Informatics Update: Progress Towards Precision Cancer Surveillance

Eric B. Durbin, DrPH, MS

Assistant Professor, Division of Biomedical Informatics, College of Medicine
Director, Cancer Research Informatics Shared Resource Facility, Markey Cancer Center
Director, Kentucky Cancer Registry
University of Kentucky

Thirty-second Annual Advanced Cancer Registrars Workshop
August 16, 2018

KENTUCKY
CANCER REGISTRY

Topics to be Covered

- Growing evidence supporting precision medicine in cancer
- Implications for cancer surveillance and public health
- KCR informatics initiatives that are enhancing precision medicine data capture in registries
- Using precision cancer surveillance data
- Future plans

KENTUCKY
CANCER REGISTRY

Growing Evidence Supporting Precision Medicine Initiatives

Dictionary

precision medicine

pre·ci·sion med·i·cine

noun

medical care designed to optimize efficiency or therapeutic benefit for particular groups of patients, especially by using genetic or molecular profiling.
"current research is focused around precision medicine—classifying patients on their tumor's molecular changes"

Translations, word origin, and more definitions

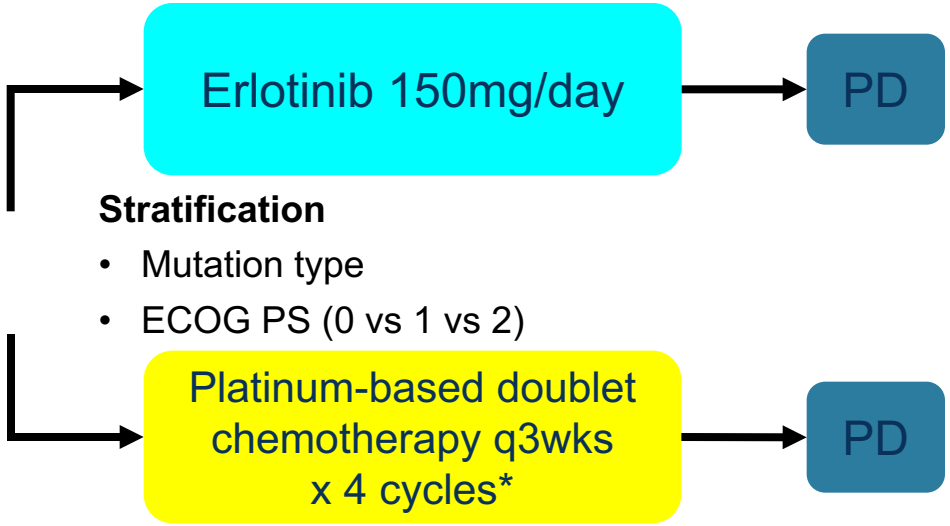
Feedback

KENTUCKY CANCER REGISTRY

EURTAC Study Design

- Chemonaïve
- Stage IIIB/IV NSCLC
- *EGFR* exon 19 deletion or exon 21 L858R mutation
- ECOG PS 0–2

(n=174)



Primary endpoint

- Progression-free survival (PFS)
  - interim analysis planned at 88 events
- Patients enrolled between 2007 and 2011

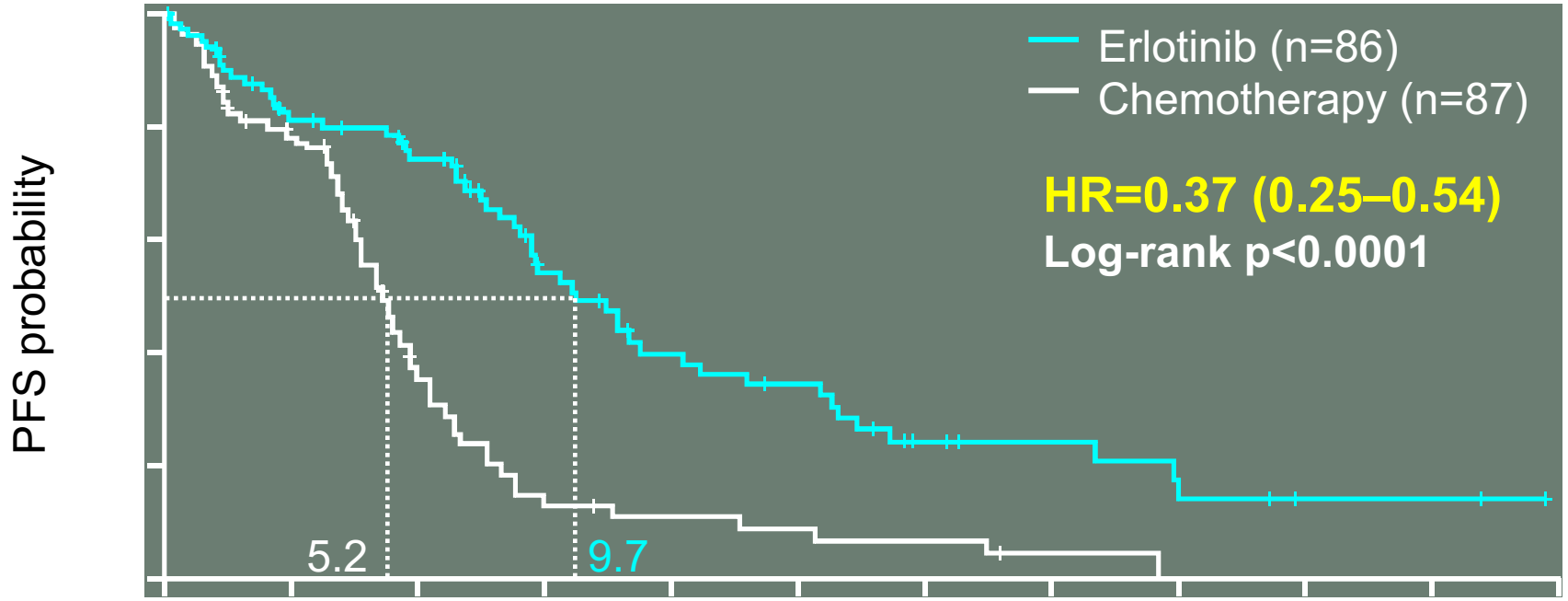
Secondary endpoints

- Objective response rate
- Overall survival (OS)
- Location of progression
- Safety
- *EGFR* mutation analysis in serum
- Quality of life

Slide courtesy of Dr. Jill Kolesar

KENTUCKY CANCER REGISTRY

EUROTAC: First-line Treatment in EGFR Mutation Positive NSCLC



Patients at risk

Erlotinib	86	63	54	32	21	17	9	7	4	2	2	0
Chemo	87	49	20	8	5	4	3	1	0	0	0	0

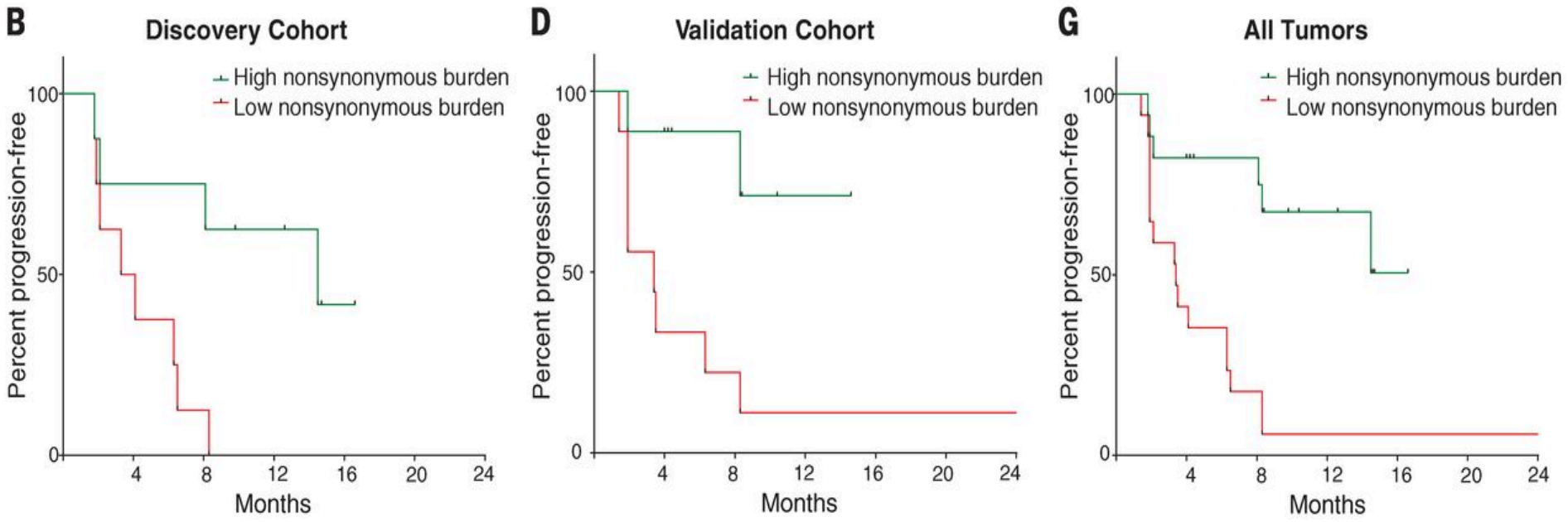
Slide courtesy of Dr. Jill Kolesar

Rosell R, et al. Proc ASOC 2011, #7503

KENTUCKY CANCER REGISTRY

Immuno-therapy with PD-1 Targeted Pembrolizumab

Nonsynonymous mutation burden associated with clinical benefit of anti–PD-1 therapy in non-small cell lung cancer.

