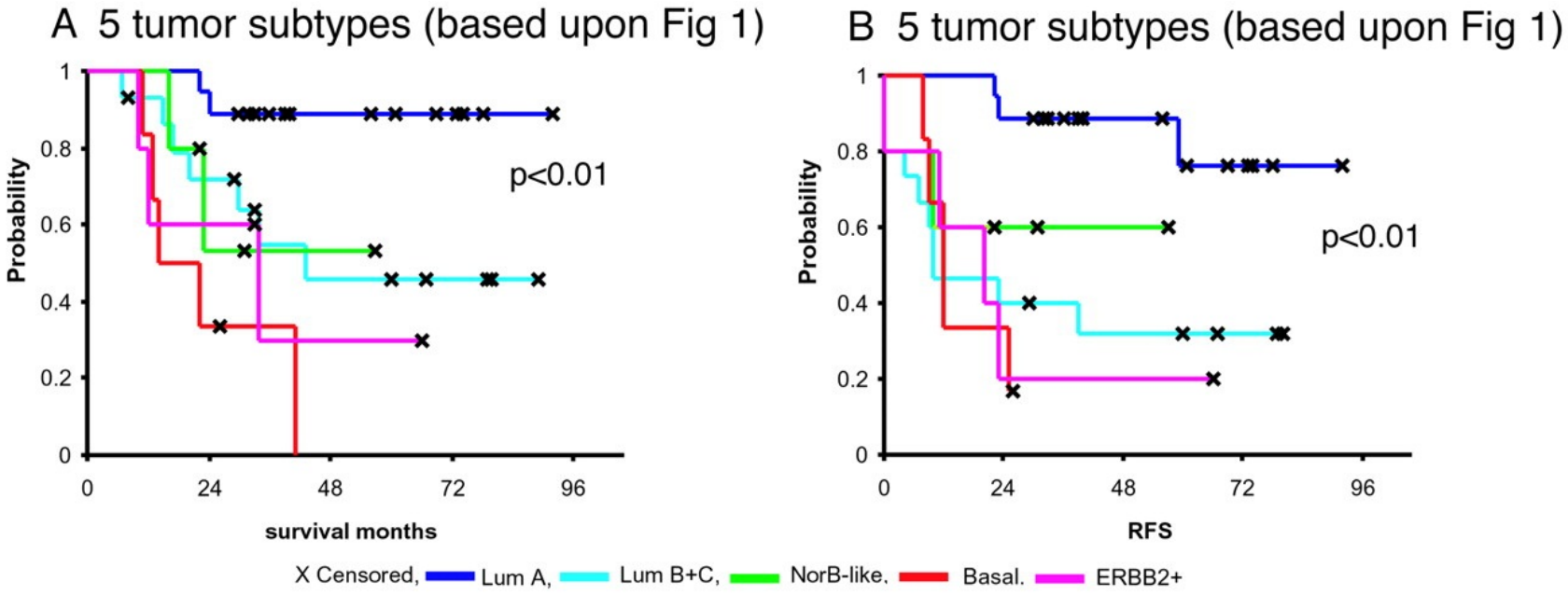


Breast cancer was comprised of 5 subtypes

Each of which is characterized by some unique and some common genes

Sorlie *et al*. PNAS Sept 11, 2001

These Subtypes Have Different Prognoses



Sorlie *et al*. PNAS Sept 11, 2001

Not properly validated for **6 years**, until Rob Tibshirani's group did a 600-patient validation study.

Kapp *et al*. BMC Genomics, 2007

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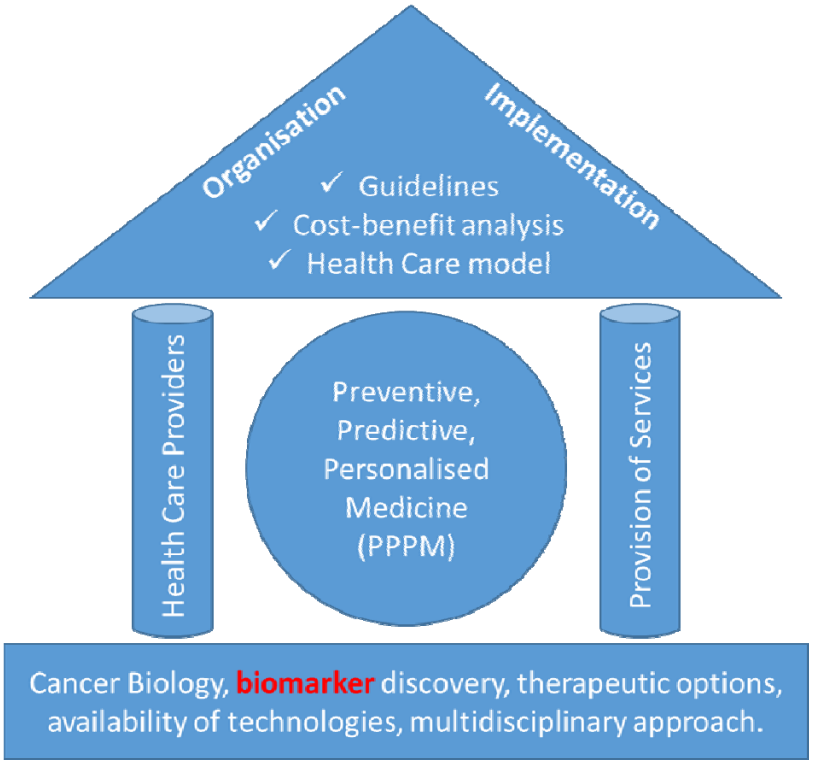

