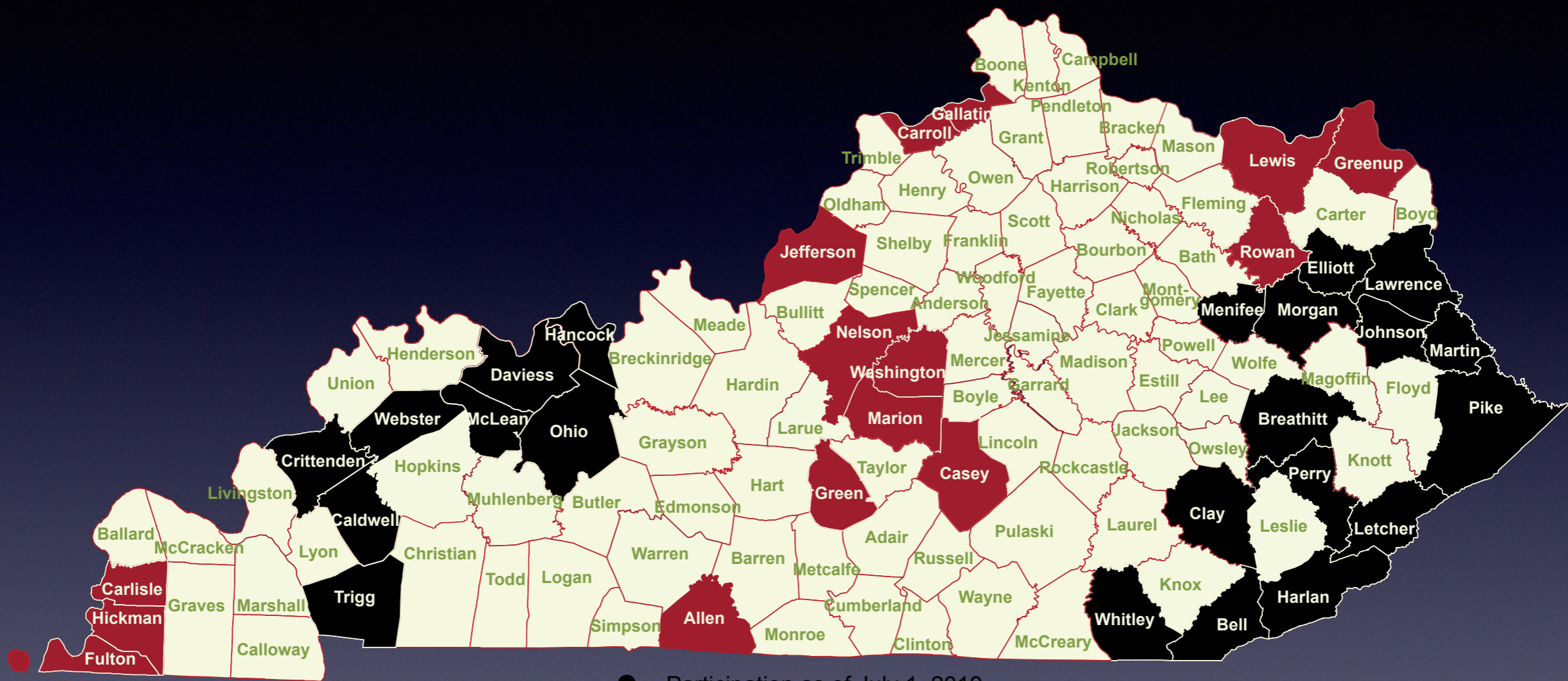


Dataseam

**Research + Education Investment Returns
Kentucky General Assembly IJC BR Sub Education
November 19, 2019**



- = Participation as of July 1, 2019
- = Expansion July 1, 2019 > Present



James Graham Brown
Cancer Center

A proud member of
UL Health Care

UNIVERSITY OF
LOUISVILLE
SCHOOL OF MEDICINE

Cancer Drug Discovery

John O. Trent, PhD

Deputy Director of Basic and Translational Research
J.G. Brown Cancer Center, University of Louisville

Wendell Cherry Endowed Chair in Cancer Translational Research
Director, Kosair Pediatric Oncology Research Program
Director, JG Brown Cancer Center Molecular Modeling Facility
Professor of Medicine, Biochemistry and Molecular Biology
Co-founder, APTAMERA Inc., Louisville, KY, Interest in Antisoma.