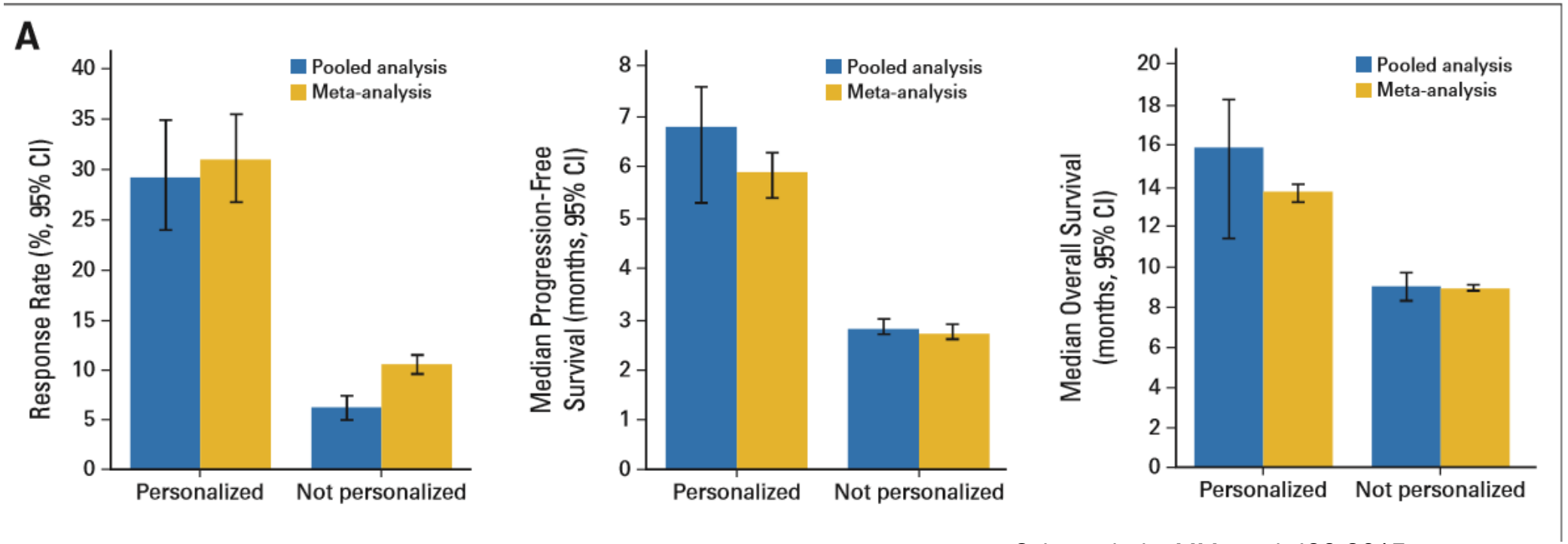


Naiyer A. Rizvi et al. Science 2015;348:124-128

Science AAAS

Study Conclusions: More Mutations Predict Better Efficacy

Pooled Analysis of 570 Phase II Trials of Single Agent Targeted Therapies



Schwaederle, MM, et al. JCO 2015

Slide courtesy of Dr. Jill Kolesar

KENTUCKY CANCER REGISTRY

The Precision Medicine Paradigm Shift

Implications for Cancer Surveillance and Public Health

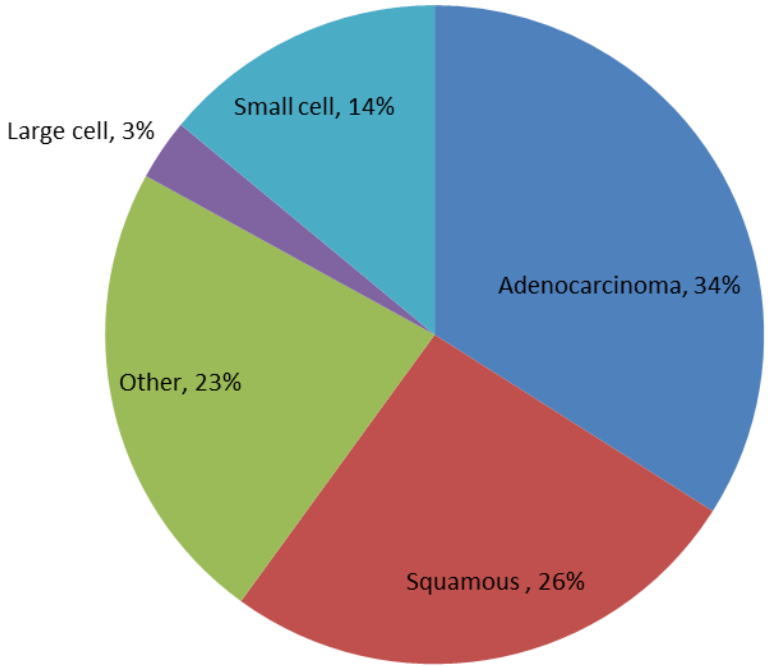
KENTUCKY
CANCER REGISTRY

Shifting Paradigm in Lung Cancer Treatment

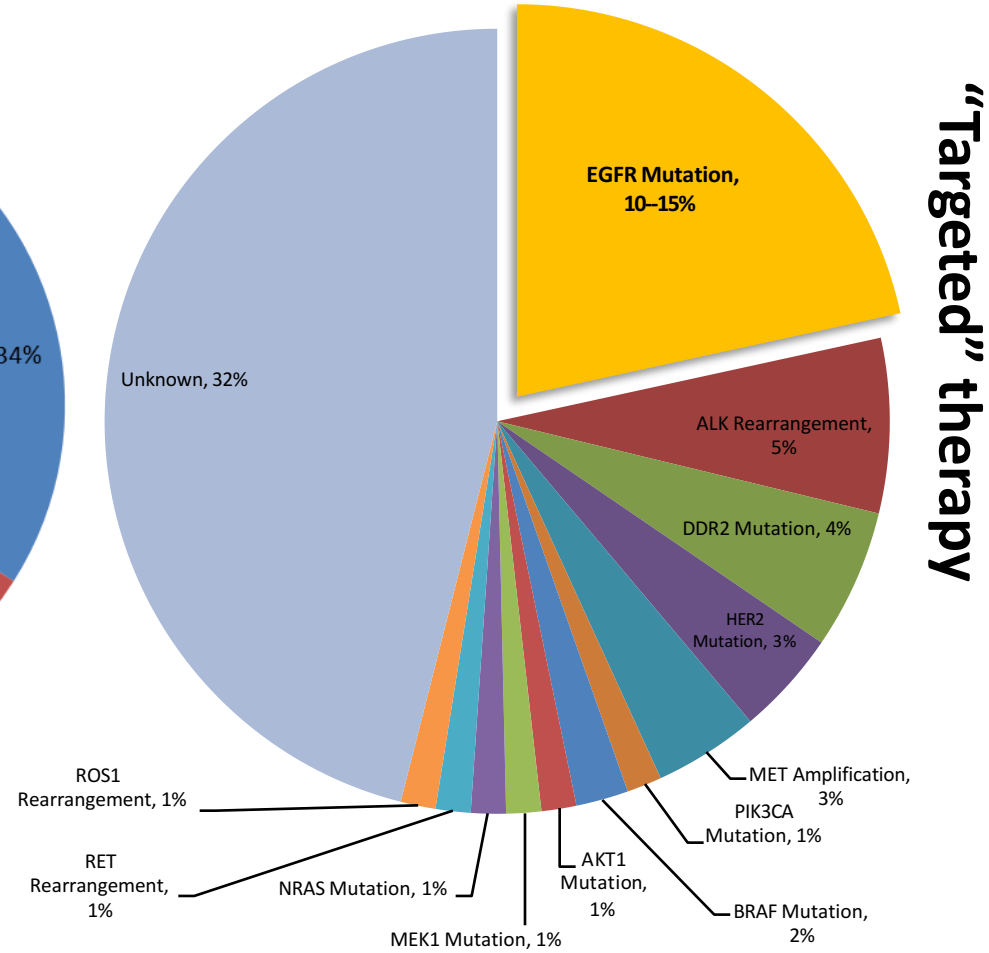
Old Way -> **Traditional:** Based on histology

Molecular: Based on genomic profile <- New Way

Chemotherapy



"Targeted" therapy



Role of Precision Cancer Surveillance

1. Capture data that accurately measures the implementation and use of precision medicine in clinical settings
2. Evaluate the adoption of precision medicine and impact on the population
3. Leverage population-based data to ensure maximum benefit to the entire population through evidence-based cancer prevention and control
4. Leverage population-based data to accelerate further advances in precision medicine
   a) Basic research
   b) Clinical research
   c) Population research

} Translational Science

KENTUCKY CANCER REGISTRY

From Precision Medicine to Precision Cancer Surveillance

pre · ci · sion sur · veil · lance

Cancer surveillance designed to optimize efficiency in medical care or predict therapeutic benefit for particular groups of patients, especially by using genetic or molecular profiling across entire populations of patients

“Current KCR research is focused around precision surveillance – how to develop informatics methods to deliver efficiencies in registry operations in order to capture additional information so that we may classify all cancer patients by their tumor’s molecular changes”

KENTUCKY
CANCER REGISTRY

Capturing the Data (The Very Big Data)

Implications for Hospital Cancer Registries

KENTUCKY
CANCER REGISTRY

It All Begins with E-Path…

onPath

SURGICAL PATHOLOGY REPORT
INTERNAL MEDICINE SPECIALISTS, INC.
1234 Holgrook Avenue, Teniwee, Georgia 25487
Phone 555.265.5547 fax 555.265.9898

PATIENT: John Q. Browne — IM-09-192
DOB: 02/09/1955 — Date Of Service:11/11/2009
SEX: Male
CHART ID: 124887

PHYSICIAN: Sensosia W. Pintela
LOCATION: Westside Surgical Center
SPECIMEN: 1. TRANSVERSE COLON POLYP X2
2. DESCENDING COLON POLYP
3. SIGMOID COLON POLYP X2
PROCEDURE:
PREOP DX:
POSTOP DX:
HISTORY: HX OF POLYPS

SAMPLE

DIAGNOSIS

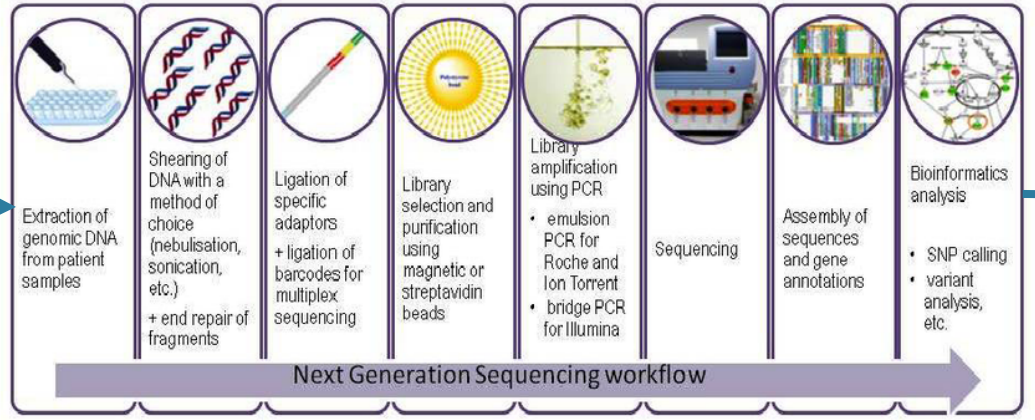
1. TRANSVERSE COLON POLYP X2: HYPERPLASTIC POLYP.

