

Data Drives Decisions

Lessons Learned Post COVID-19

Peter J. van der Spek

Erasmus MC



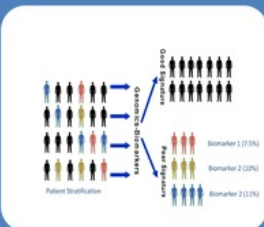
Mission Omics into the Clinic

- Support molecular diagnostic devices
- Enable clinicians to deliver innovative therapies
- Optimize care processes to improve a patients health



Vision Personalized Health Care

- Educate, Develop and Support solutions
- Support collaborative multidisciplinary decisionmaking
- Introduce patient- centric value-based health care



Strategy Patient Stratification

- Molecular Diagnostics
- Targeted Treatment

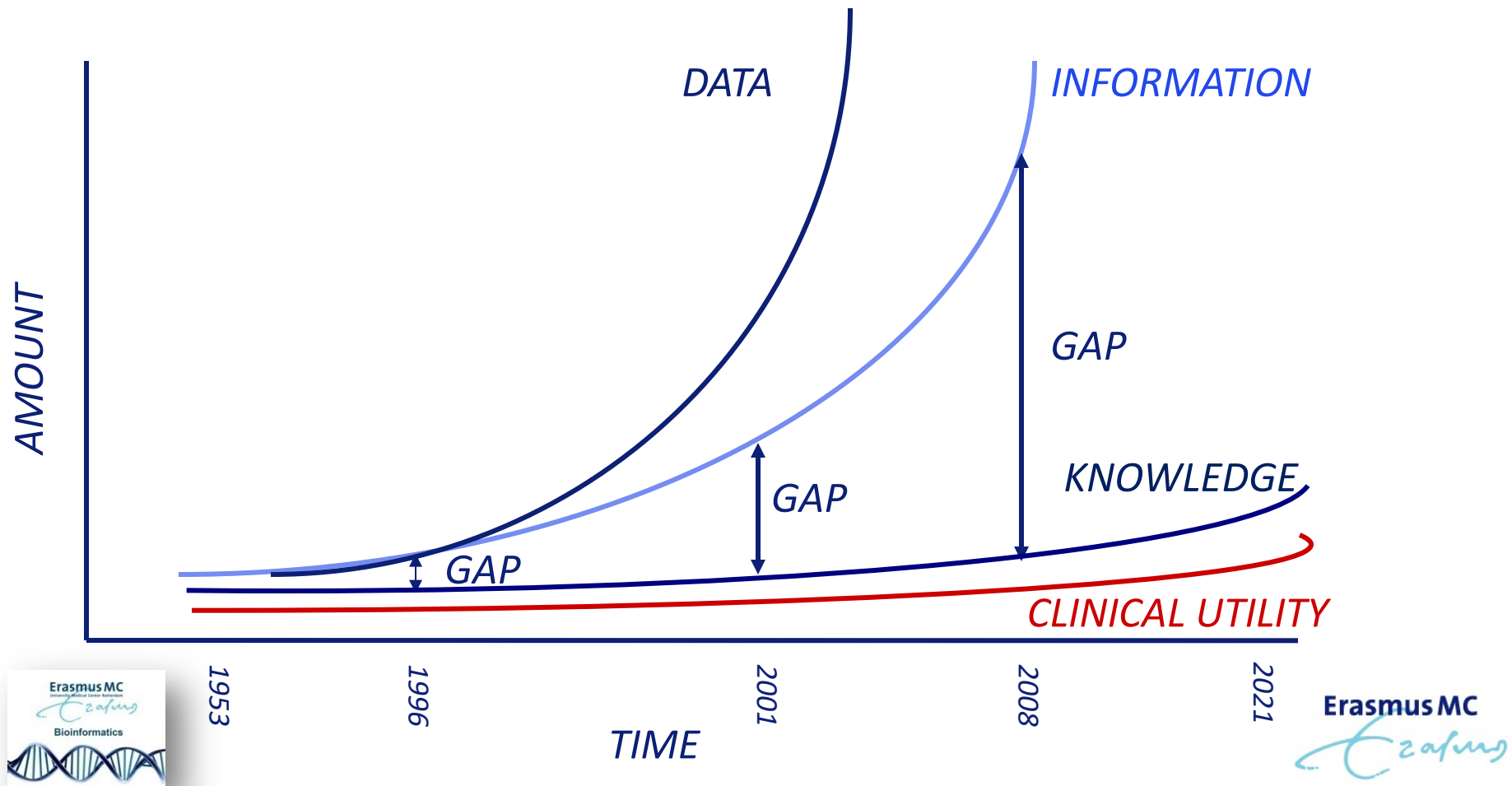
Impact of Genomics, Smart Diagnostics

4% of Health Cost spent on Dx

72% of decisions based on Dx

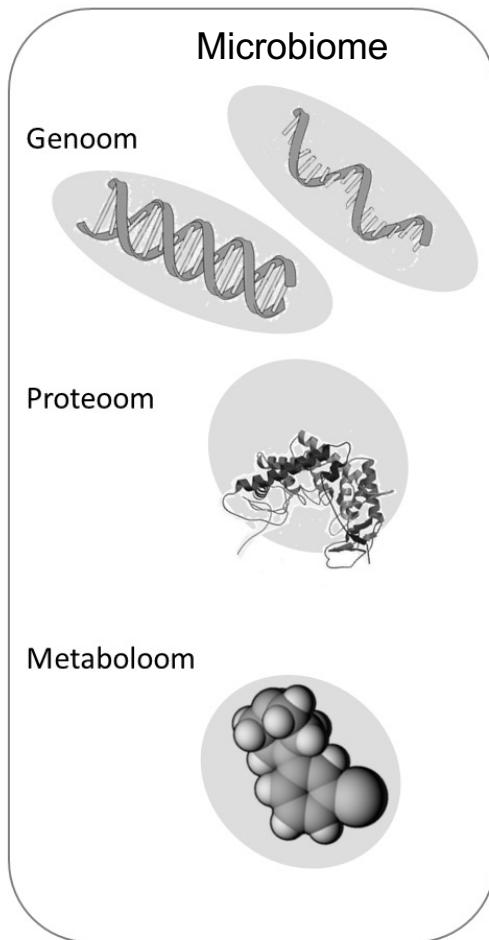


Exponential Growth of (Big) Data



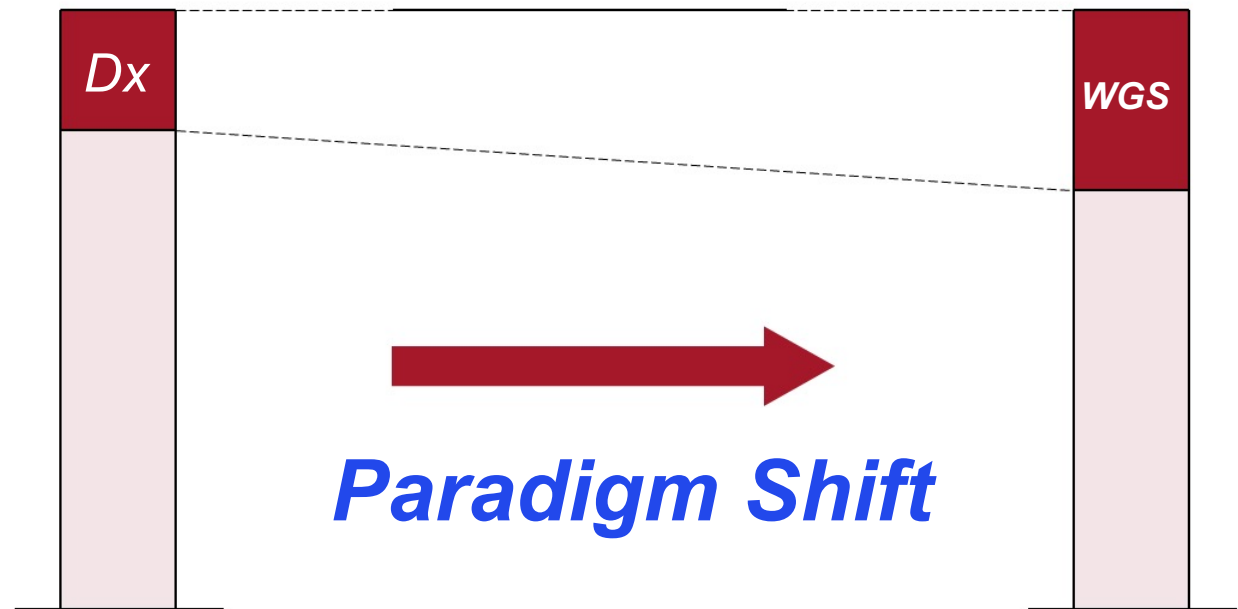
Molecular Diagnostics Enables PM

- Shift in Cost and Activities -



Current Situation

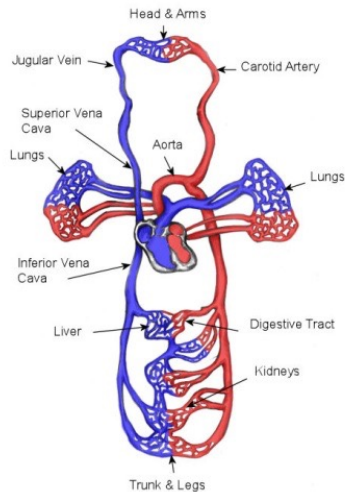
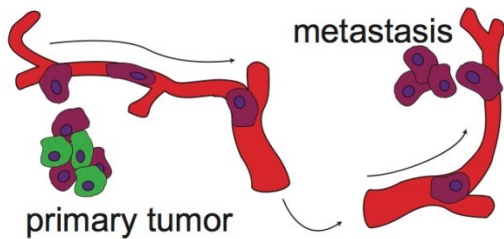
New Situation



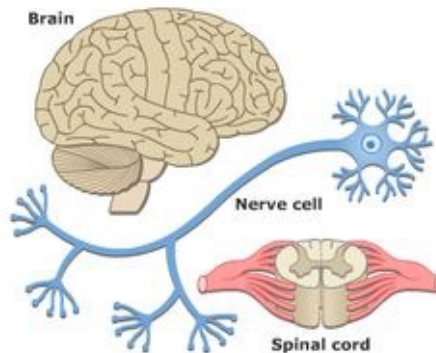
FAIR Open Data (Data Re-use)

