

Glioblastoma and the Development of Non-invasive Biomarkers

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Summer 2020

- COVID-19/No students allowed at NIH
- Serum samples collected from patients 2010-present
- Samples run on Somascan assay May 2020 by Mary Sproull
- Data analyzed by me with help from Dr Shankavaram

Clinical Case

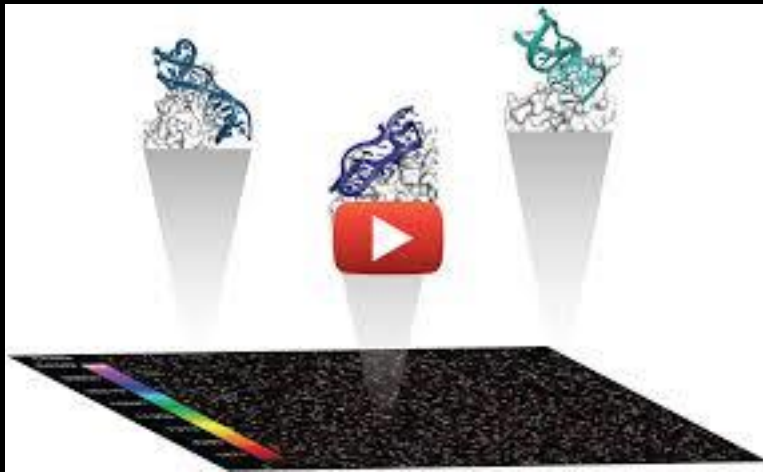
- 48 y/o male with seizure and head trauma
 - ER visit, CT scan, MR scan



- maximal surgical resection
- Chemotherapy
- Radiotherapy

Introduction

- Serum from 56 patients with Glioblastoma
- Somascan technology/1310 different proteins



Data Analysis

- 212 outlier proteins:
 - 95 up in GBM patients
 - 117 down
- Loaded these into Bioinformatics Program
 - Ingenuity Pathway Analysis

Ingenuity Pathway Analysis

The screenshot shows the Ingenuity Pathway Analysis (IPA) software interface. The window title is 'IPA'. The menu bar includes 'File', 'Edit', 'View', 'Window', and 'Help'. There are links for 'Provide Feedback | Support', 'Kevin Camphausen', and 'Close IPA'. The main navigation tabs are 'Genes and Chemicals', 'Diseases and Functions', and 'Pathways and Tox Lists'. A search bar with a 'SEARCH' button and an 'Advanced Search' link is present. The current analysis is titled 'Expression Analysis - GBMvNormal - 2020-07-08 08:03 AM'. The breadcrumb trail is 'Summary | Canonical Pathways | Upstream Analysis | Diseases & Functions | Regulator Effects | Networks | Lists | My Pathways | Molecules | Analysis Match'. An 'Export' button is visible. A red arrow points to the 'Top Canonical Pathways' section.

Top Canonical Pathways

Name	p-value	Overlap
Systemic Lupus Erythematosus In B Cell Signaling Pathway	1.48E-15	8.4 % 23/275
HIF1α Signaling	7.47E-14	9.3 % 19/205
Acute Phase Response Signaling	8.43E-14	10.1 % 18/179
Pancreatic Adenocarcinoma Signaling	9.98E-14	13.8 % 15/109
Role of Osteoblasts, Osteoclasts and Chondrocytes in Rheumatoid Arthritis	2.69E-13	8.6 % 19/220

