

# **DNA methylation as a key to new diagnostic and therapeutic technology in oncology**

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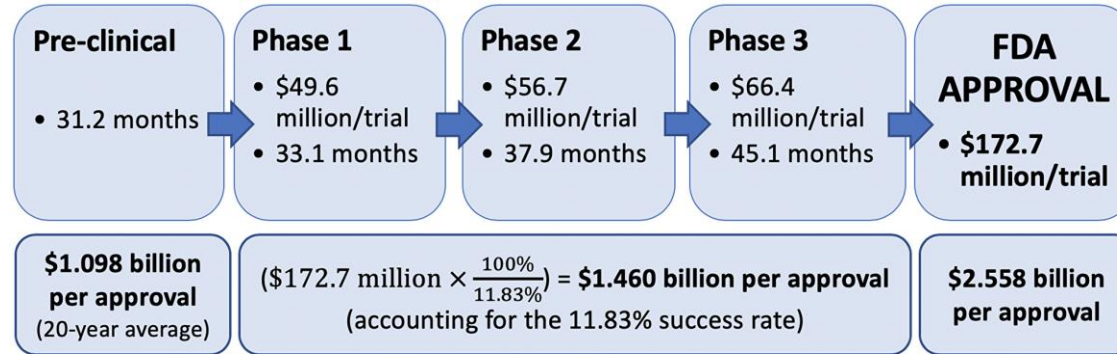
# Cancer – a great challenge for health care system