Preventive and Predictive biomarkers: towards Personalised Medicine

Treatment modalities and adjustment

- ✓ Efficacy and toxicity
- ✓ Pharmacogenetics to predict treatment outcome

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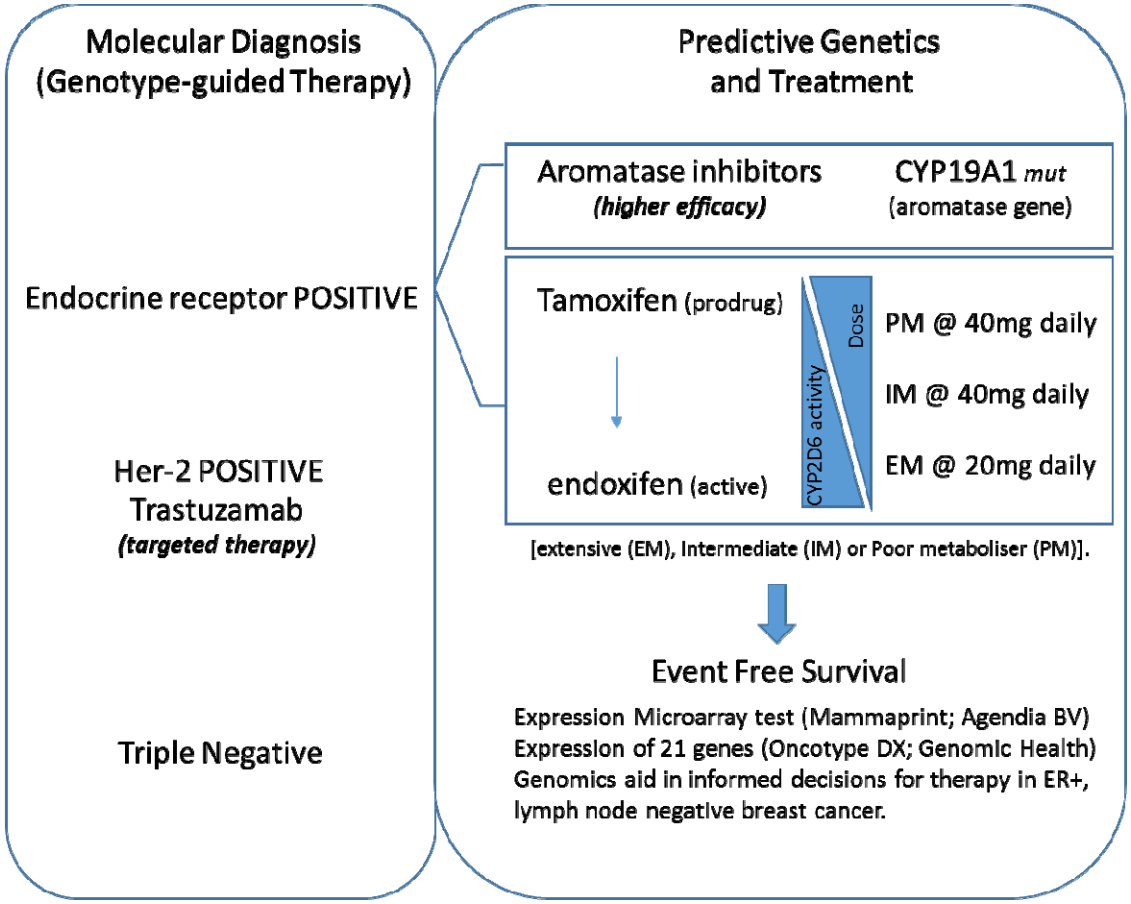
Oncology



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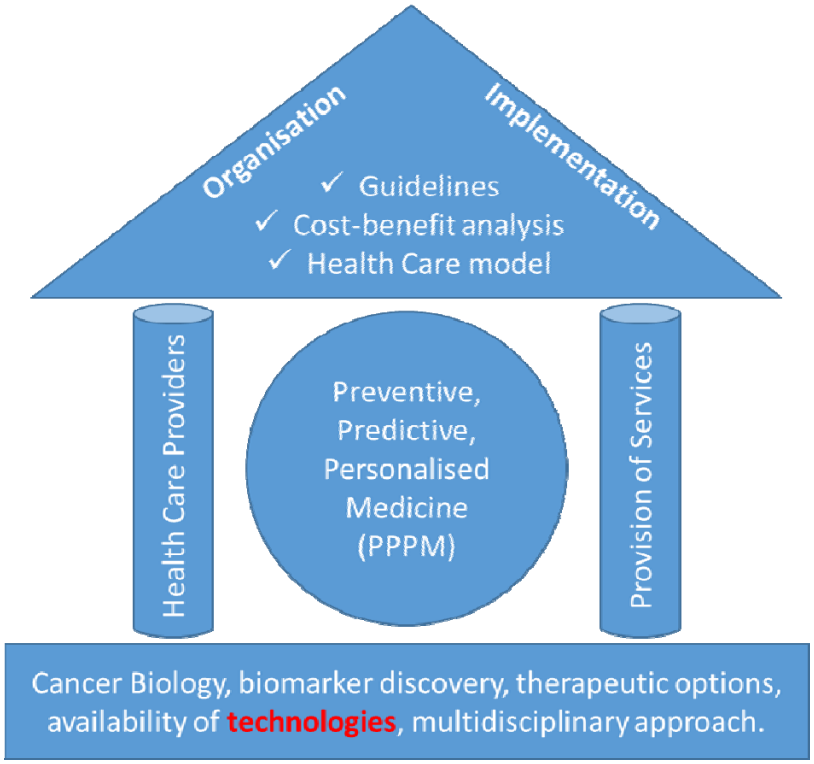