- ISO27001 & METC documentation -

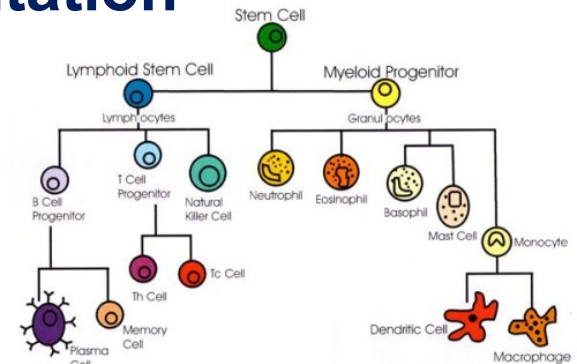
Cancer



Cardio



Neuro

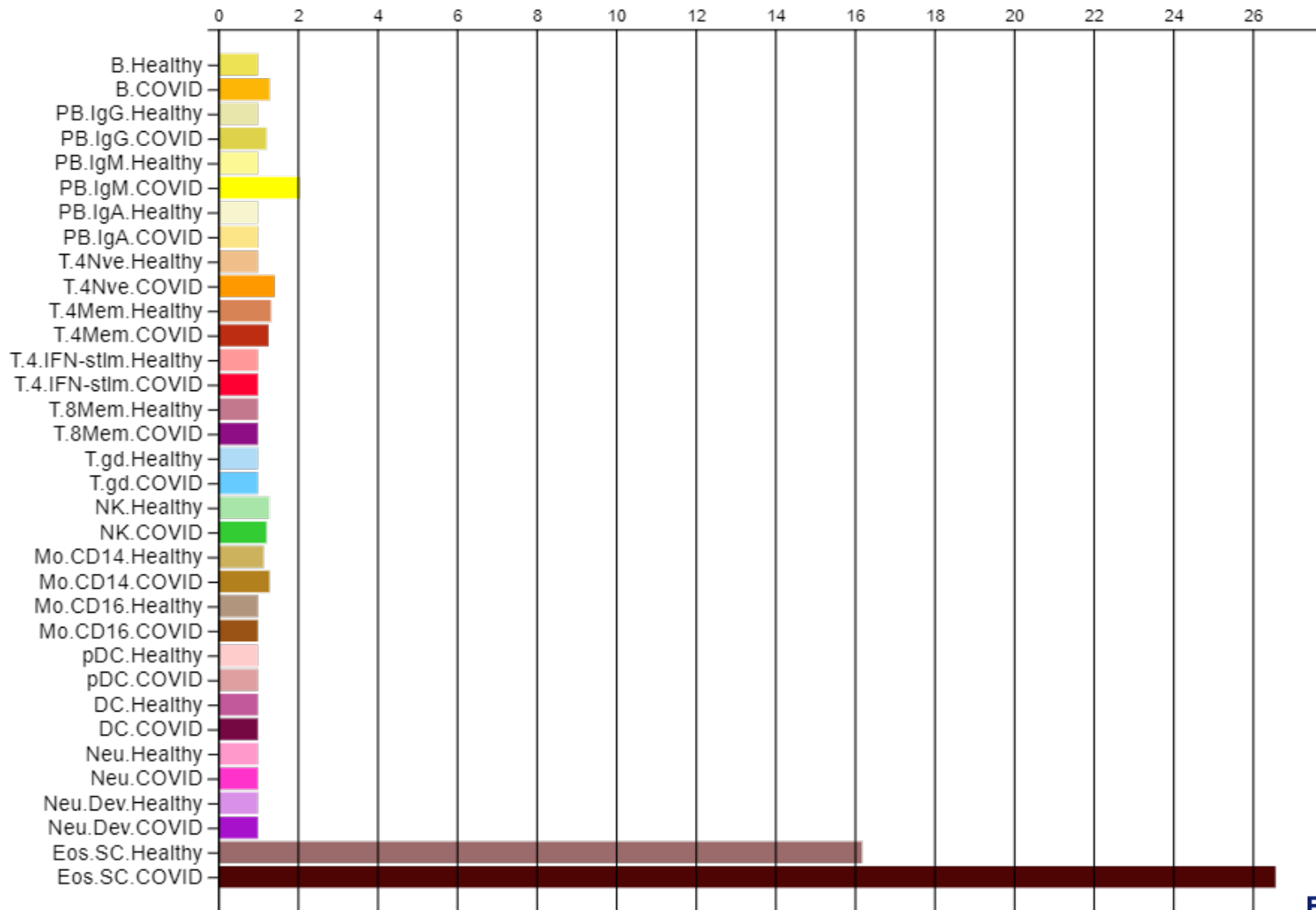


Immune & Transplantation

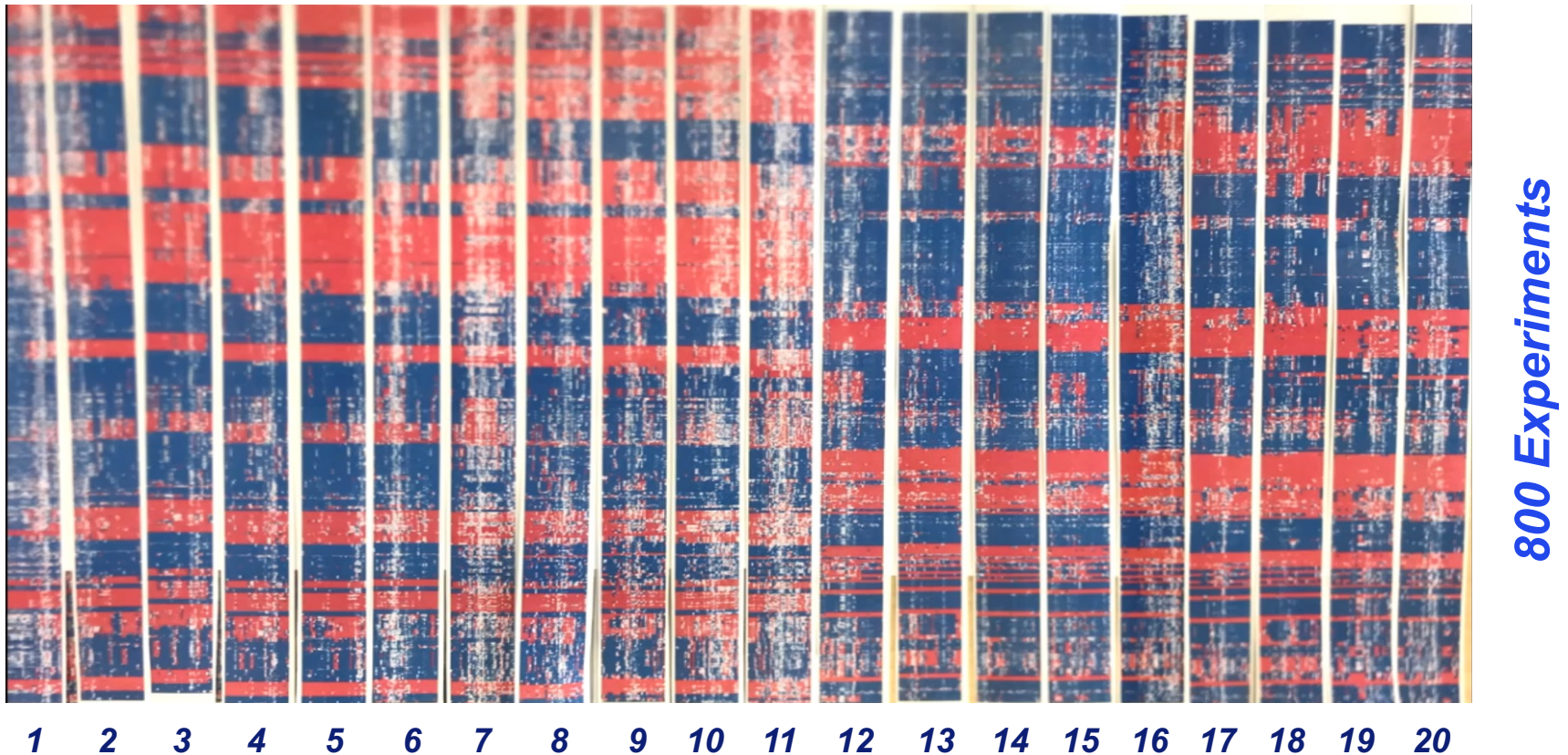


Child
Erasmus MC
Erasmus

Data Re-use



DNA & RNA based Stratification



Different Genes mutated in Atopic Dermatitis Patients