Top Upstream Regulators

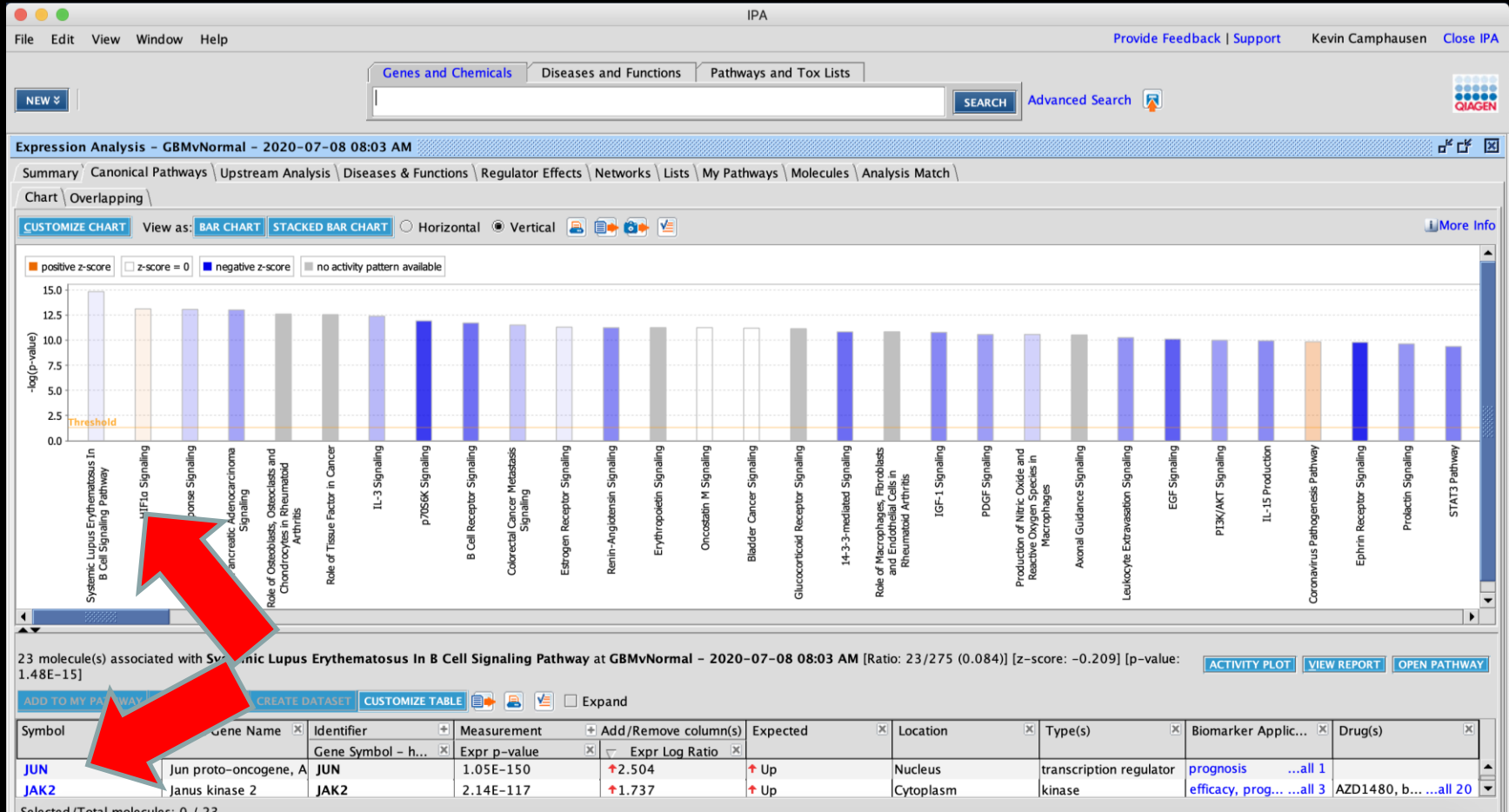
Upstream Regulators

Name	p-value	Predicted Activation
beta-estradiol	4.69E-27	
lipopolysaccharide	8.02E-26	
TGFB1	2.25E-25	Inhibited
dexamethasone	2.79E-24	Inhibited
TNF	2.89E-24	