Current technologies: a brighter future

Single analysis for multi-cancer screening using metabolic information in blood

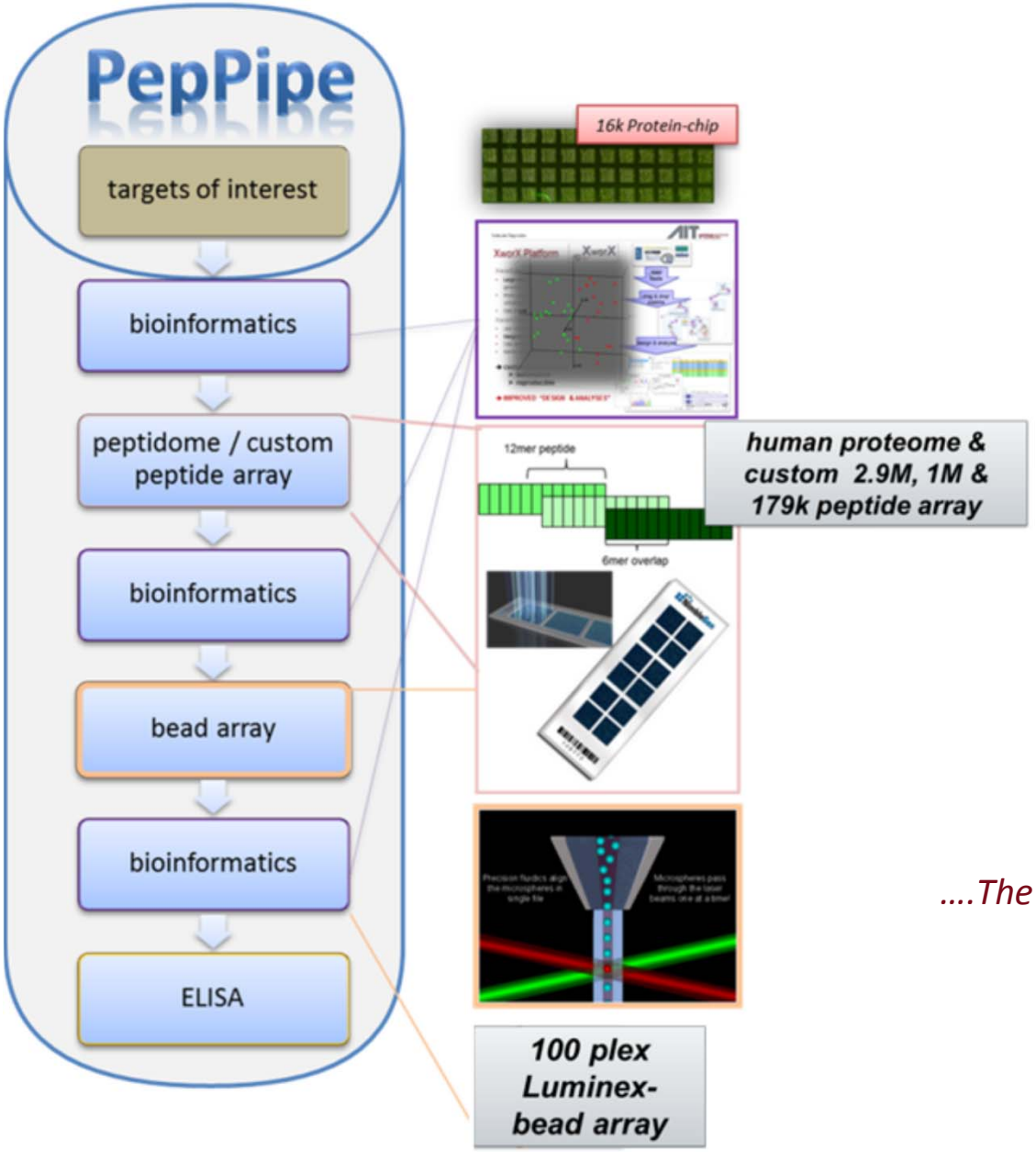
Dynamic analysis for monitoring therapy response using circulating cell-free tumor DNA

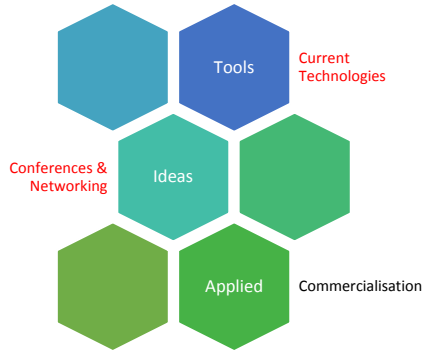
Imaging cancer for screening, diagnosis, staging and therapy response indicators

Access to archival material for faster validation of results

Nanotechnologies – the challenge for advanced diagnosis, treatment and prevention

Innovative Technologies





….The technologies are ready …
& cooperations are welcome….

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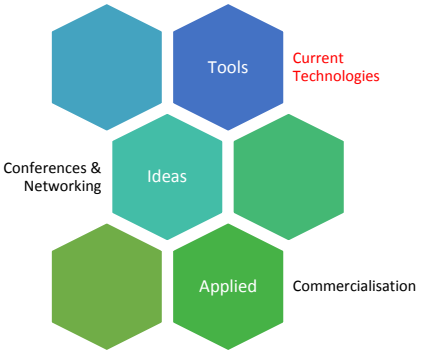
Innovative Technologies

QuantiGene® Assays

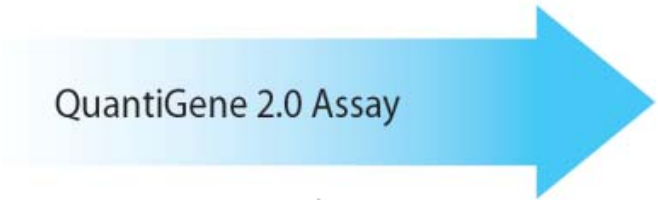
'Direct-from-sample' miRNA, RNA and DNA quantitation