2. DESCENDING COLON POLYP: FRAGMENTS OF TUBULAR ADENOMA.

3. SIGMOID COLON POLYP X2: HYPERPLASTIC POLYP.

GROSS DESCRIP

CPT Detail: 88



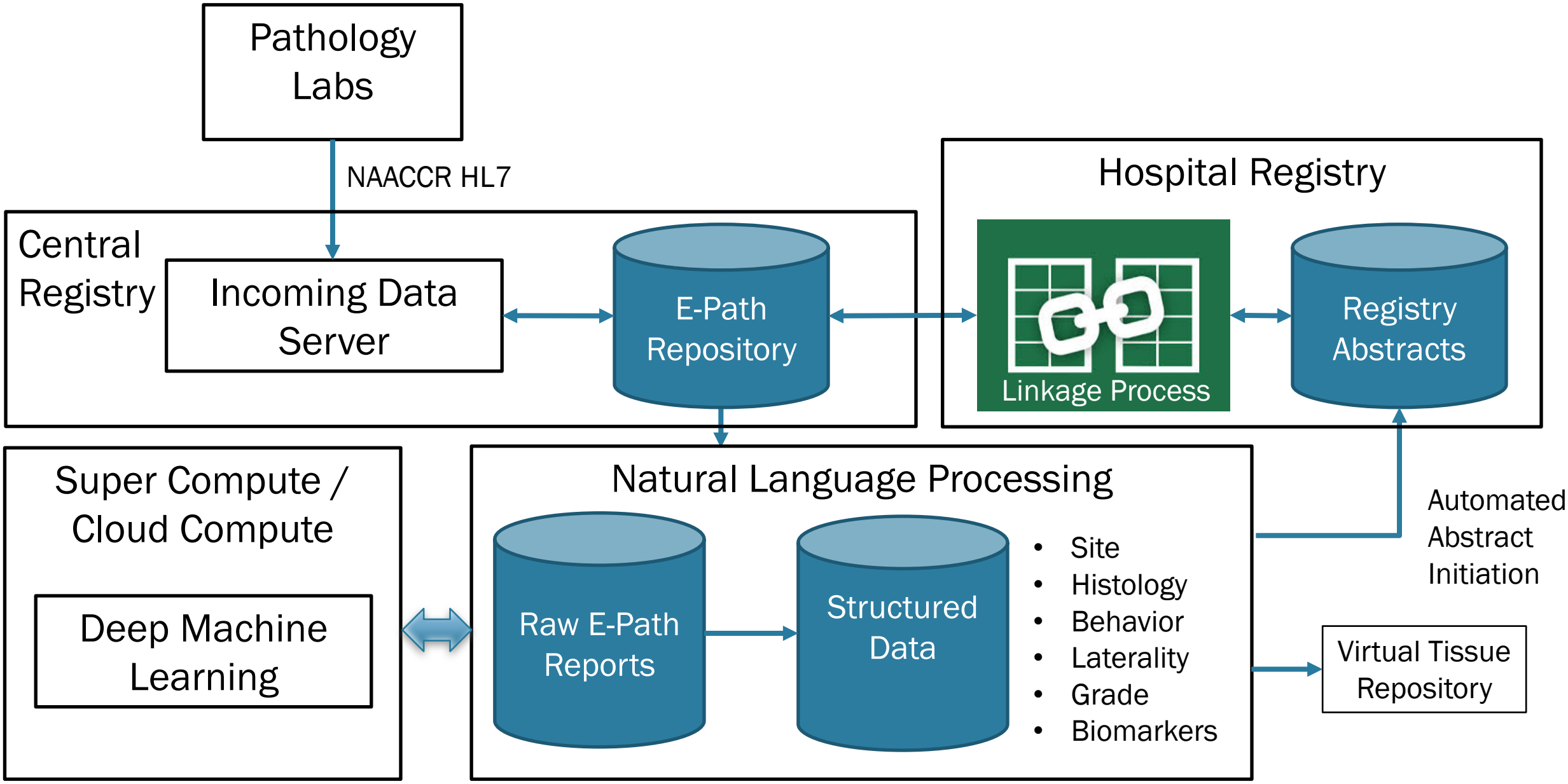
1

Tumor Molecular Report

Alteration	Function	Oncogenic?
BRCA2 Q1782* (4.4%)	Tumor suppressor involved in the DNA damage response	Not previously reported, but frameshift at 1784 and 1738 are likely oncogenic and loss of function
BRAF D594N (2.2%)	Intracellular kinase	Hot spot, Likely oncogenic, gain of function
TP53 R337L (10.7%)	Tumor suppressor in the DNA damage pathway	Hot spot, likely oncogenic, loss of function

[1]Next generation sequencing applications for breast cancer research - Scientific Figure on ResearchGate. Available from: https://www.researchgate.net/Overview-of-the-main-steps-in-Next-Generation-Sequencing-workflow_fig1_282061980 [accessed 13 Aug, 2018]

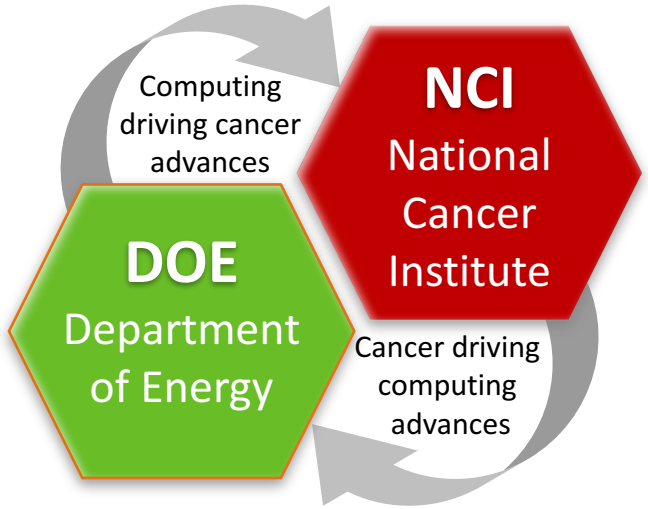
Electronic Pathology Data Flow at KCR



KCR Collaborating with National Cancer Institute and Department of Energy (DOE) on Major NLP Initiative

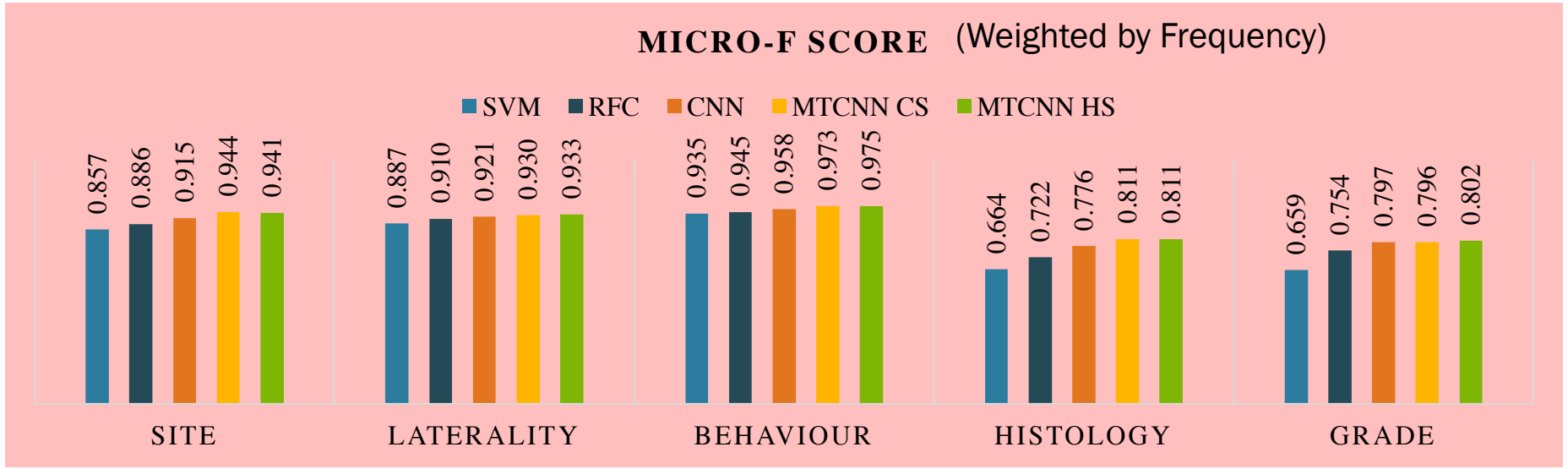
- KCR one of only four SEER registries chosen to participate
- Moonshot Initiative
  - Exascale CAncer Distributed Learning Environment (CANDLE)
- Pilot 3: Population Information Integration, Analysis, and Modeling
- Specific Aim: Deep NLP for Information Capture
  - Advanced machine learning for scalable patient information capture from unstructured clinical reports to semi-automate SEER data capture