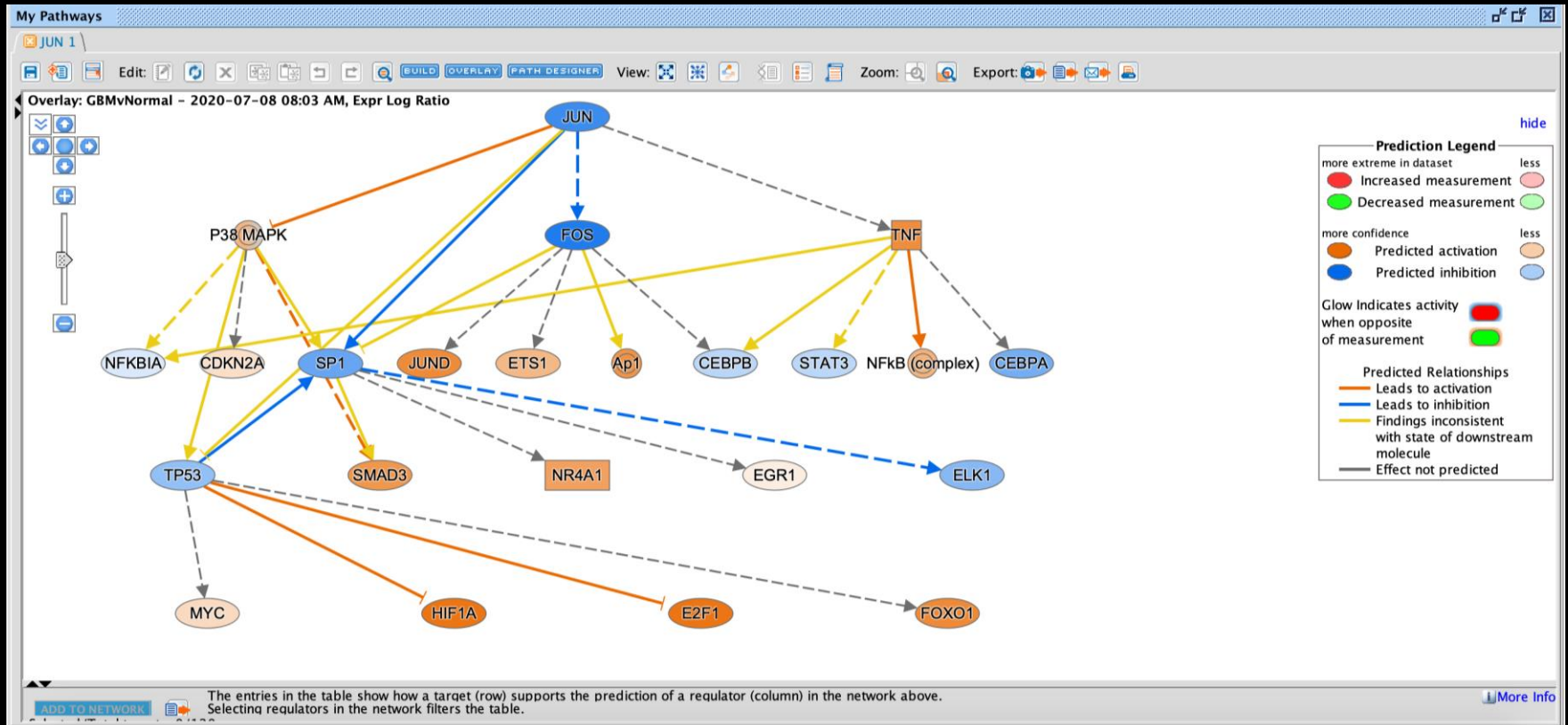
Causal Network

Name	p-value	Predicted Activation
ITGB6	3.74E-30	Inhibited
KCNA3	7.93E-29	

Protein Pathways



JUN Pathway



Next Steps

- Second cohort of patients to verify JUN
- Test JUN in other Cancer Types
- Test a drug that inhibits JUN

Acknowledgments

- Mary Sproull
- Uma Shankavaram