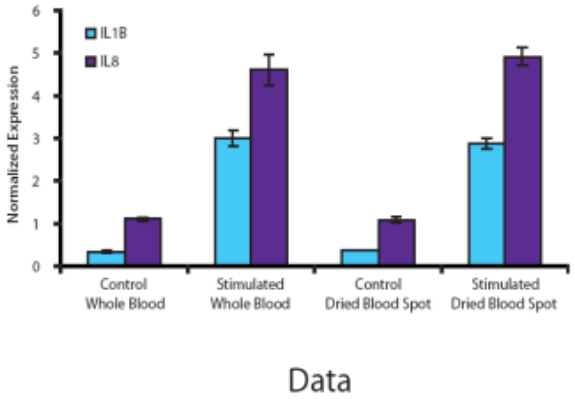


Gene expression quantitation directly from the source

ANY SAMPLE
cells, tissues, viruses, bacteria, FFPE, blood, saliva, semen, etc.

Branched DNA - Signal Amplification Assay

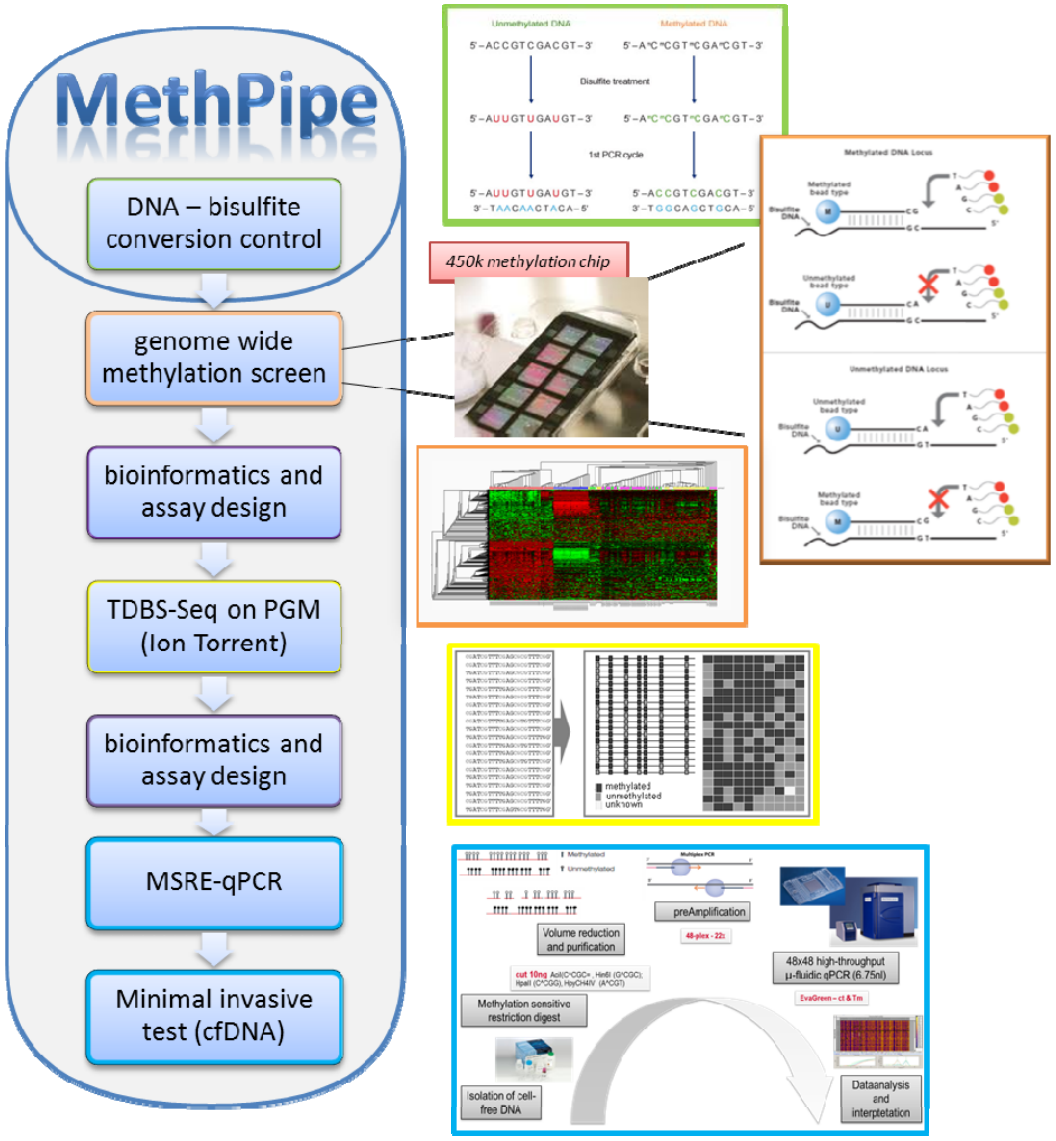


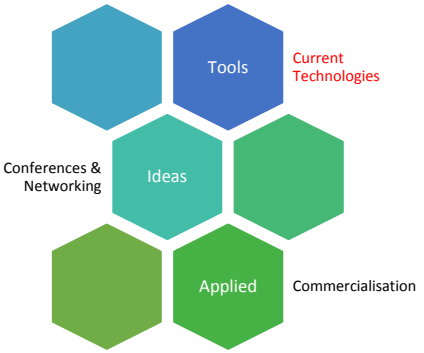


No miRNA, RNA and DNA isolation
No reverse transcription
No PCR amplification

affymetrix eBioscience

Innovative Technologies