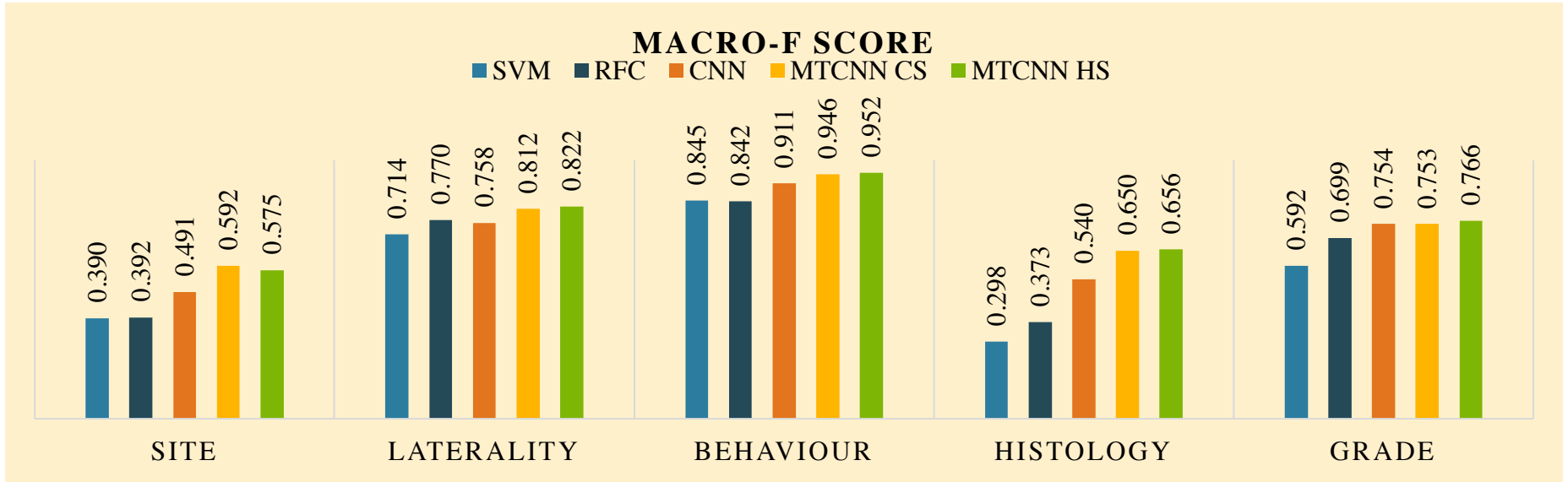
DOE-NCI partnership to advance exascale development through cancer research



Tumor-Level Analysis: 2-fold cross-validation 2004-2015 data (59,427 cases)

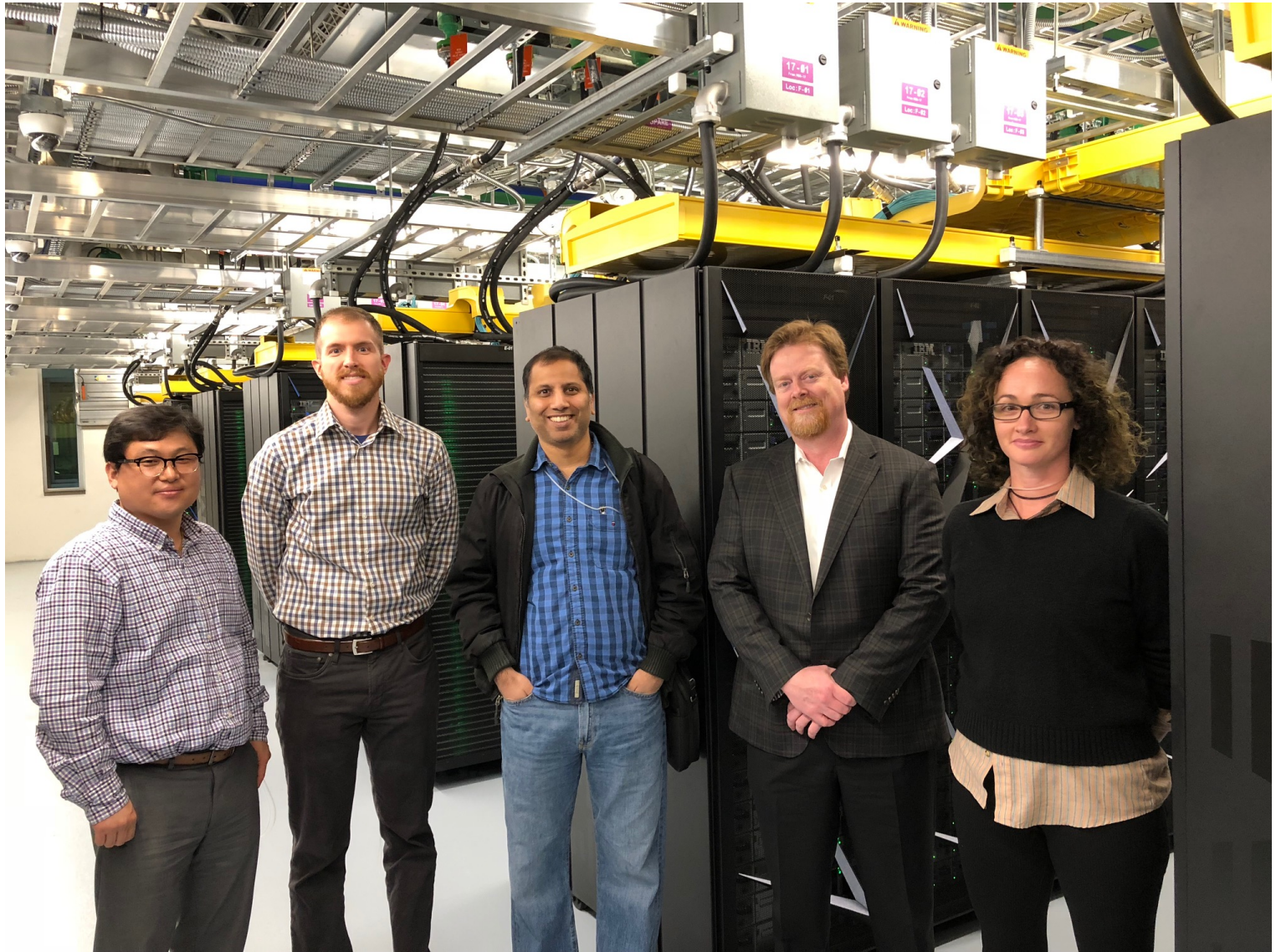
Pilot 3





F Scores
>= .90 Good
>= .95 Very Good

KCR/Markey Team at the Oakridge National Lab SUMMIT: Most Powerful Supercomputer on Earth



KENTUCKY
CANCER REGISTRY

Capturing Biomarkers

Natural Language Processing for Electronic Pathology Reports

KENTUCKY
CANCER REGISTRY

Capturing Molecular Biomarkers the Old-fashioned Way: Manual Abstraction of Site Specific Factors

- Brain and CNS
  - Brain molecular markers
  - Brain & CNS chromosome 1p and 19q
  - MGMT
- Breast
  - Ki-67
  - Oncotype DX
- Colon and Rectum
  - KRAS
  - Microsatellite Instability (MSI)
- Uveal Melanoma
  - Chromosome 3 and 8q status
- Oropharynx
  - HPV Status

KENTUCKY CANCER REGISTRY

NLP to Enhance Automated Capture of Biomarkers

- NCCN Guidelines for EGFR and ALK Testing in Lung Cancer
  - EGFR
    - Epidermal growth factor receptor (EGFR) mutations cause new cancer cells to form quickly
    - **Testing advised** for metastatic lung adenocarcinomas, large-cell lung carcinomas and unknown subtypes
  - ALK
    - Anaplastic lymphoma kinase (ALK) gene re-arrangements makes an overactive ALK surface receptor that helps lung cancer cells grow
    - **Testing advised** for metastatic lung adenocarcinomas, large-cell lung carcinomas and unknown subtypes

KENTUCKY
CANCER REGISTRY

KCR Collaboration with the SEER Seattle Puget-Sound Registry and the Fred Hutchinson Cancer Research Center

- Hypothesis
  - NLP can be used to derive ALK and EGFR testing results from non-small cell lung cancer E-Path reports
- Study Methods
  - Each team selected 1000 random E-Path reports from their respective registry
    - Seattle ended up selecting over 3500 reports
  - Lung cancer oncologists reviewed all E-Path reports to identify reports indicating ALK and EGFR testing and reporting of testing results
  - Each team developed a machine-learned NLP model to derive tests and test results from E-Path reports
  - Model tested on other team's cohort of E-Path reports

KENTUCKY
CANCER REGISTRY

Study Results

- Seattle and Kentucky achieved excellent results identifying EGFR and ALK testing was ordered
  - F-Scores 96.0 – 98.0
- Seattle performed better identifying positive test results
  - Seattle ALK/EGFR Positive Results F-Scores 97.0
  - Kentucky EGFR Positive Results F-Score 60.0
- Models did not perform well on the other site's E-Path reports
  - Seattle on KY Data: ALK/EGFR F-Scores 36.0, 4.0, respectively
  - Kentucky on Seattle Data: results pending
- Conclusions
  - Testing results not routinely reported
  - Pathology reporting terminology for biomarkers differs by region
  - Models perform better when trained on region specific data
  - More research needed