target

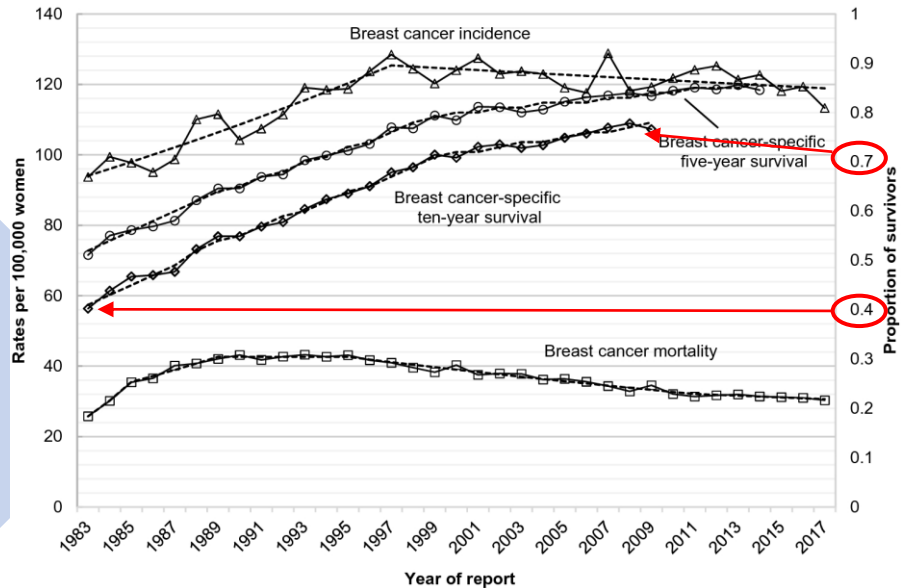


therapy

## Pancreatic cancer example

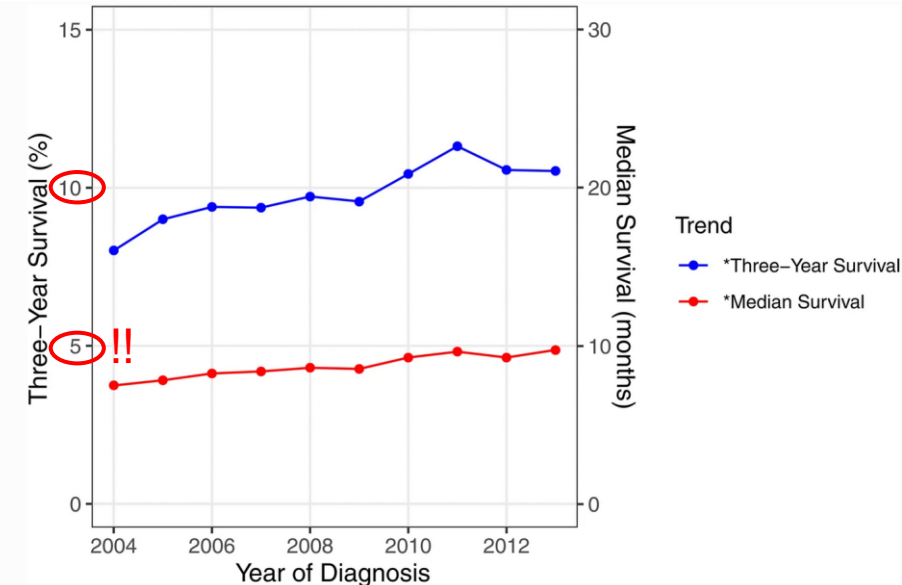


## Breast cancer example



## Glioblastoma cancer example

Data from DiMasi et al. (2016)



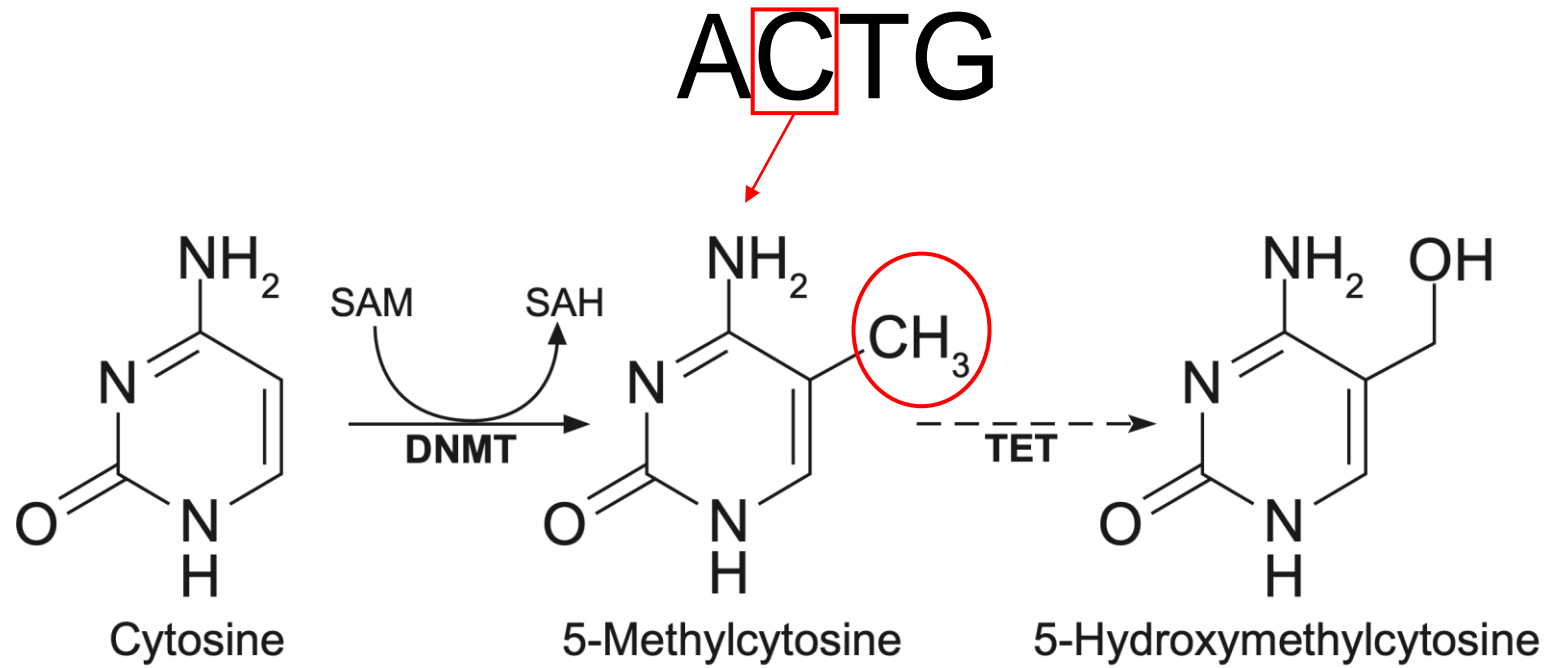
# Cancer clinical research – main areas of development