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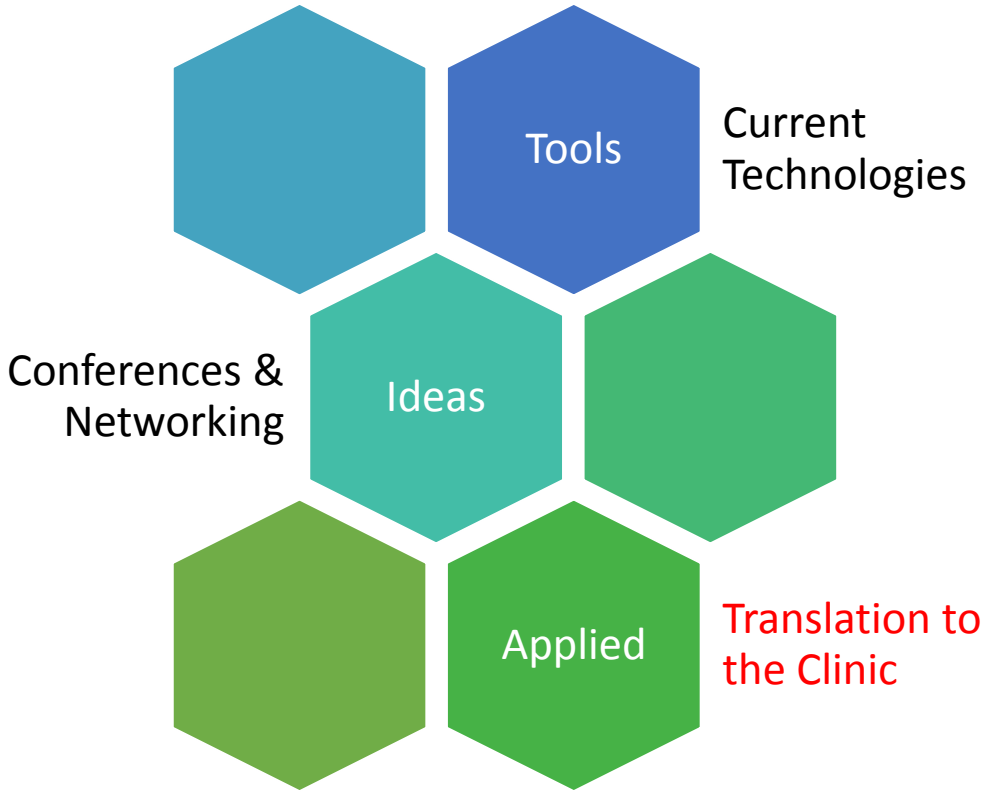
Application of Molecular Medicine

Oncology



OMICS International

World Bio Summit & Expo

November 02-04, 2015 Dubai, UAE

Day 2 November 03, 2015

Track 4: Biomedical and Translational Medicine Research

15:35-15:55

Molecular classification of breast cancer using a multiplex assay

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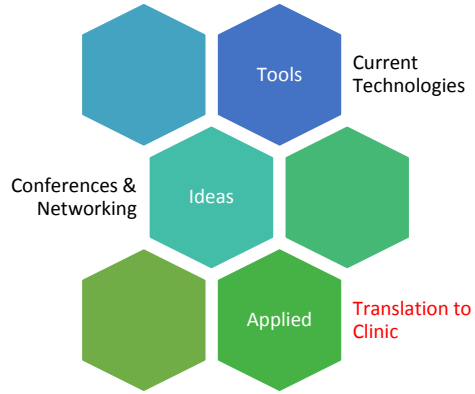
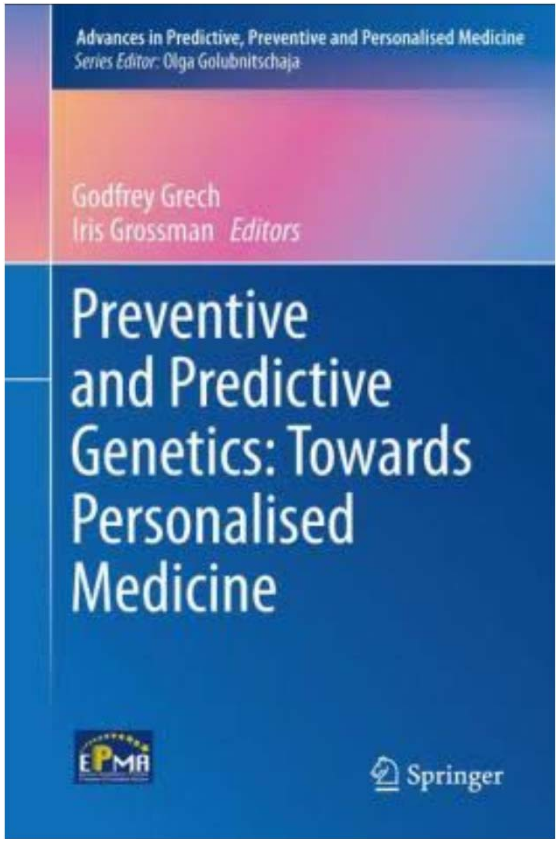
Oncology