Erasmus MC



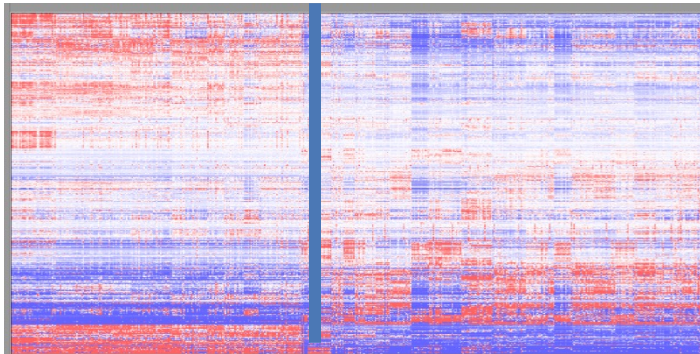
Knowledge Mining



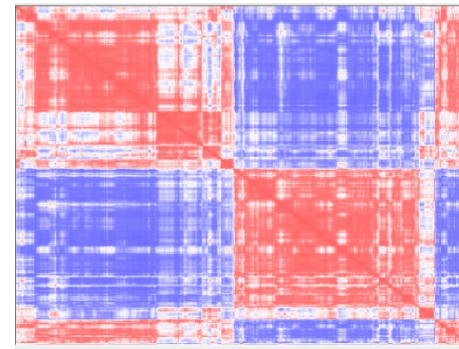
YK YK
Textmining



YK DK
Lab Experiment

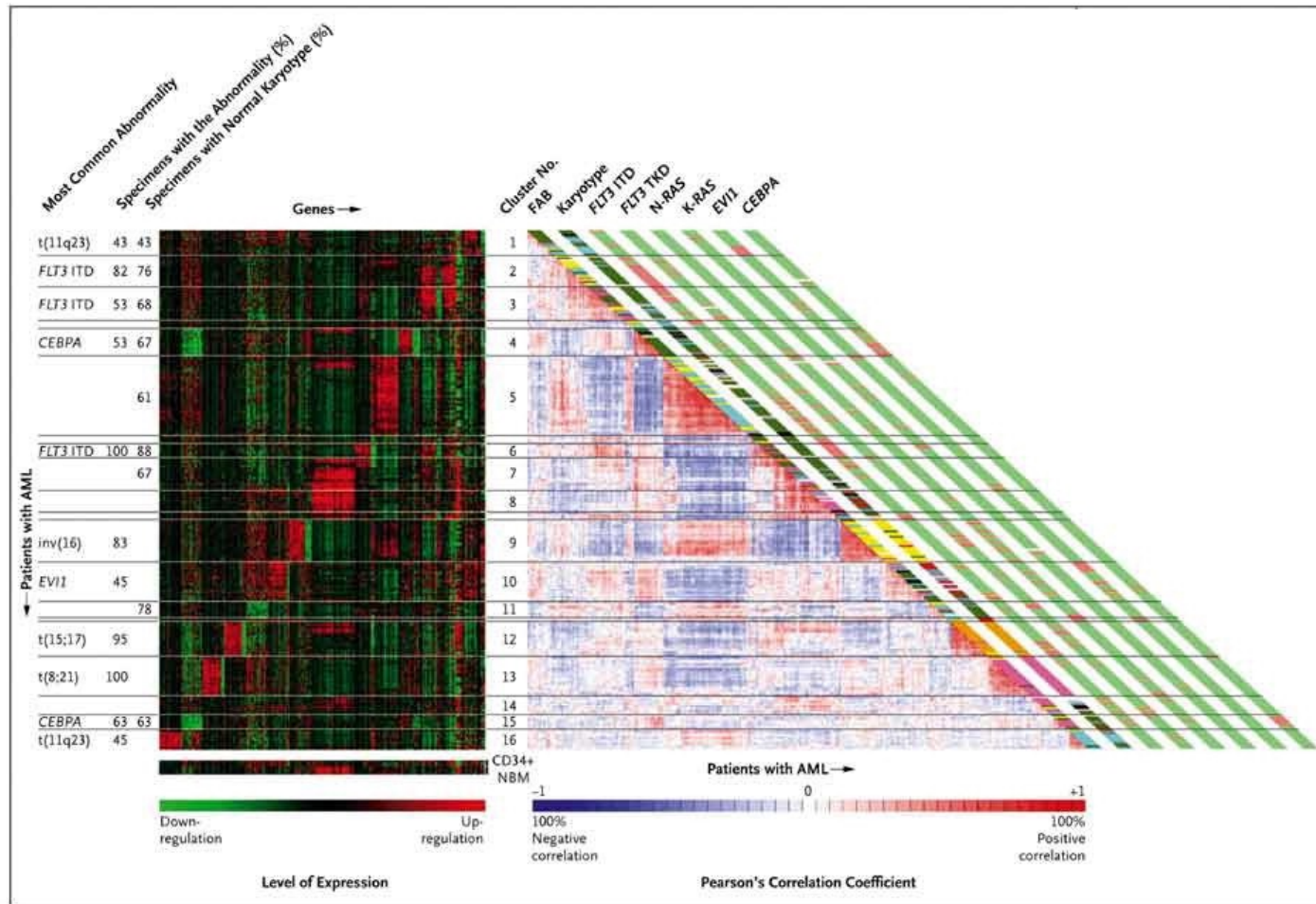


DK YK
Data Visualization



DK DK
Network Analysis

RNA Expr. based Patient Stratification in WBCs