KENTUCKY
CANCER REGISTRY

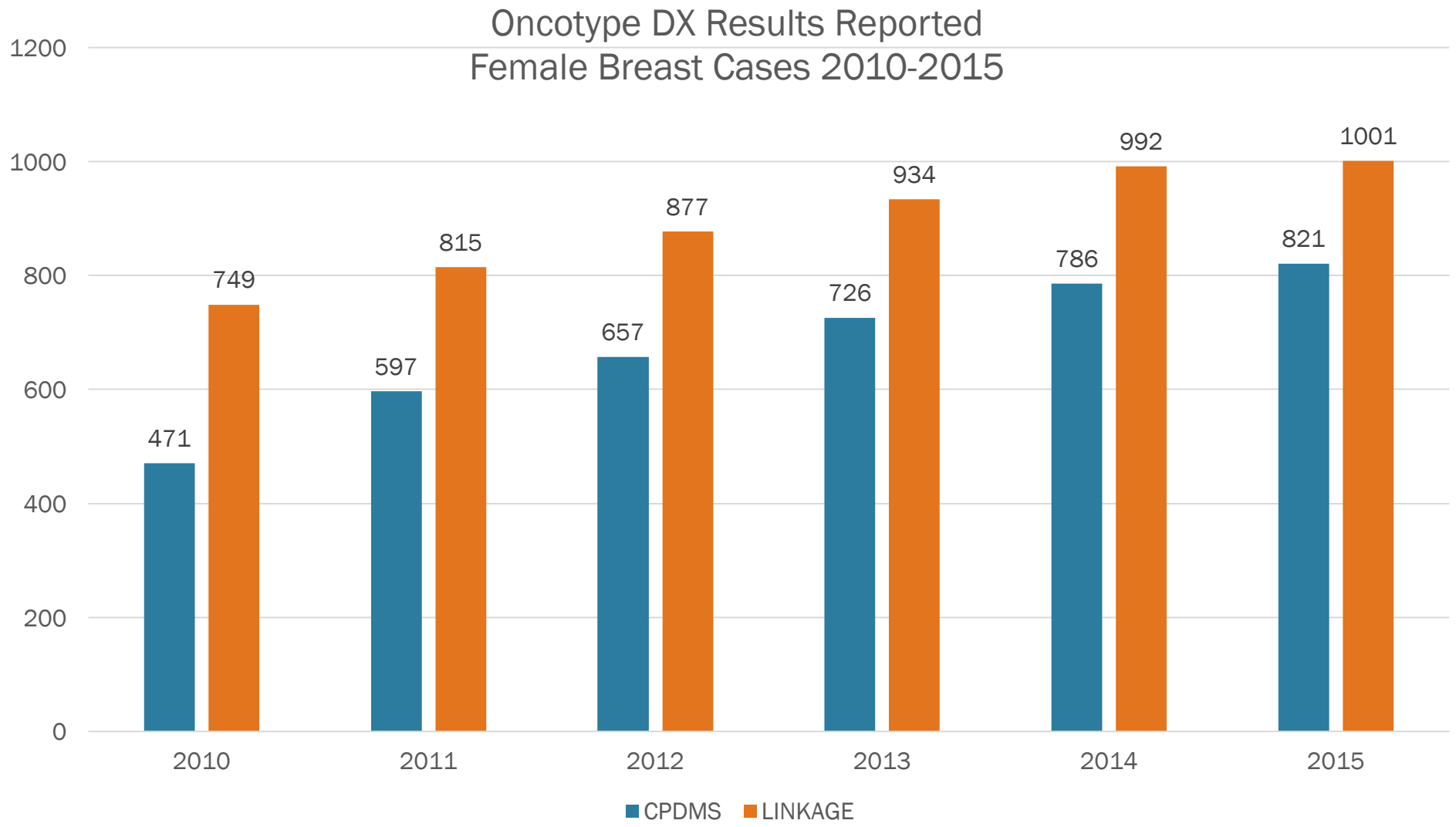
Capturing Molecular Biomarkers at Scale

Oncotype DX Linkages

NGS Multi-gene Panel Reporting

KENTUCKY
CANCER REGISTRY

Results of Oncotype DX Linkage
32% Increase in Completeness



Capturing Next Generation Sequencing (NGS) Multi-Gene Panel Biomarkers

- Clinical use of multi-gene panel sequencing of tumors is increasing rapidly
  - Molecular Tumor Boards
- Common service providers
  - Foundation Medicine
  - Caris Life Sciences
  - Guardant Health
  - OncoDNA
  - Tempus
  - Oncology Research Information Exchange Network (ORIEN) [Research]
  - Academic Clinical Labs
- Reports include mutations (both significant and of unknown significance)
  - Several providers are also willing to share raw data files (BAM)

KENTUCKY
CANCER REGISTRY

Foundation Medicine

- FoundationOne CDx
  - Next generation sequencing based in vitro diagnostic device for detection of substitutions, insertion and deletion alternations (indels), and copy number alterations (CNAs) in 324 genes
  - Select gene rearrangements
  - Genomic signatures
    - Microsatellite instability (MSi)
    - Tumor mutation burden (TMB)
- Uses DNA isolation from formalin-fixed paraffin embedded (FFPE) tumor tissue specimens
- FDA approved on November 30, 2017
- CMS coverage simultaneously proposed
  - Medicare beneficiaries with recurrent, metastatic or advanced state IV cancer, not previously NGS tested

KENTUCKY
CANCER REGISTRY

FoundationOne CDx

Table 1: Companion diagnostic indications

INDICATIONS	BIOMARKER	FDA-APPROVED THERAPY*
Non-Small Cell Lung Cancer (NSCLC)	*EGFR* exon 19 deletions and *EGFR* exon 21 L858R alterations	Gilotrif® (afatinib), Iressa® (gefitinib), or Tarceva® (erlotinib)
	EGFR exon 20 T790M alterations	Tagrisso® (osimertinib)
	ALK rearrangements	Alecensa® (alectinib), Xalkori® (crizotinib), or Zykadia® (ceritinib)
	BRAF V600E	Tafinlar® (dabrafenib) in combination with Mekinist® (trametinib)
Melanoma	*BRAF* V600E	Tafinlar® (dabrafenib) or Zelboraf® (vemurafenib)
	BRAF V600E or V600K	Mekinist® (trametinib) or Cotellic® (cobimetinib), in combination with Zelboraf® (vemurafenib)
Breast Cancer	*ERBB2* (HER2) amplification	Herceptin® (trastuzumab), Kadcyla® (ado-trastuzumab-emtansine), or Perjeta® (pertuzumab)
Colorectal Cancer	*KRAS* wild-type (absence of mutations in codons 12 and 13)	Erbitux® (cetuximab)
	KRAS wild-type (absence of mutations in exons 2, 3 and 4) and *NRAS* wild-type (absence of mutations in exons 2, 3 and 4)	Vectibix® (panitumumab)
Ovarian Cancer	*BRCA1/2* alterations	Rubraca® (rucaparib)

* Tarceva® is the registered trademark of OSI Pharmaceuticals, LLC. Zelboraf®, Herceptin®, Perjeta®, Kadcyla®, and Cotellic® are registered trademarks of Genentech, Inc. Gilotrif® is a registered trademark of Boehringer Ingelheim International GmbH. Iressa® and Tagrisso® are registered trademarks of the AstraZeneca group of companies. Xalkori® is a registered trademark of Pfizer Inc. Zykadia®, Tafinlar®, and Mekinist® are registered trademarks of Novartis AG Corporation Switzerland. Erbitux® is a registered trademark of ImClone LLC, a wholly owned subsidiary of Eli Lilly and Company. Alecensa® is a registered trademark of Chugai Seiyaku Kabushiki Kaisha. Vectibix® is a registered trademark of Immunex Corporation. Rubraca® is a registered trademark of Clovis Oncology, Inc.

KENTUCKY CANCER REGISTRY

Current Gene List[2]

Genes with full coding exonic regons included in FoundationOne CDx for the detection of substitutions, insertion-deletions (indels), and copy-number alterations (CNAs).