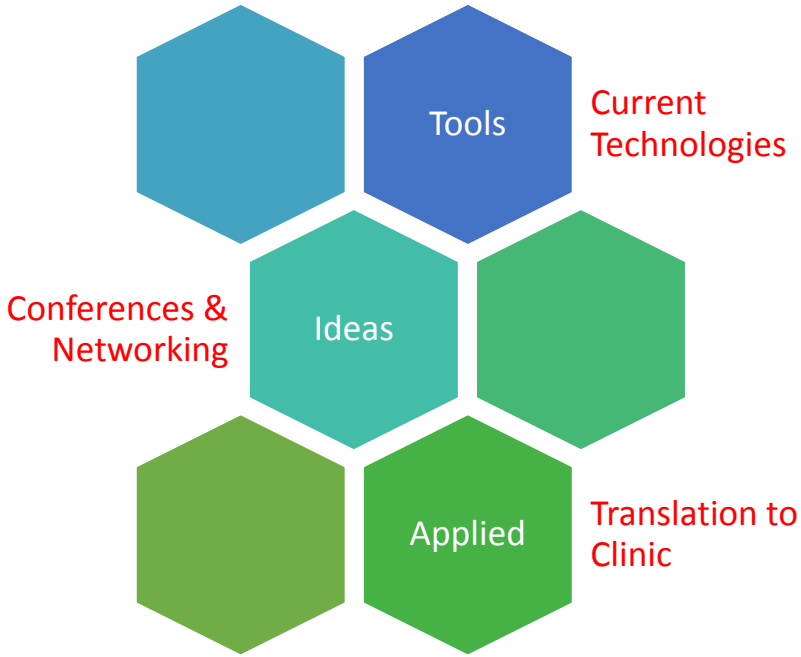


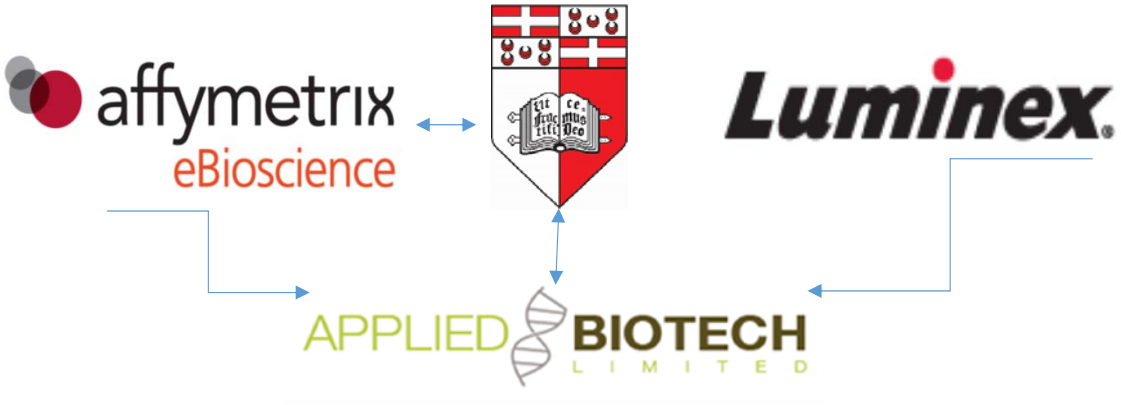
Translation to Clinic



- ✓ Improved techniques offering better results with increased sensitivity
- ✓ Novel biomarkers to classify patient subtypes
- ✓ Novel protein targets
- ✓ Pharmacogenetic markers