Drug Discovery at the Brown Cancer Center

How we use the Dataseam Grid.

Drug Discovery: Virtual screening.

Use computers to find potential drugs that block cancer target structures.

Why?

It is faster and cheaper than traditional discovery.

Faster: Speed is linear to number of computers.

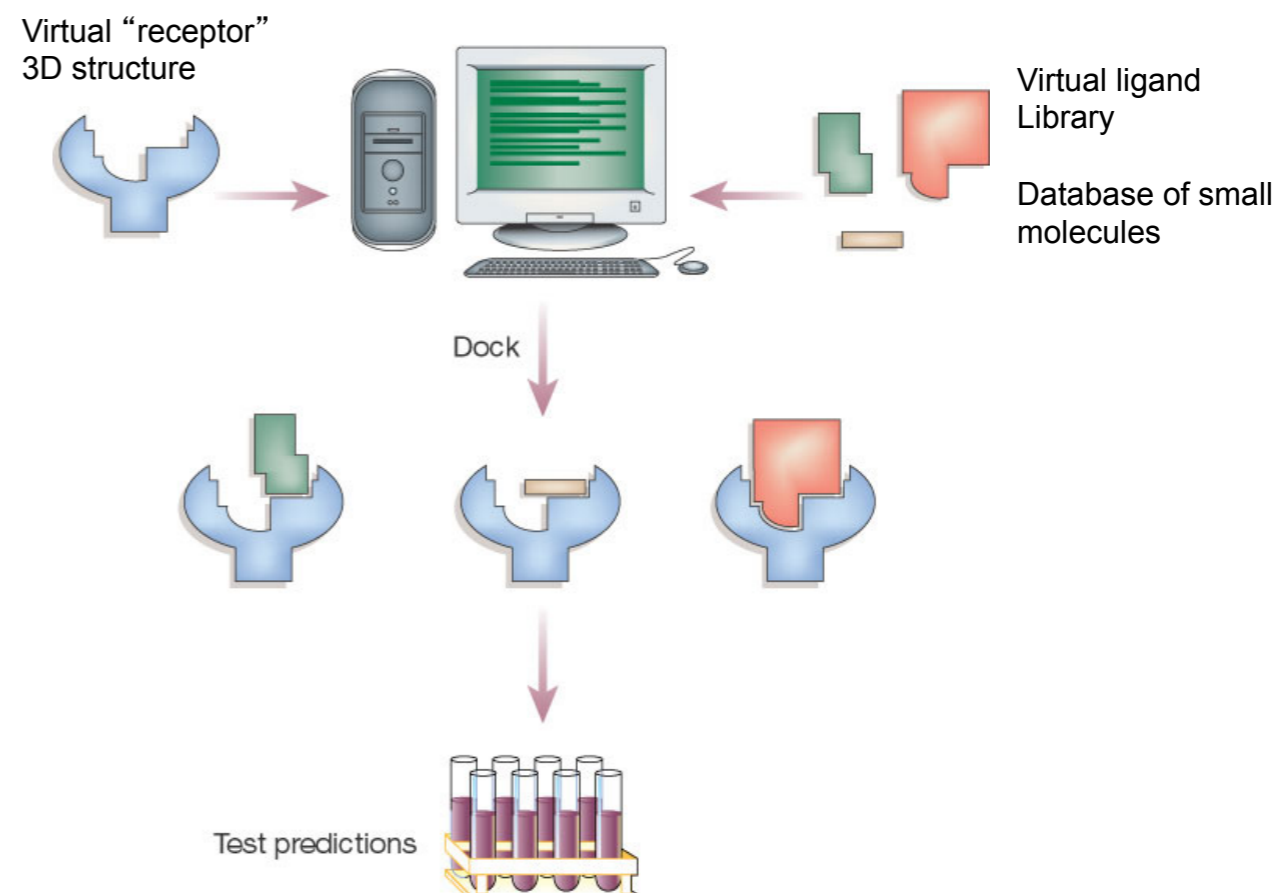
Dataseam Grid: 10,000 dedicated virtual screening processor cores

Cheaper: We buy in 100 compounds, not millions.