How Many Entries in Each Zygosity and varType Class?

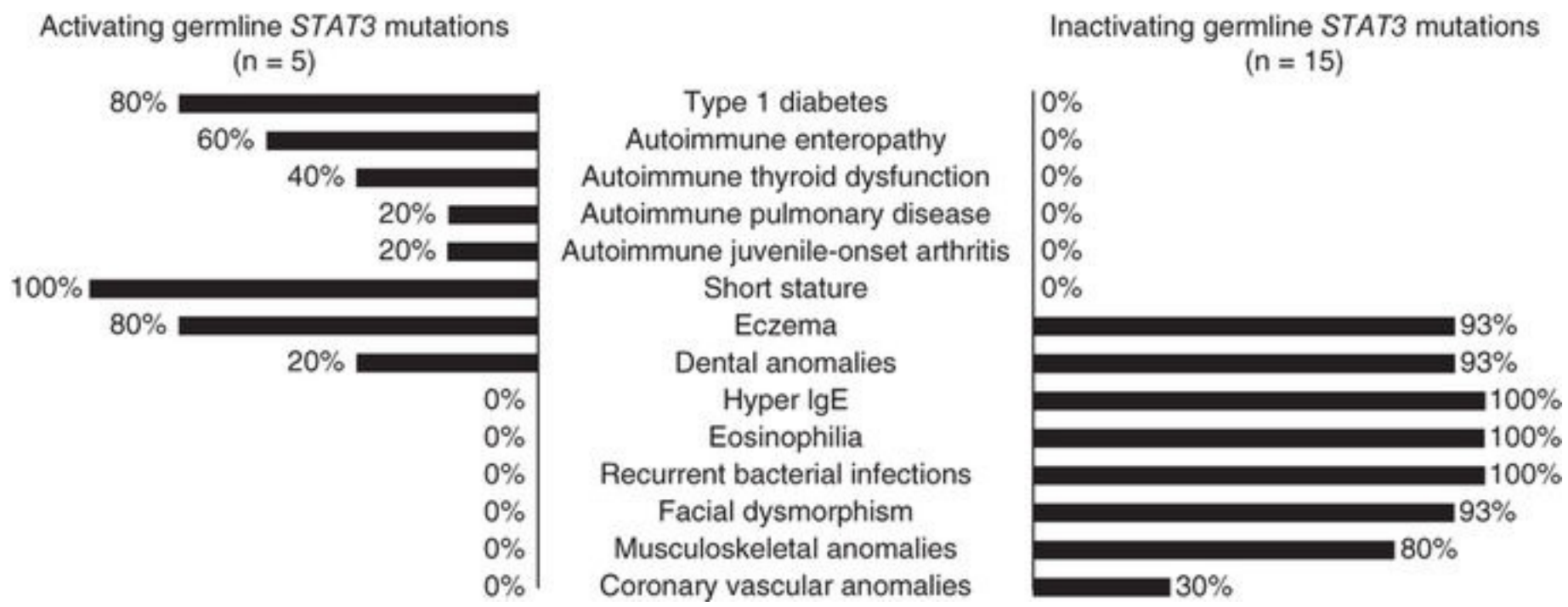
Zygosity	varType	Count
hom	ref	8,326,739
half	ref	101,086
no-call	complex	3,037,047
no-call	no-ref	286
het-ref	snp	2,806,489
hom	snp	1,400,785
het-alt	snp	1,654
half	snp	54,967
het-ref	del	214,461
hom	del	79,579
het-alt	del	249
half	del	64,349