**Early diagnosis**  
**Cancer development monitoring – metastasis/recurrence**  
**Cancer therapy**

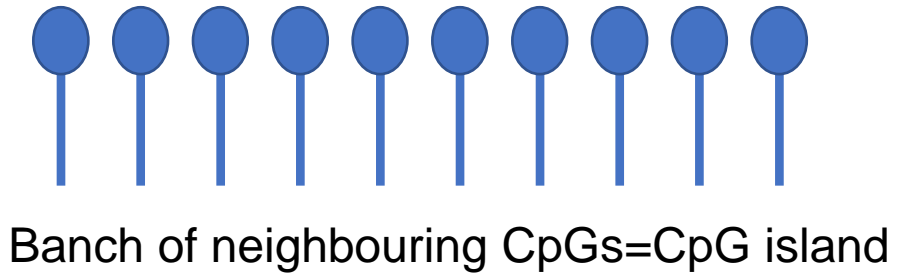
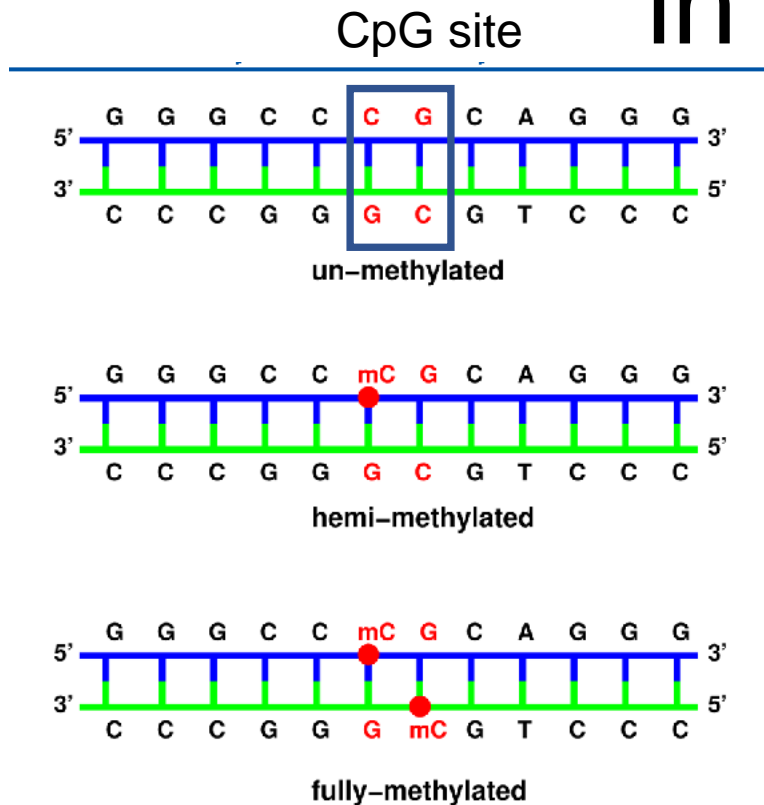


Analysis of DNA methylation in cancer and matched blood samples may contribute significantly to all of these 3 areas!