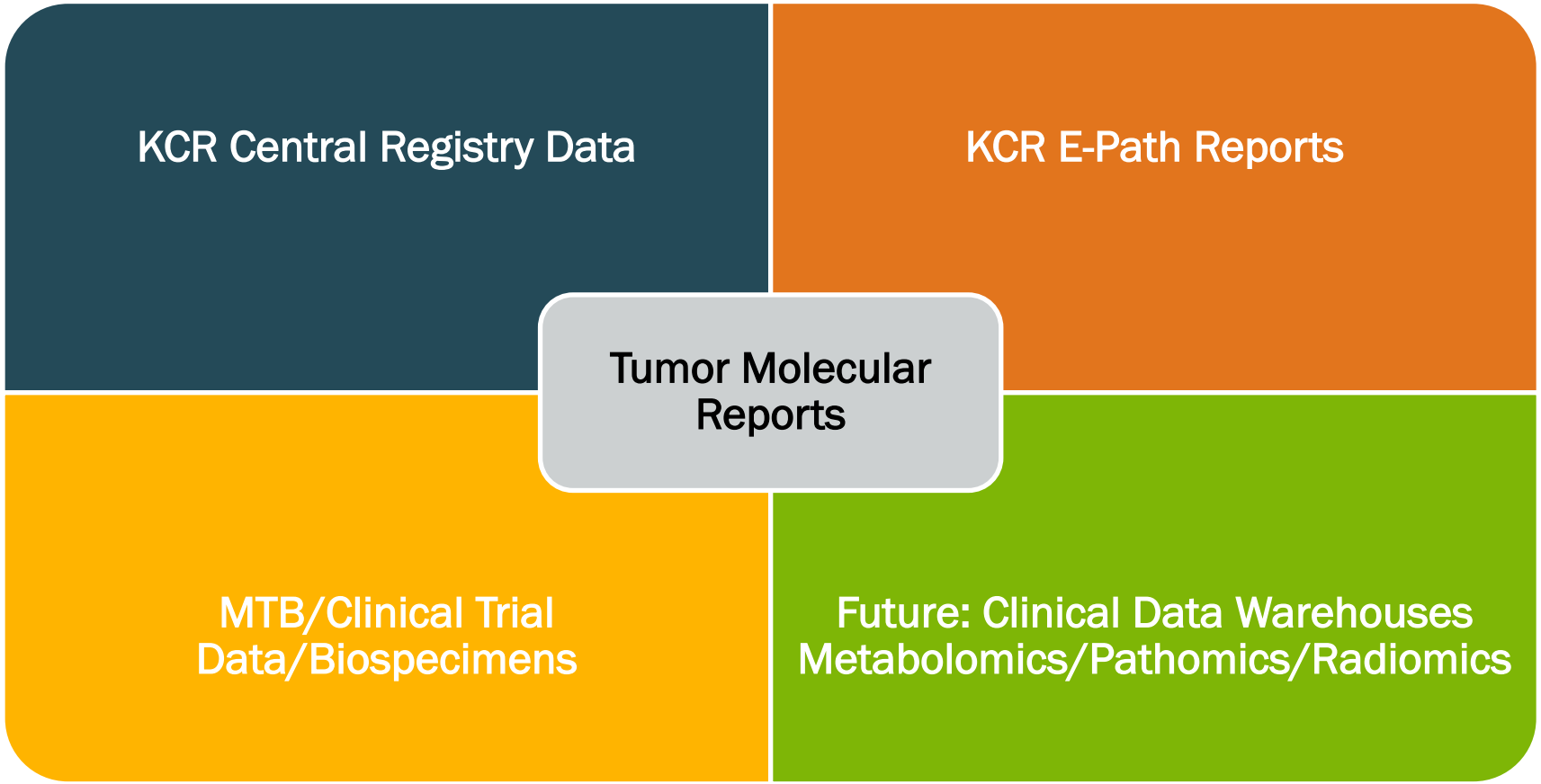
ABL1	*ACVR1B*	*AKT1*	*AKT2*	*AKT3*	*ALK*	*ALOX12B*	*AMER1 (FAM123B)*	*APC*
AR	*ARAF*	*ARFRP1*	*ARID1A*	*ASXL1*	*ATM*	*ATR*	*ATRX*	*AURKA*
AURKB	*AXIN1*	*AXL*	*BAP1*	*BARD1*	*BCL2*	*BCL2L1*	*BCL2L2*	*BCL6*
BCOR	*BCORL1*	*BRAF*	*BRCA1*	*BRCA2*	*BRD4*	*BRIP1*	*BTG1*	*BTG2*
BTK	*C11orf30 (EMSY)*	*CALR*	*CARD11*	*CASP8*	*CBFB*	*CBL*	*CCND1*	*CCND2*
CCND3	*CCNE1*	*CD22*	*CD274 (PD-L1)*	*CD70*	*CD79A*	*CD79B*	*CDC73*	*CDH1*
CDK12	*CDK4*	*CDK6*	*CDK8*	*CDKN1A*	*CDKN1B*	*CDKN2A*	*CDKN2B*	*CDKN2C*
CEBPA	*CHEK1*	*CHEK2*	*CIC*	*CREBBP*	*CRKL*	*CSF1R*	*CSF3R*	*CTCF*
CTNNA1	*CTNNB1*	*CUL3*	*CUL4A*	*CXCR4*	*CYP17A1*	*DAXX*	*DDR1*	*DDR2*
DIS3	*DNMT3A*	*DOT1L*	*EED*	*EGFR*	*EP300*	*EPHA3*	*EPHB1*	*EPHB4*
ERBB2	*ERBB3*	*ERBB4*	*ERCC4*	*ERG*	*ERRFI1*	*ESR1*	*EZH2*	*FAM46C*

Poll: Who is interested in reviewing molecular reports and coding the mutations manually?

JUN	*KDM5A*	*KDM5C*	*KDM6A*	*KDR*	*KEAP1*	*KEL*	*KIT*	*KLHL6*
KMT2A (MLL)	*KMT2D (MLL2)*	*KRAS*	*LTK*	*LYN*	*MAF*	*MAP2K1 (MEK1)*	*MAP2K2 (MEK2)*	*MAP2K4*
MAP3K1	*MAP3K13*	*MAPK1*	*MCL1*	*MDM2*	*MDM4*	*MED12*	*MEF2B*	*MEN1*
MERTK	*MET*	*MITF*	*MKNK1*	*MLH1*	*MPL*	*MRE11A*	*MSH2*	*MSH3*
MSH6	*MST1R*	*MTAP*	*MTOR*	*MUTYH*	*MYC*	*MYCL (MYCL1)*	*MYCN*	*MYD88*
NBN	*NF1*	*NF2*	*NFE2L2*	*NFKBIA*	*NKX2-1*	*NOTCH1*	*NOTCH2*	*NOTCH3*
NPM1	*NRAS*	*NT5C2*	*NTRK1*	*NTRK2*	*NTRK3*	*P2RY8*	*PALB2*	*PARK2*
PARP1	*PARP2*	*PARP3*	*PAX5*	*PBRM1*	*PDCD1 (PD-1)*	*PDCD1LG2 (PD-L2)*		*PDGFRA*
PDGFRB	*PDK1*	*PIK3C2B*	*PIK3C2G*	*PIK3CA*	*PIK3CB*	*PIK3R1*	*PIM1*	*PMS2*
POLD1	*POLE*	*PPARG*	*PPP2R1A*	*PPP2R2A*	*PRDM1*	*PRKAR1A*	*PRKCI*	*PTCH1*
PTEN	*PTPN11*	*PTPRO*	*QKI*	*RAC1*	*RAD21*	*RAD51*	*RAD51B*	*RAD51C*
RAD51D	*RAD52*	*RAD54L*	*RAF1*	*RARA*	*RB1*	*RBM10*	*REL*	*RET*
RICTOR	*RNF43*	*ROS1*	*RPTOR*	*SDHA*	*SDHB*	*SDHC*	*SDHD*	*SETD2*
SF3B1	*SGK1*	*SMAD2*	*SMAD4*	*SMARCA4*	*SMARCB1*	*SMO*	*SNCAIP*	*SOCS1*
SOX2	*SOX9*	*SPEN*	*SPOP*	*SRC*	*STAG2*	*STAT3*	*STK11*	*SUFU*
SYK	*TBX3*	*TEK*	*TET2*	*TGFBR2*	*TIPARP*	*TNFAIP3*	*TNFRSF14*	*TP53*
TSC1	*TSC2*	*TYRO3*	*U2AF1*	*VEGFA*	*VHL*	*WHSC1 (MMSET)*	*WHSC1L1*	*WT1*
XPO1	*XRCC2*	*ZNF217*	*ZNF703*					

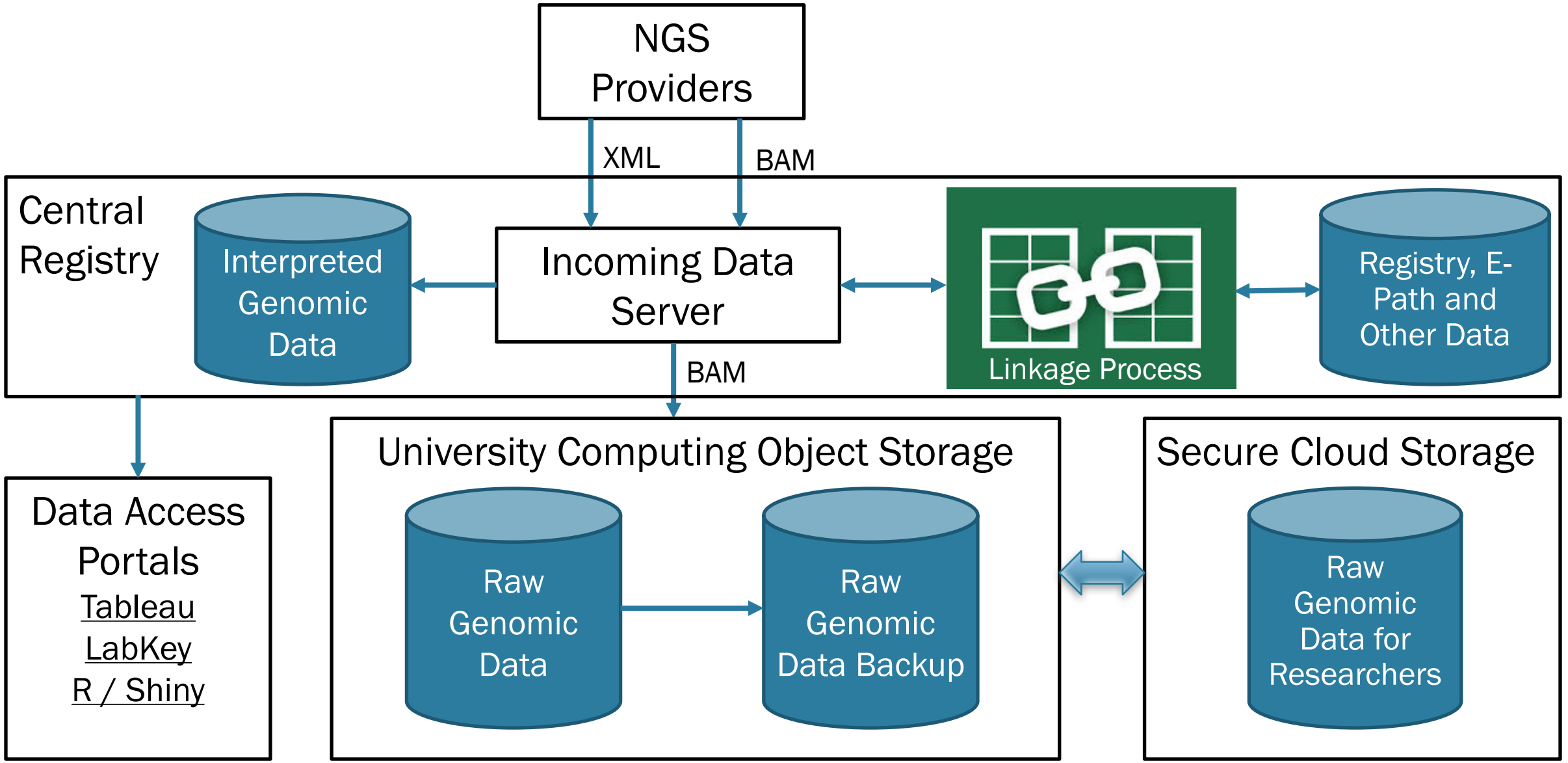
KENTUCKY CANCER REGISTRY

Integration of Molecular, Registry, Pathology, MTB, Clinical Trial, Biorepository, Other Data



Integrated data to support Molecular Tumor Boards, Population Health and Research in Precision Medicine