A World of Opportunities … *success stories*

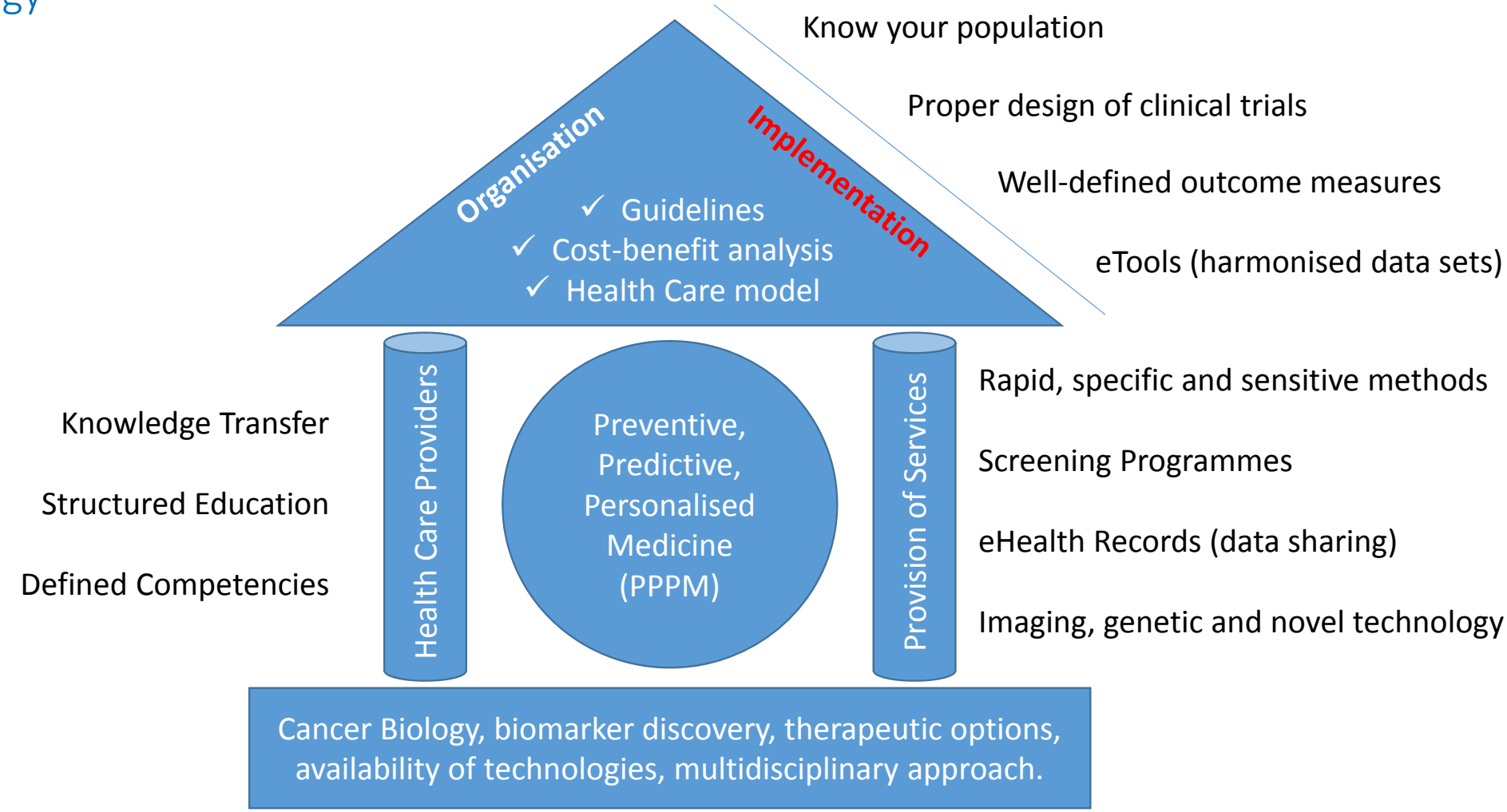




Outcomes

Application of Molecular Medicine

Oncology



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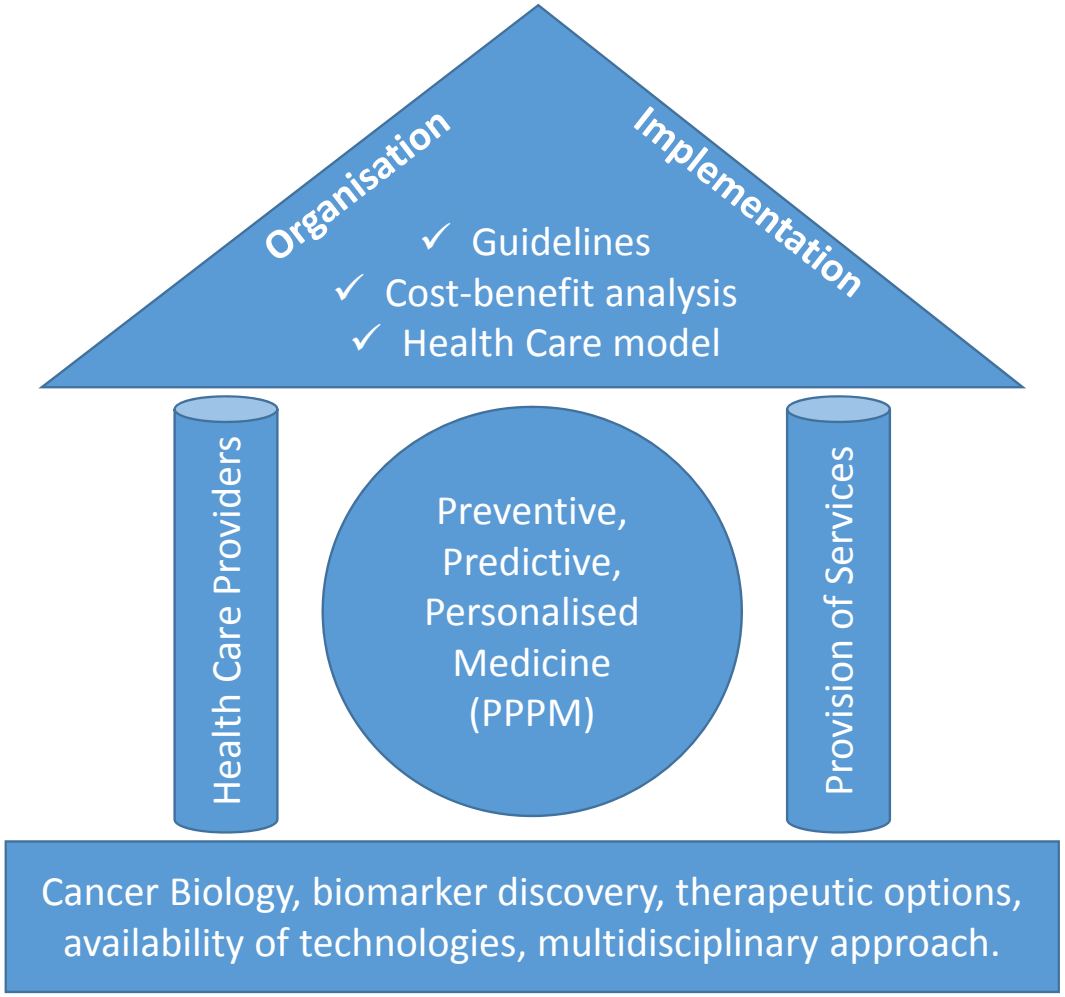