# DNA methylation at cytosine 5<sup>th</sup> position



# Methylated cytosines usually are present in the CG context



- DNA methylation looking from the perspective of its clinical utility gives us 2 levels of specificity:
1. Sequence, as it occurs in a specific regions of the genome
  2. Binary information of being chemically modified (methylated) or not (un-methylated)

# DNA methylation atlas of normal tissues gives a great opportunity of having a reference


nature

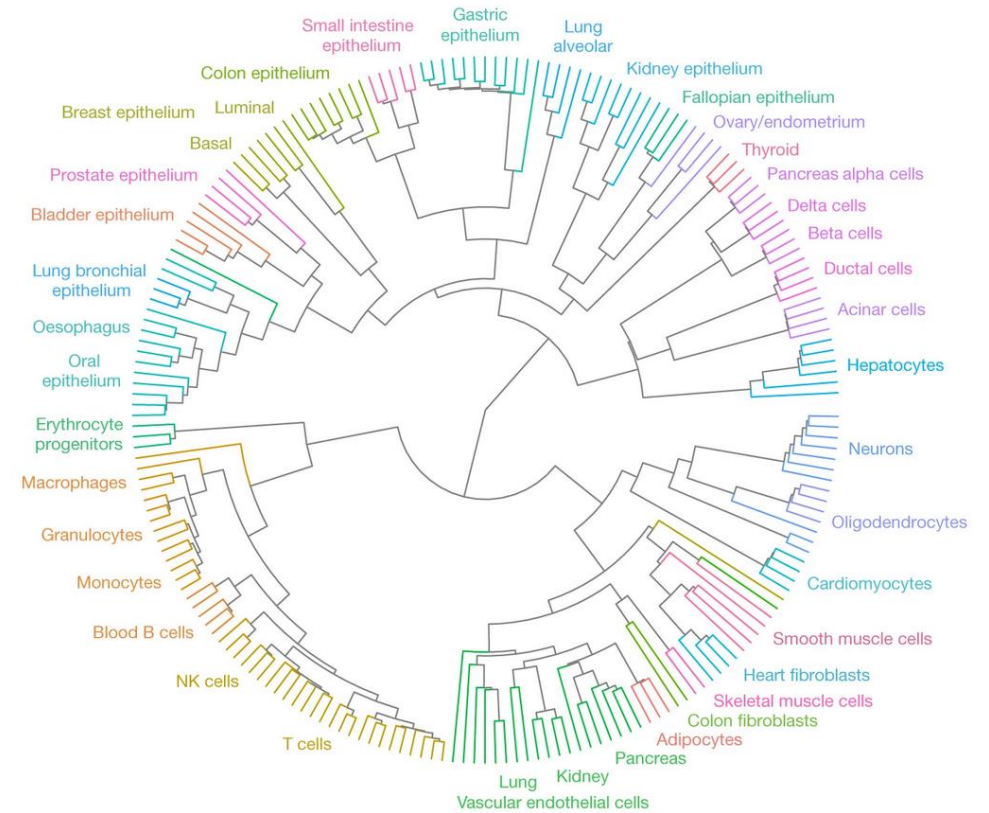
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## A DNA methylation atlas of normal human cell types

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# Proof of concept glioblastoma (GBM) tumors