Routine Libraries to screen

ZINC Drug-Like: 24,877,119 compounds

Pubchem: 97,000,000 compounds



Brian K. Shoichet Virtual screening of chemical libraries.
Nature 432, 862-865(16 December 2004)

Does it work....and do Researchers use it?

The pipeline of targets that have been virtually screened and inhibitors have been found experimentally at the BCC by these research groups listed by PI. (Multiple listing means multiple targets.)

- Chesney
- Telang
- Trent
- Bates, Miller, Trent
- Chesney
- Mitchell
- Clem
- Bodduluri
- Clark
- Clark
- Donninger
- Chaires
- Chaires, Trent
- Bates
- Lane, Fan
- Mitchell
- Clem
- Li, C.
- Tooley
- Jonsson
- Grimes
- Hein
- Hein
- States
- Eaton
- Beverly
- Lillard
- Learner
- Zundel
- Clark
- Ceresa
- Li, B.
- Trent, Chaires

Dataseam Grid Benefits to Research.

Increases research capacity up to 10-fold.

Makes research nationally competitive for Federal grants using a unique resource.

Generates data making Federal Grant Applications possible.

Attract and retain expert researchers.

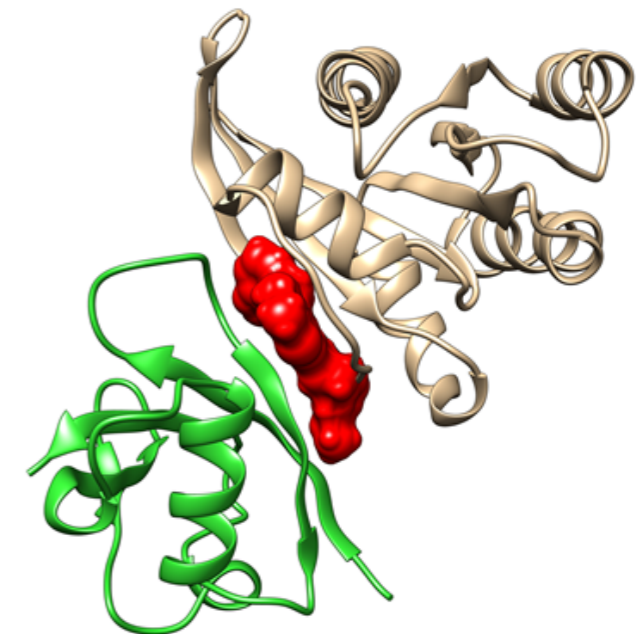
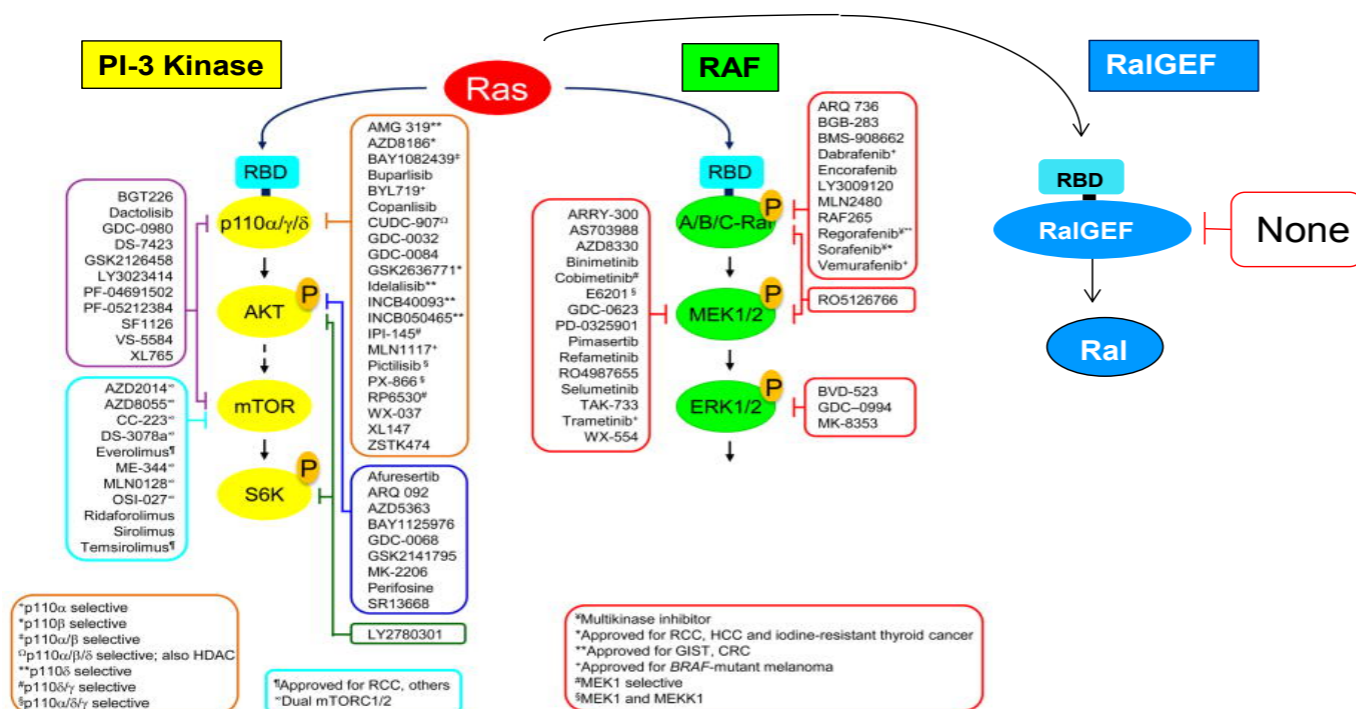
We can perform new research that we would not pursue without it.