Zygosity	varType	Count
het-ref	ins	223,910
hom	ins	86,916
het-alt	ins	9,682
half	ins	43,785
het-ref	sub	114,791
hom	sub	23,748
het-alt	sub	1,268
half	sub	12,127
het-alt	complex	52,540
half	complex	6,080
hom	complex	36

Interpretation of Big data.....(250 km paper = 1 genome)



Activating and De-activating STAT3 Mutations



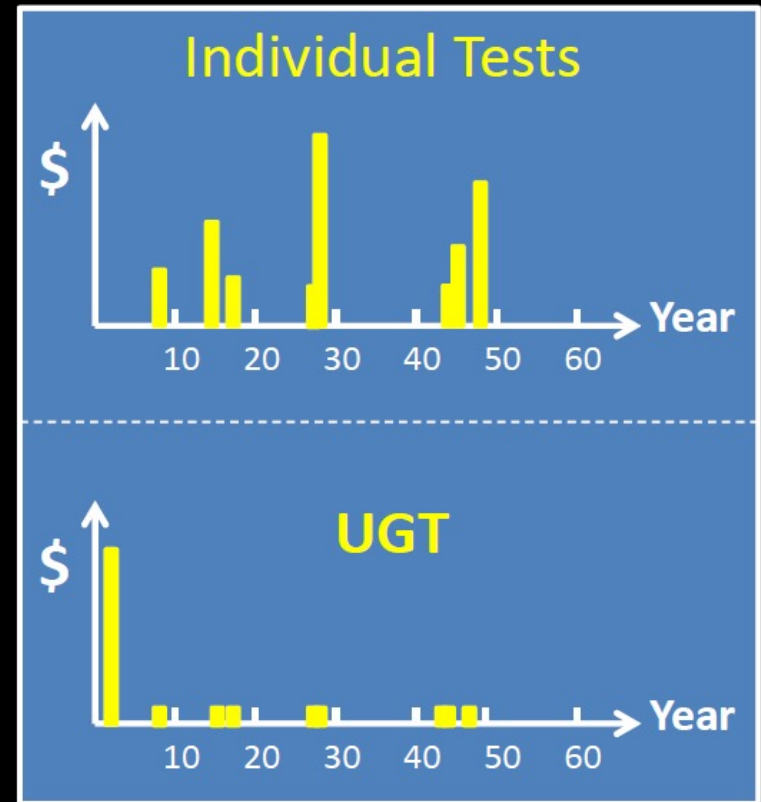
Gain of Function

Loss of Function

Dramatically Different Economics

- Current tests: run chemistry for each test
 - \$100s-\$1,000s per test
- UGT: run chemistry only once per person

- **\$ 520 WGS (2021)**



Wie budget heeft, kan onderhandelen met verzekeraars.....

Smart Analysis of WGS Data

(prior to targeted treatment)

WGS to detect SNP's (In known genes)

WGS to detect Structural variants SV's (Chr. Translocations)