CANCER GENETICS AND EPIGENETICS



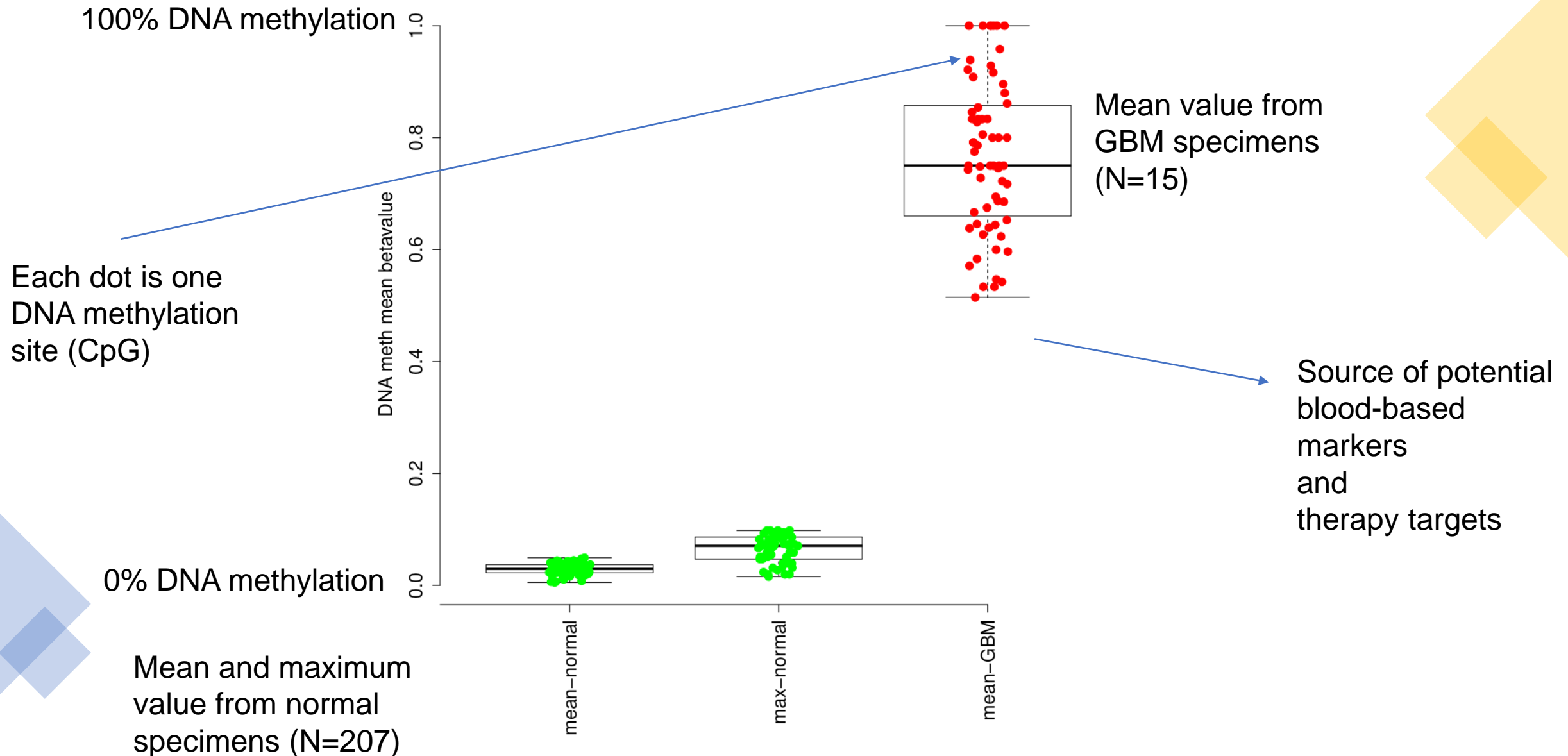
Targeted sequencing of cancer-related genes reveals a recurrent TOP2A variant which affects DNA binding and coincides with global transcriptional changes in glioblastoma