Two targets 1) Phase I Clinical Trial 2014, 2) Phase I Clinical Trial 2018

Ras Pathway: Another Holy Grail.

G. Clark and J. Trent

Ras is one of the most important cancer genes
 Mutant Ras in Cancer: Lung 30%, Liver 30%, Pancreas 90%, colon 50%.



Targeting the Ras – Ral Pathway
 Selected 500 compounds, tested 48,
 2 inhibitors Ras:Ral protein-protein
 complex.

List of indirect RAS inhibitors tested in clinical trials.
 All prove disappointing so far.

Ras Pathway: Another Holy Grail.

G. Clark and J. Trent

History.

2007 - 2010: Drug Discovery: Brown Cancer Center NIH Molecular Targets
COBRE (2003-2018 \$26M)

2016 - 2018: Drug Development: UofL ExCITE NIH REACH: Research
Evaluation and Commercialization Hub: (\$6.1M)

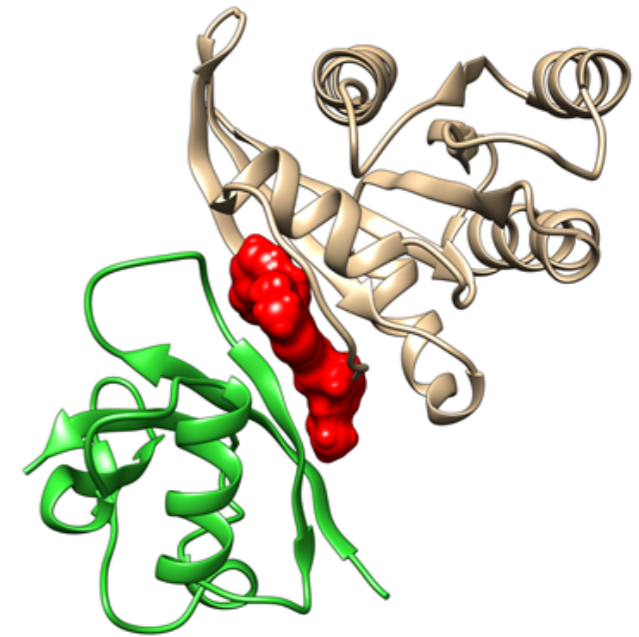
2018-2020 NIH R21 grant (\$423K)

2019-2023 KYNETIC Program: Kentucky Network for Innovation and
Commercialization 2019-2023 \$6.56M (\$3.96M NIH, \$1.8M KY state, \$400K
UK and UL)

2019 - 2020: Industry Sponsored Research Agreement for Lead Optimization
for Clinical Trials.