WGS to detect Copy Number Abberations

WGS to detect Human Papilloma virus integration

WGS to detect infection with Herpes strains

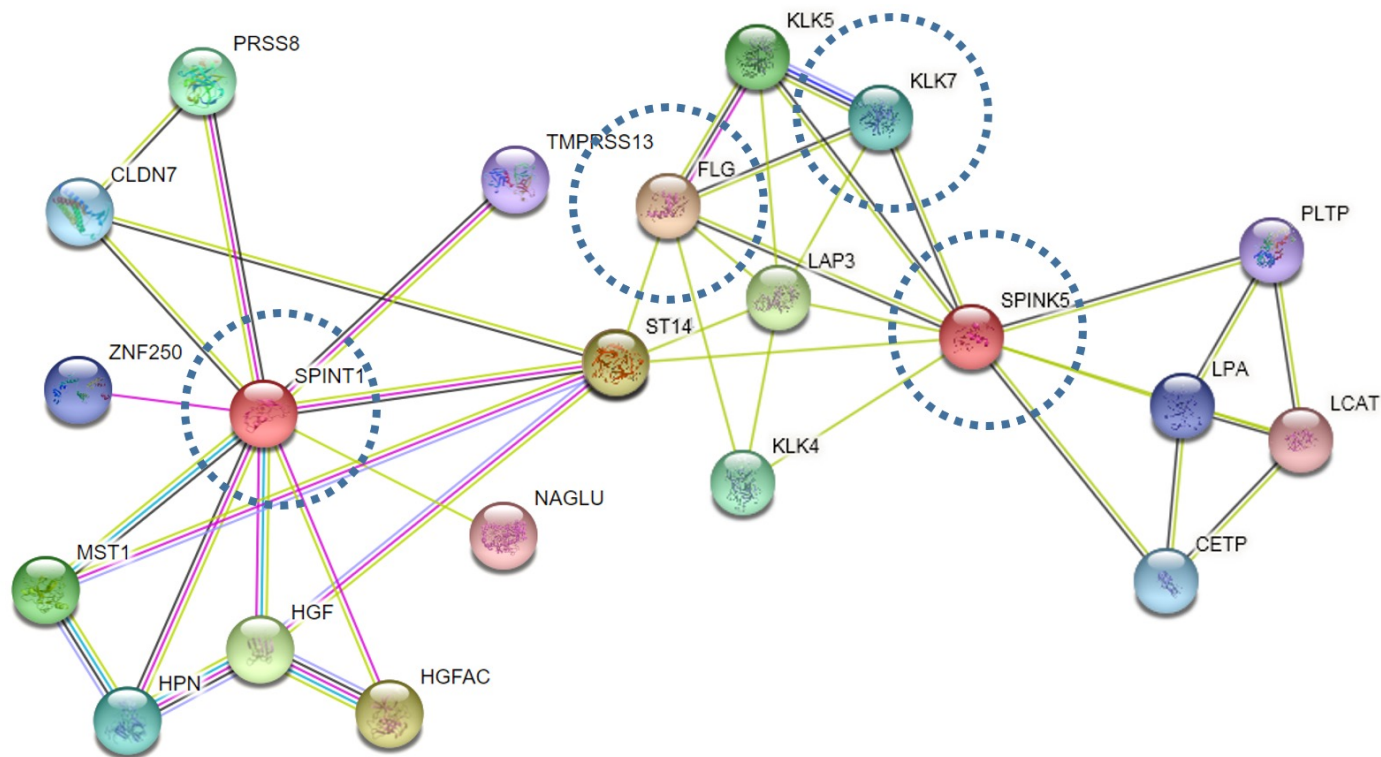
WGS to detect Mitochondrial mutations

WGS to detect Methylation status

WGS to detect Acetylation status



SPINK5 (Netherton), FLG, KLK7 & SPINT1



Lemon Frost Leopard Geckos



lf/+; blizzard/blizzard

PLOS GENETICS

RESEARCH ARTICLE

Genetics of white color and iridophoroma in "Lemon Frost" leopard geckos

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Abstract

The squamates (lizards and snakes) are close relatives of birds and mammals, with more than 10,000 described species that display extensive variation in a number of important biological traits, including coloration, venom production, and regeneration. Due to a lack of genomic tools, few genetic studies in squamates have been carried out. The leopard gecko, *Eublepharis macularius*, is a popular companion animal, and displays a variety of coloration patterns. We took advantage of a large breeding colony and used linkage analysis, synteny, and homozygosity mapping to investigate a spontaneous semi-dominant mutation, "Lemon Frost", that produces white coloration and causes skin tumors (iridophoroma). We localized the mutation to a single locus which contains a strong candidate gene, SPINT1, a tumor suppressor implicated in human skin cutaneous melanoma (SKCM) and over-proliferation of epithelial cells in mice and zebrafish. Our work establishes the leopard gecko as a tractable genetic system and suggests that a tumor suppressor in melanocytes in humans can also suppress tumor development in iridophores in lizards.

Author summary

The squamates (lizards and snakes) comprise a diverse group of reptiles, with more than 10,000 described species that display extensive variation in a number of important biological traits, including coloration. In this manuscript, we used quantitative genetics and genomics to map the mutation underlying white coloration in the Lemon Frost morph of the common leopard gecko, *Eublepharis macularius*. Lemon Frost geckos have increased white body coloration with brightened yellow and orange areas. This morph also displays a high incidence of iridophoroma, a tumor of white-colored cells. We obtained phenotype information and DNA samples from geckos in a large breeding colony and used genome sequencing and genetic linkage analysis to localize the Lemon Frost mutation to a single

OPEN ACCESS

Citation: Guo L, Bloom J, Sykes S, Huang E, Kashif Z, Phan E, et al. (2021) Genetics of white color and iridophoroma in "Lemon Frost" leopard geckos. *PLoS Genet* 17(6): e1009580. <https://doi.org/10.1371/journal.pgen.1009580>