Outcomes

Know your population / cohort

Implement preventive measures

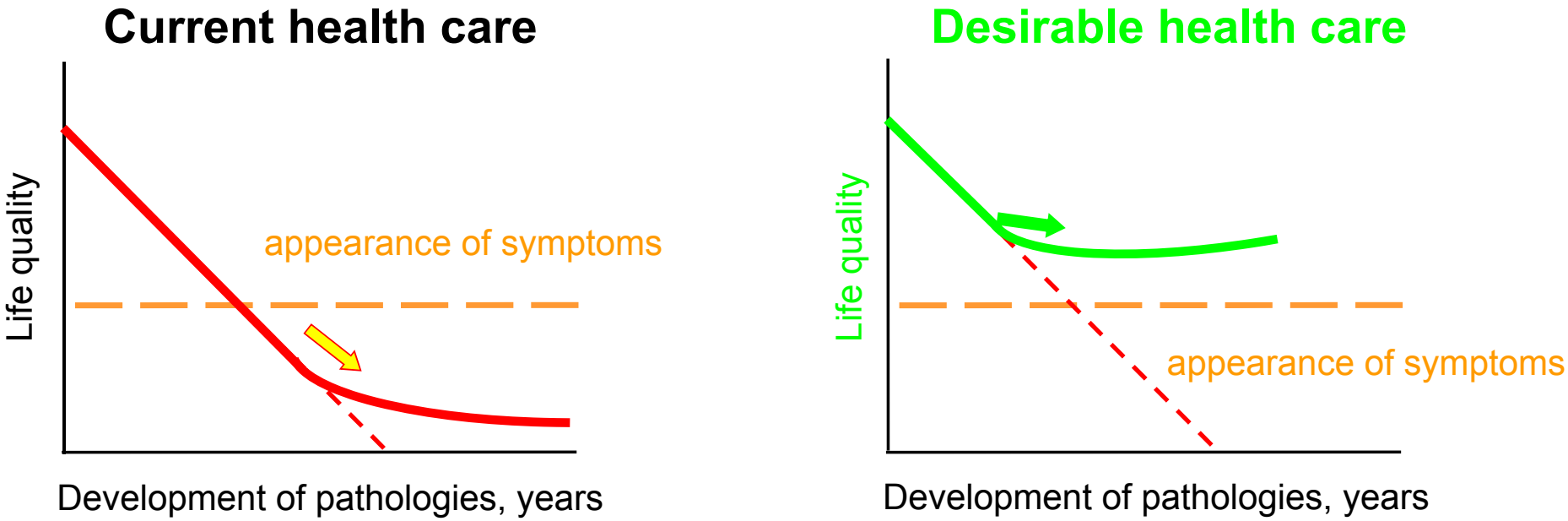
Reduce cancer risk

Earlier detection

Better patient management

Better Quality of Life

Application of Molecular Medicine towards personalised treatment in Oncology.



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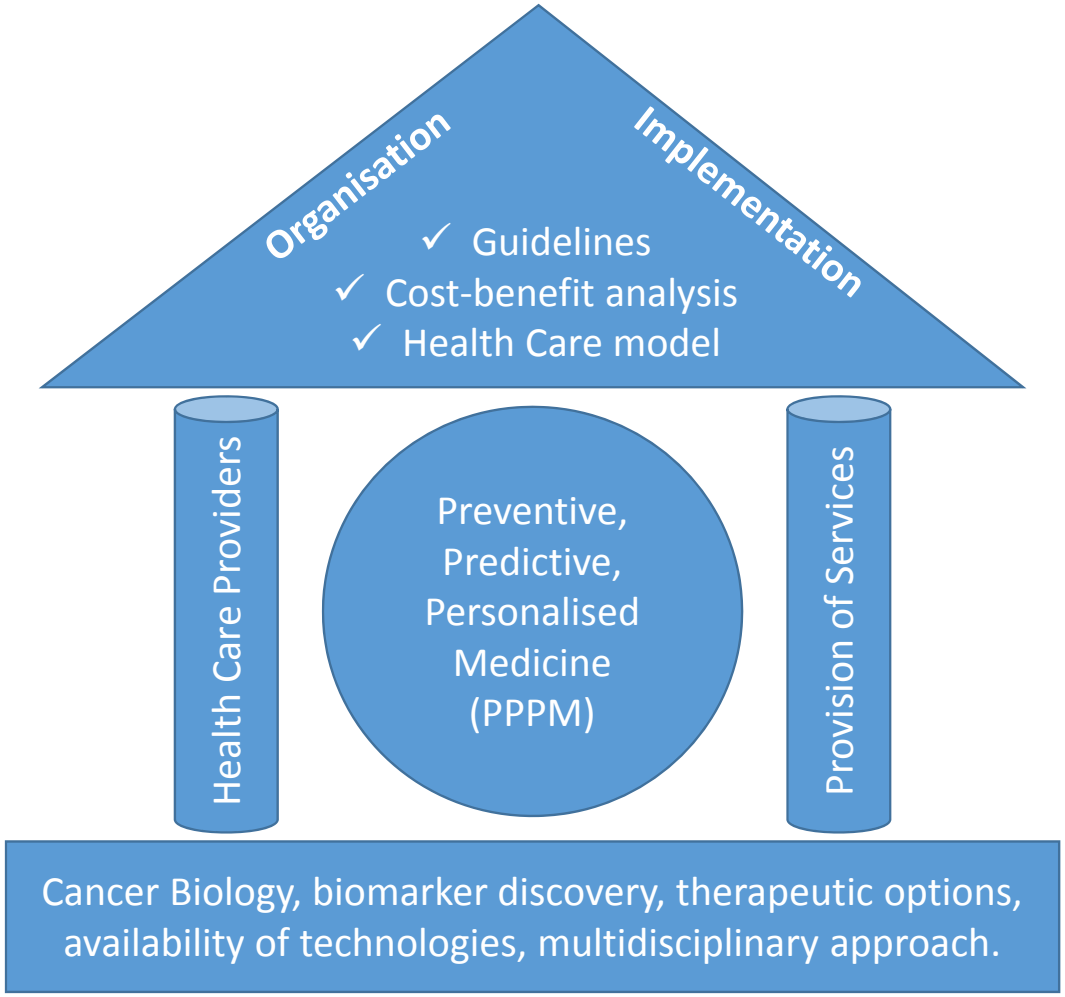

Recommendations

1. Prioritise actionable risk factors
   - ✓ Promote healthy diets
   - ✓ Measure pre-disposition markers
   - ✓ Provide risk assessment
2. formulate health care economic studies
3. prepare guidelines to monitor risks
4. define harmonised health care strategies
5. develop guidelines to implement effective screening and diagnostic algorithms
6. expand and improve image guided treatments,
7. adjustment of treatment modalities based on pre-defined algorithms

Longitudinal actions

1. provision of relevant education programs
2. technological innovation
3. medical research followed by evidence-based implementation to the clinic.

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A World of Opportunities with New Innovations in Bio Industry

Biomedical and Translational Medicine Research

World Bio Summit and Expo
Dubai on 02-04 November
Dr Godfrey Grech

Thank You to the organisers
Omics International and Middle East Molecular Biology Society

Thank You to the scientific committee

Thank you for listening