Pending

*Brown Cancer Center NIH CCII: Center for Cancer Immunology &
Immunotherapy COBRE Award (\$11.5M 2020-2025)*

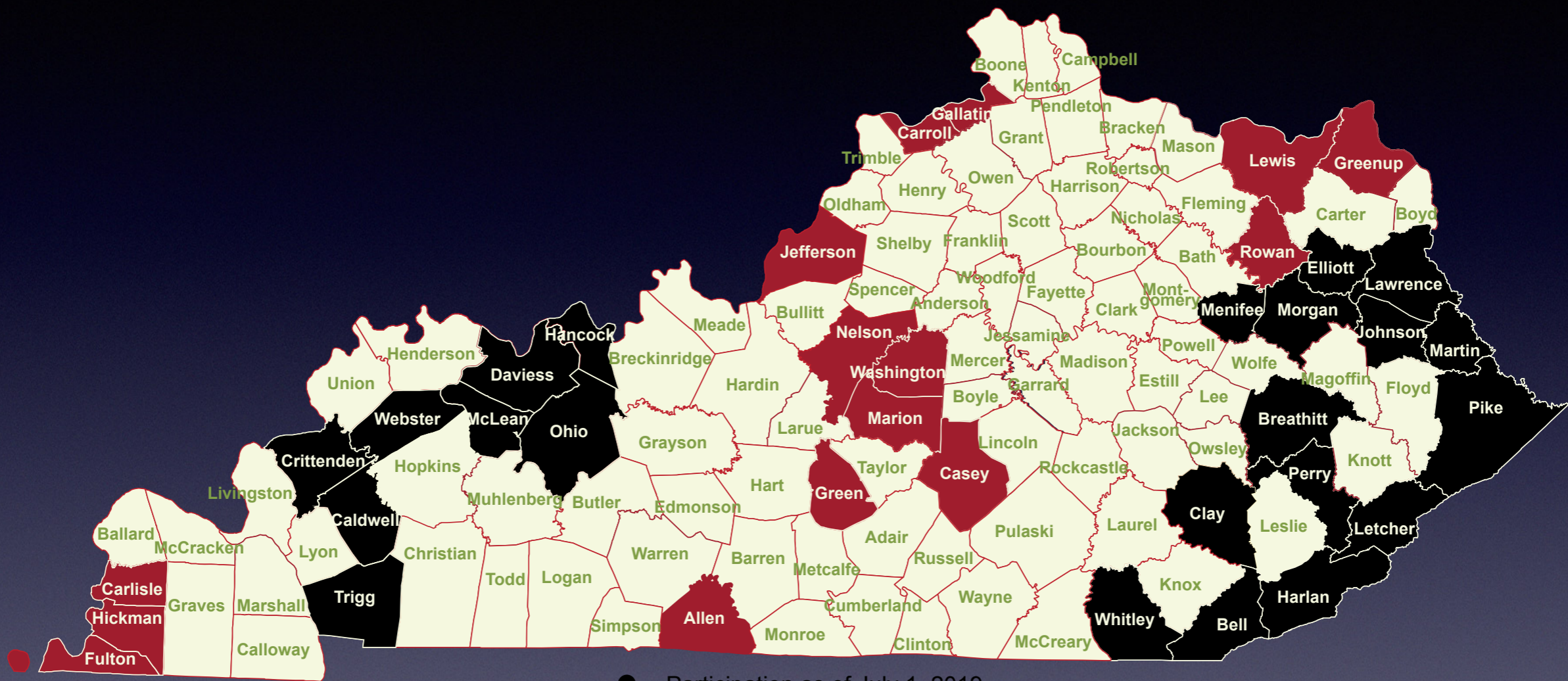


Progress (since Jan 1, 2010)

- **382 screens, 6,256,770,745 compounds screened against Protein and DNA targets**
- **Found inhibitors to over 50 protein and DNA targets.**
- **Filed 94 patent applications, 23 issued patents, 15 issued US patents (2010-2019).**
- **Licensed/optioned six compound family's IP to Biotech**
- **Second drug entered cancer clinical trials (May 2014);
PFK-158 targeting PFKFB3 (Trent/Chesney/ACT)**
- **Third drug/product Biotech Product in clinical development (2018-).**

Dataseam Partnership with Brown Cancer Center:

- **WIN for Cancer Research**
- **WIN for K-12 Students:**
- **WIN for Kentucky:**



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“Thank You!”

**Dataseam Partner Districts, University of Louisville, University of Louisville
Brown Cancer Center, Morehead State University, Morehead Space
Sciences, Dataseam Scholars and Educators.**