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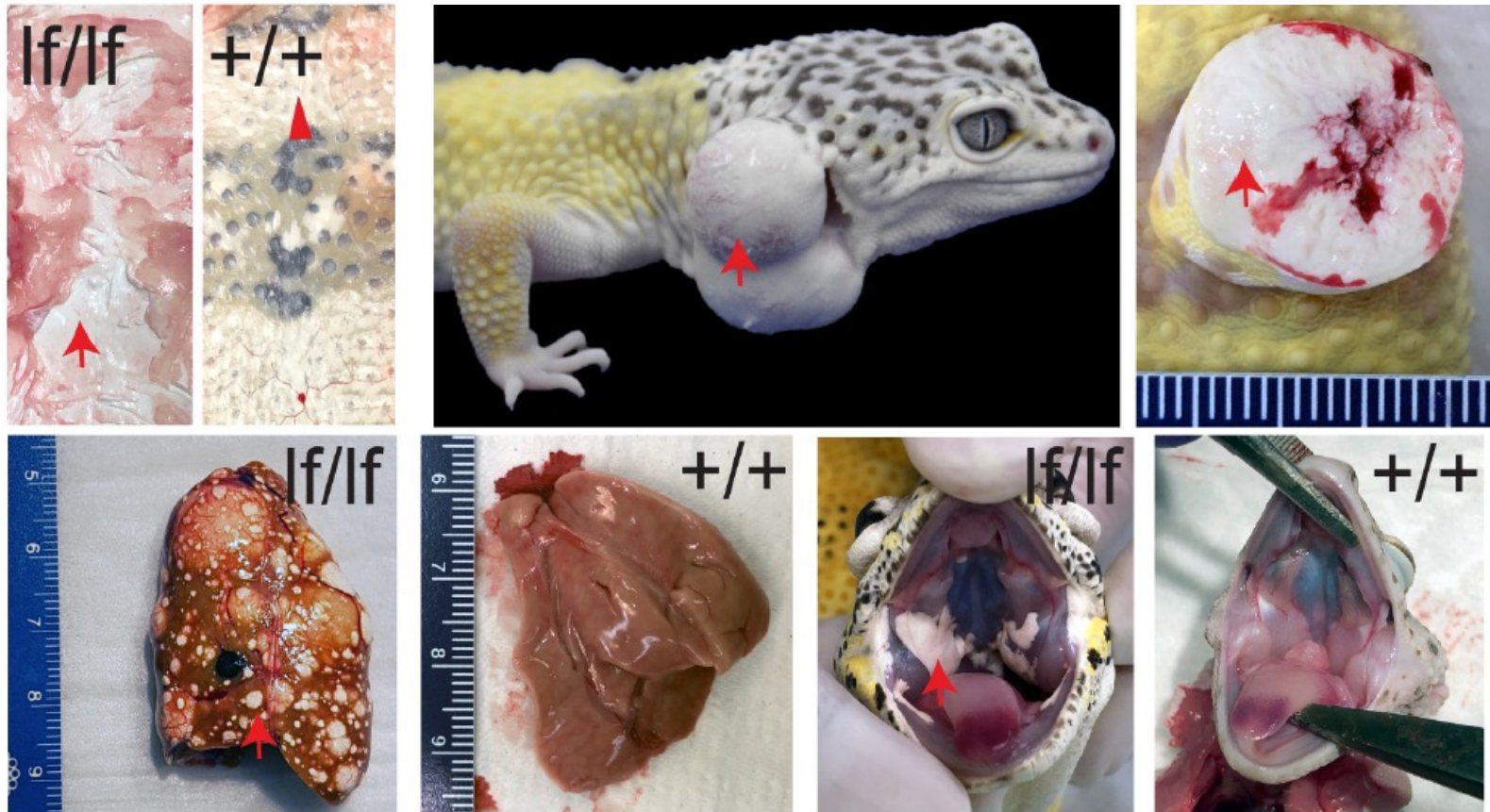
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Data Availability Statement: All sequencing data available from the NCBI SRA database (accession number PRJNA30064).

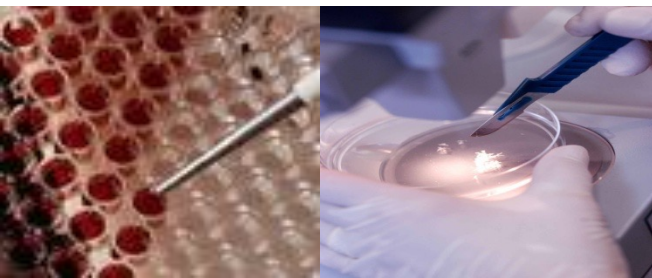
Funding: This work is supported by the Howard Hughes Medical Institute (to LG) and the Helen Hay

Tumors in Skin, Liver and Oral Cavity



Plos Genetics, 2021

Personalized Healthcare Recommendations:



Education

Intro Teaching Program

Reimbursement

Genome First approach (WGS)

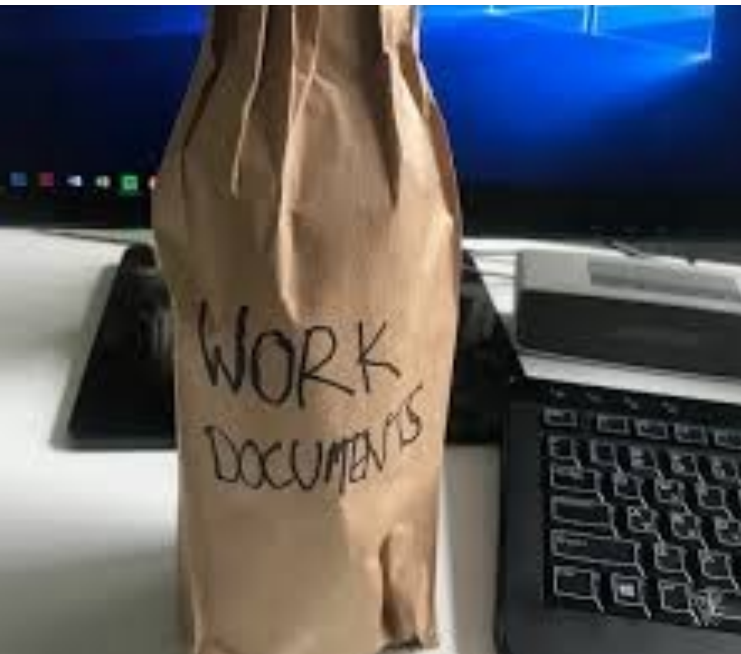
Legislation

Open data, Re-use

Regulation

GDPR reality check

Oncology, Clinical Genetics vs Pathology: Work as a Team.... Include your friends!





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Pioneering Immunotherapy