Genomic Data Flow into the Central Registry



Additional Data Needed from Hospital Registrars

- Contextual information about specimen sent for testing
  - Primary site?
  - Recurrence?
  - Metastatic lesion?
- Timing/State of Disease
  - At time of diagnosis?
  - Before or after chemotherapy?
  - Following recurrence?
    - How long after remission?
- Additional treatment details
  - Specific targeted therapy
    - Selected from dropdown (searchable)
- Treatment response to targeted therapy

KENTUCKY
CANCER REGISTRY

Population Health and Research

Using population-based molecular report data

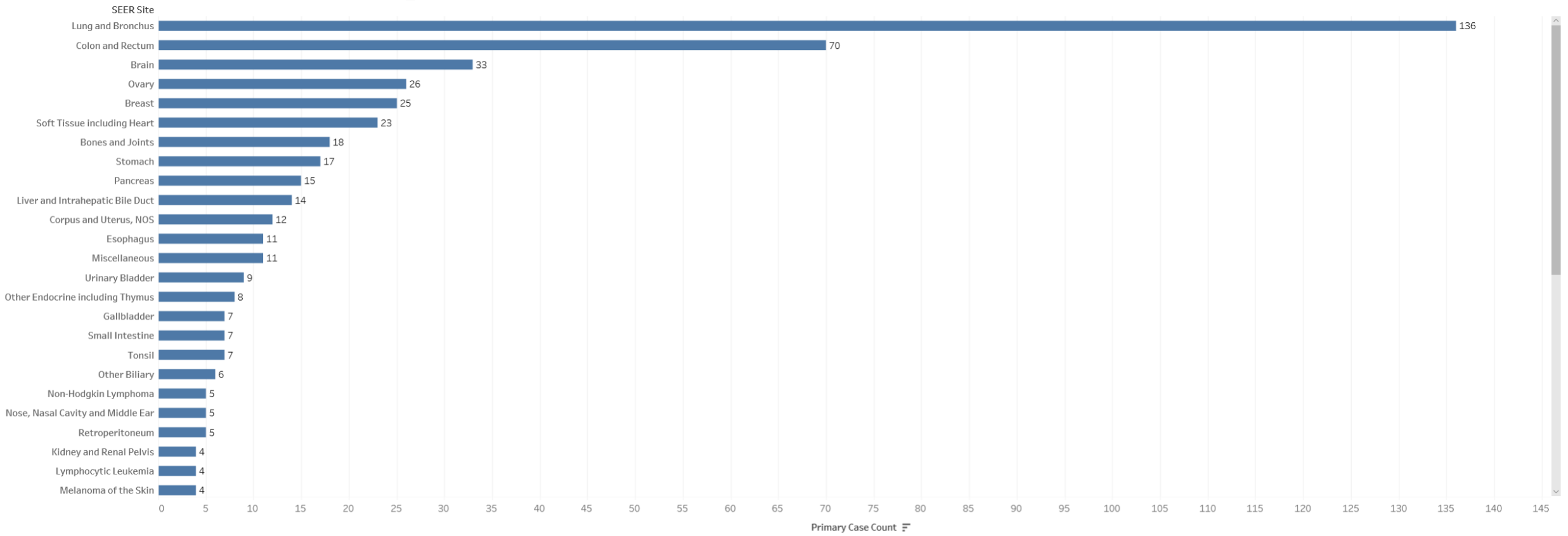
KENTUCKY
CANCER REGISTRY

UK HealthCare Markey Cancer Center — Cancer Research Informatics Shared Resource Facility (CRI) — NCI·CC A Cancer Center Designated by the National Cancer Institute

Total Primary Case Count: 518

Cancer Cases with Molecular Reports by SEER Site

Updated: 5/18/2018 8:26:10 AM



Gene Interpretation
- (All)
- Interpreted
- Not Interpreted

SEER Site
- (All)
- Anus, Anal Canal and Anorectum
- Bones and Joints
- Brain
- Breast
- Cervix Uteri
- Colon and Rectum
- Corpus and Uterus, NOS
- Cranial Nerves Other Nervous System
- Esophagus
- Eye and Orbit

Histology
- (All)
- ACINAR CELL CARCINOMA
- ACUTE MYELOMONOCYTIC LEUKEMIA
- ADENDOCAR W/MXD SUBTYPES
- ADENO/ADENOMAT.POLYPOSIS COLI
- ADENOCAR.IN VILLOUS ADENOMA
- ADENOCAR.W/NEROENDOCR DIFFERNT
- ADENOCAR/ADENOMATOUS POLYP
- ADENOCAR/TUBULOVILLOUS ADENOMA
- ADENOCARCINOMA, INTESTINAL TYP
- ADENOCARCINOMA, NOS

Behavior
- (All)
- Benign
- Borderline
- Malignant

Stage at Diagnosis
- (All)
- Stage I
- Stage II
- Stage III
- Stage IV
- Stage Unknown

Age at Diagnosis
1 — 92

Diagnosis Year
1991 — 2017

Vital Status
- (All)
- Alive
- Dead

Gender
- (All)
- Female
- Male

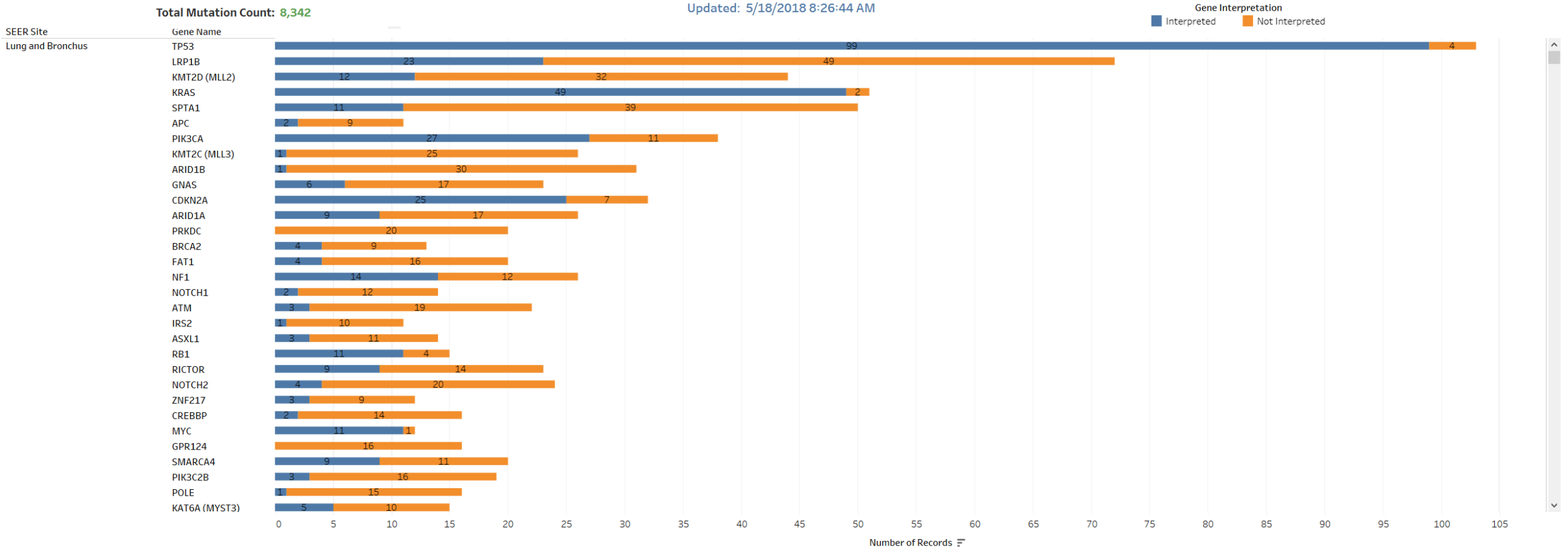
KY Appalachia
- (All)
- Appalachia
- non-Appalachia
- Outside KY

UK HealthCare Markey Cancer Center — Cancer Research Informatics Shared Resource Facility (CRI) — NCI·CC A Cancer Center Designated by the National Cancer Institute

Cancer Cases with Molecular Reports by SEER Site and Gene Mutation Counts

Updated: 5/18/2018 8:26:44 AM

Total Mutation Count: 8,342



Gene Name
- (All)
- ABL1
- ABL2
- ACTB
- ACVR1B
- AKT1
- AKT2
- AKT3
- ALK
- AMER1 (FAM123B)
- APC

Gene Interpretation
- (All)
- Interpreted
- Not Interpreted

SEER Site
- (All)
- Anus, Anal Canal and Anorectum
- Bones and Joints
- Brain
- Breast
- Cervix Uteri
- Colon and Rectum
- Corpus and Uterus, NOS
- Cranial Nerves Other Nervous System
- Esophagus
- Eye and Orbit

Histology
- (All)
- ACINAR CELL CARCINOMA
- ACUTE MYELOMONOCYTIC LEUKEMIA
- ADENDOCAR W/MXD SUBTYPES
- ADENO/ADENOMAT.POLYPOSIS COLI
- ADENOCAR.IN VILLOUS ADENOMA
- ADENOCAR.W/NEROENDOCR DIFFERNT
- ADENOCAR/ADENOMATOUS POLYP
- ADENOCAR/TUBULOVILLOUS ADENOMA
- ADENOCARCINOMA, INTESTINAL TYP
- ADENOCARCINOMA, NOS

Behavior
- (All)
- Benign
- Borderline
- Malignant

Best Stage Grouping
- (All)
- Stage I
- Stage II
- Stage III
- Stage IV
- Stage Unknown