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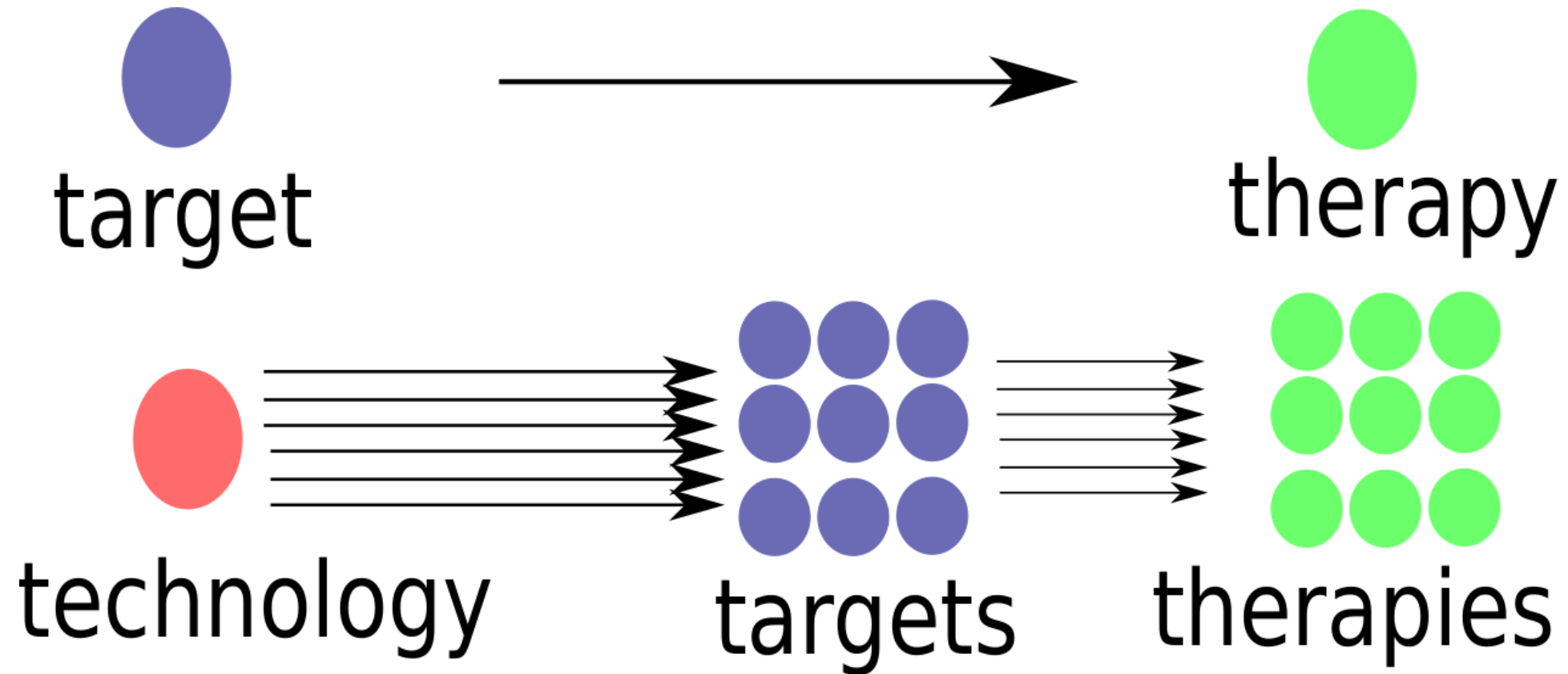
15 GBM samples were analyzed regarding their whole genome DNA methylation profile and crossed with normal atlas of DNA methylation

# Proof of concept glioblastoma (GBM) tumors





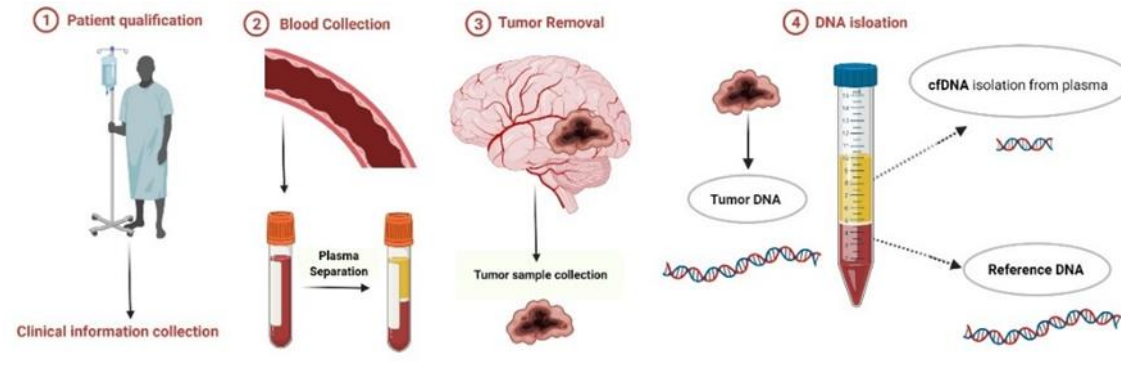
# Looking for technology, rather than for single target-therapy strategies !



# Idea of prospective large-scale study

Collect a heterogeneous cohort of patients with different cancer types, including metastatic, recurrent and in-situ cancers, collect tumor samples together with blood samples to analyze DNA methylation markers.

Develop new flexible ways for diagnosis, disease monitoring and therapy based on DNA methylation.



# Thank you for listening