Age at Diagnosis
0 — 92

Diagnosis Year
1991 — 2017

Vital Status
- (All)
- Alive
- Dead

Gender
- (All)
- Female
- Male

KY Appalachia
- (All)
- Appalachia
- non-Appalachia
- Outside KY

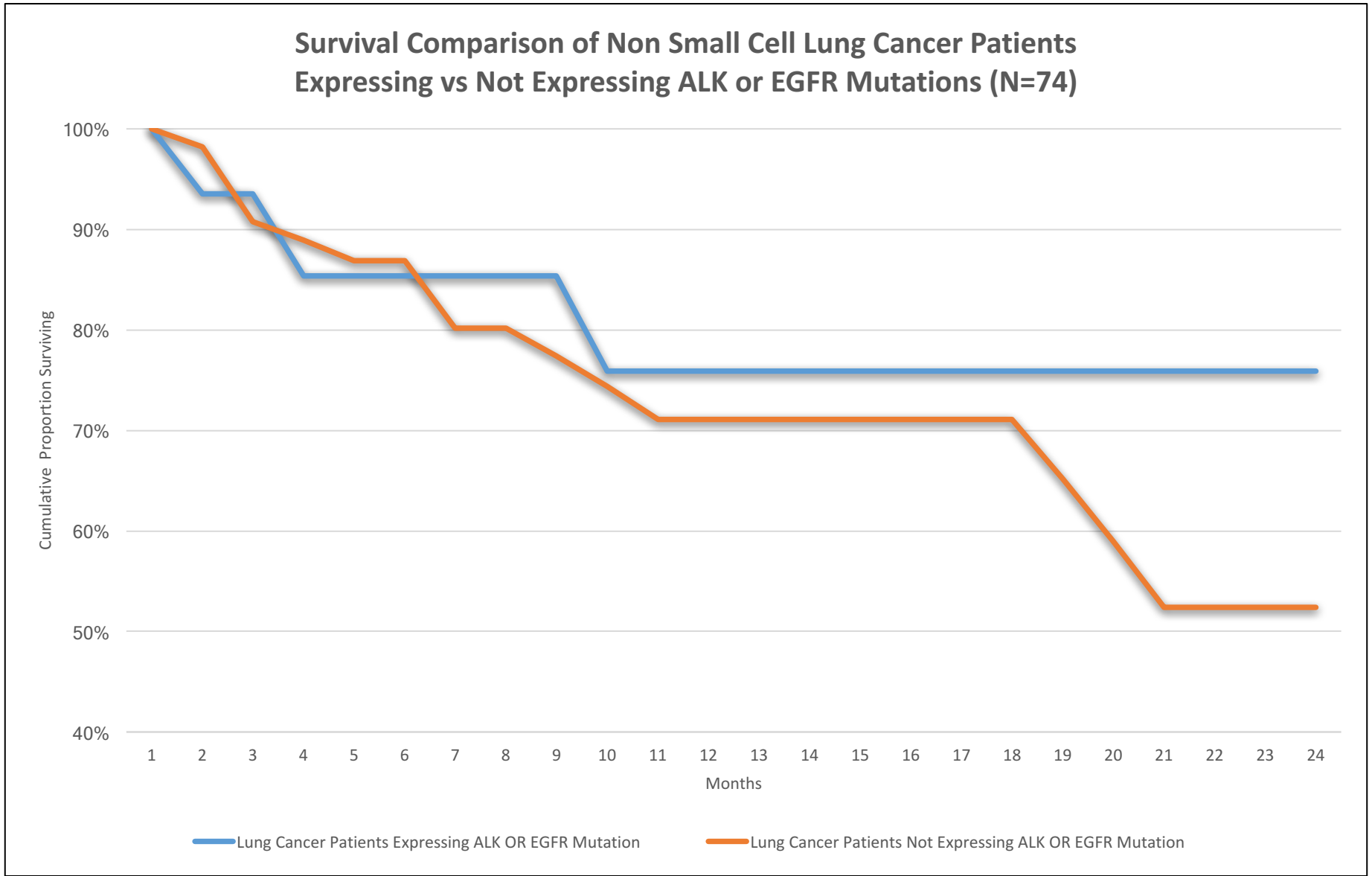
Identifying Molecular Disparities in the Population

- Recent study examined molecular profiles of 51 non-small cell lung cancer in Appalachian Kentucky compared to the Cancer Genome Atlas (TCGA)
- Certain tumor mutations were significantly higher among Appalachian Kentucky patients compared to the U.S.
  - PCMTD1
  - IDH1
- Does this represent a health disparity in Kentucky's underserved population?

Liu J, Murali T Liu C, Yu T, Sivakumaran TA, Mosely HNB, Zhulin IB, Durbin EB, Ellingson SR, Liu J, Hallahan B, Horbinski CM, Hodges K, Napier DL, Mueller J, Vanderford NL, Fardo DW, Wang C, Arnold SM. Characterization of Squamous Cell Lung Cancers from Appalachian Kentucky. CEBP. In Press 2018.

KENTUCKY CANCER REGISTRY

Population Measures: How do Gene Mutations Impact Survival?



Mapping Biomarker Data for Cancer Prevention and Control

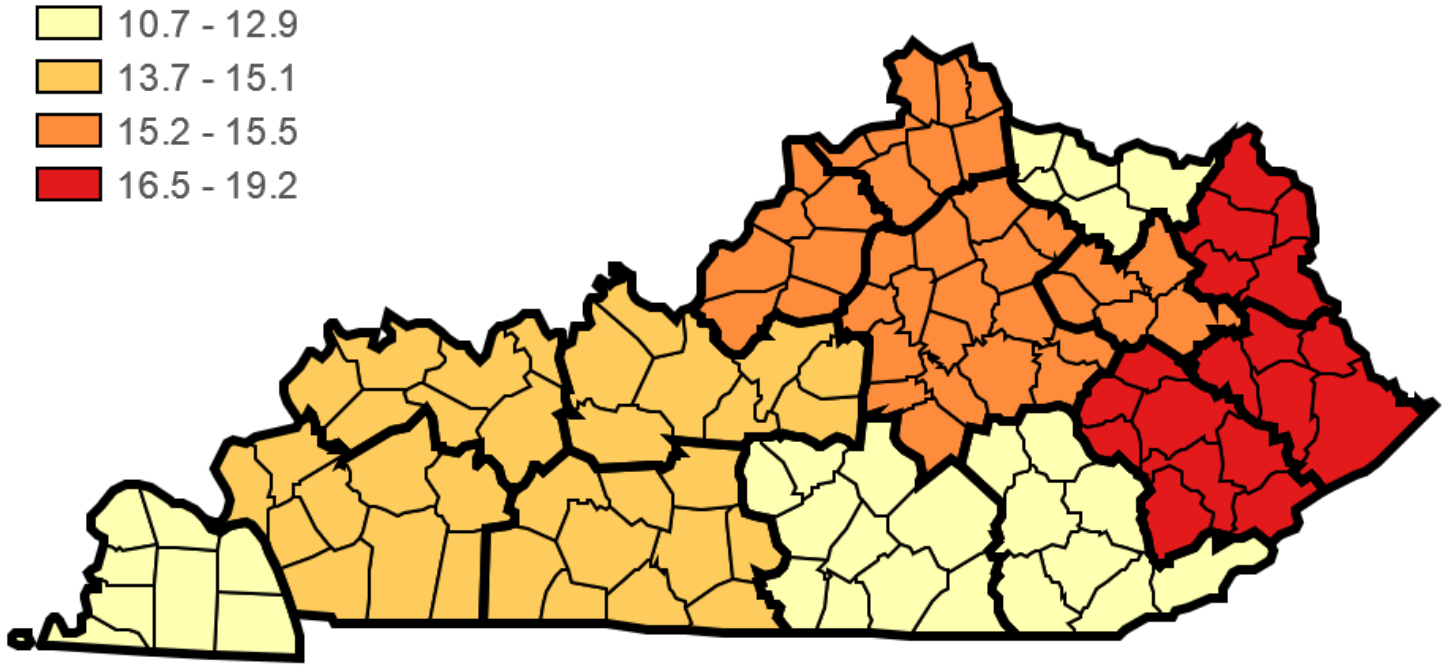
Age-Adjusted Invasive Cancer Incidence Rates in Kentucky

Triple Negative (HR-/HER2-) - Breast, Female, 2011 - 2015

By Area Development District

Age-Adjusted to the 2000 U.S. Standard Million Population

Kentucky Rate: 14.8 / per 100,000



All rates per 100,000.
Data accessed May 16, 2018. Based on data released Nov 2017.
© 2018 Kentucky Cancer Registry.

KENTUCKY
CANCER REGISTRY

Conclusions: Precision Cancer Surveillance is a Critical Role for Cancer Registries

- Capture and integration of Next Generation Sequencing (NGS) molecular test results is a major goal of the Kentucky Cancer Registry
- Informatics efforts are developing methods and tools to enhance e-Path reporting and other infrastructures needed to capture data for all patients who are tested
  - Cannot wait for site specific factors to emerge
  - Cancer registrar manual entry of 100s of molecular markers impossible
- Electronic transmissions of standardized molecular test results from NGS service providers is feasible and practical
  - Molecular test report data is no more challenging than electronic pathology reporting
  - Raw data file storage, however, requires more significant technical expertise and storage facilities
- Central cancer registries can be enhanced with **population-based** molecular test data within 2-4 years
- Advances will positively impact clinical decision making and evidence-based cancer prevention and control

KENTUCKY
CANCER REGISTRY

Acknowledgements:
KCR/Markey Informatics Team

- Software Team
  - Isaac Hands
  - Peter Ransdell
  - Jason Jacob
  - David Rust
  - Roger Chui
  - Clay Campbell
  - Chaney Blu
  - York Dobyns
  - Luan Pham
  - Bront Davis
  - Justin Levens
- Project Management
  - Joseph Mueller
- Systems Team
  - Jenny Gregory
  - John Williams
  - Joel Wheeler
  - Malissa Sullivan
- Faculty
  - Dr. JC Jeong
  - Dr. Sally Ellingson
  - Dr. Rama Kavuluru

KENTUCKY
CANCER REGISTRY

Questions/Discussion

- Contact Information:

  Eric B. Durbin, DrPH, MS

  Telephone: 859-218-3182

  E-mail: ericd@kcr.uky.edu

  Web: http://www.kcr.uky.edu

- Funding Acknowledgements
  - Commonwealth of Kentucky
  - University of Kentucky Markey Cancer Center
  - CDC/NPCR/ECC: U58DP005400, U58DP006313
  - NCI/SEER: HHSN261201000131, P30CA177558

KENTUCKY CANCER REGISTRY