

SEER program: Overview of Enhancements

The SEER Program



Funded by NCI **to support research** on the diagnosis, treatment and outcomes of cancer since 1973

16 population-based registries covering **35%** of the US population

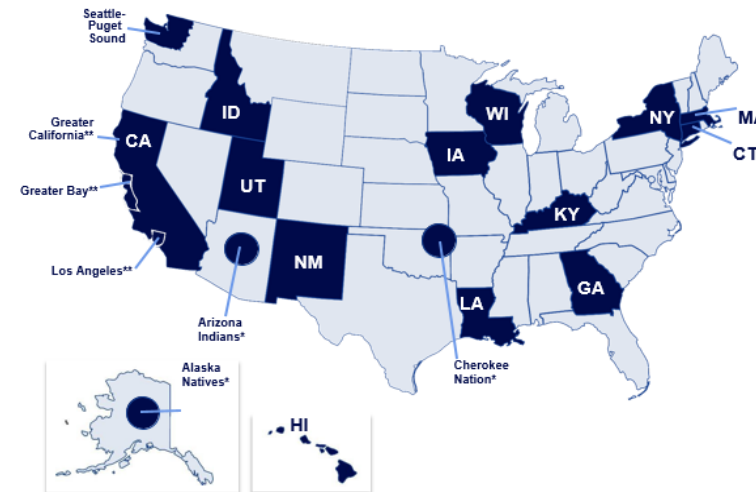
- Recent RFP to expand the SEER program further (contract January 2021)

We receive ~550,000 incident cases annually

- Approximately 85% of cases with real time electronic pathology (e-path) reporting
- Facilitates rapid case identification for supporting research

All registries will be on a common data platform (SEER DMS) that permits

- central linkages with external partners
- facilitates scaling of new initiatives across all registries simultaneously



*Subcontract under New Mexico

**Three regions represent the state of California: Greater Bay, Los Angeles, and Greater California

Main Goals in Enhancing SEER

Create a system representing *population level* real world data that will:

- compliment clinical trials in understanding the use and effectiveness of oncology care for the 95% of patients outside the clinical trial setting
- assess quality of cancer care provided to patients across the broader health care continuum
- represent the data in more clinically meaningful categories
 - molecular subtypes
 - histologic categories
- develop methods to provide cancer reporting in near real time using NLP and linkages with external partners

Gaps in current surveillance data being addressed with new initiatives

- Detailed longitudinal treatment
- Comprehensive genomic data characterizing the cancer
- Outcomes other than survival and cause of death (recurrence)
- Comorbidity to provide context for therapies and outcomes

Partnerships and linkages to enhance SEER data

Claims sources

- Unlimited Systems (oncology claims processor)
 - **Data from 2013+ covering approx. 15% of cases in SEER**
- Large insurers (United Health Care)
- Exploring All Payer All Claims (6 SEER registries have state wide APAC)
- Pharmacy (CVS and Walgreens/RiteAid)
 - Data received for all registries- 2013 +
 - >7 million prescriptions for anti-neoplastic drugs in SEER regions
 - Receiving routine data submissions representing 55% of all anti-neoplastic prescriptions in US

**Tyrosine Kinase Inhibitor Use among
patients in SEER Reported through
Walgreens/RiteAid (2013-mid 2020)**

Drug Name	Walgreens Number of Patients	Walgreens Number of Fills
ALECENSA	8	37
BOSULIF	83	625
CABOMETYX	113	618
Gilotrif	89	406
Gleevec	1196	13776
IMATINIB MESYLATE	2	2
INLYTA	206	1021
IRESSA	6	20
Iclusig	7	28
Lenvima	44	114
Nexavar	878	3585
RYDAPT	65	220
SPRYCEL	1016	9191
SUTENT	466	2215
Stivarga	464	1392
TAGRISO	129	931
TARCEVA	934	7015
TYKERB	216	1000
Tasigna	444	4634
VOTRIENT	601	2754
Xalkori	96	737
ZYKADIA	19	94
Total	7082	50415

Example:

Frequency of TKI use from 2013-mid 2020. Provides an opportunity to:

- Monitor dissemination over time
- Evaluate outcomes among the general population
- Understand adherence with prescribed treatment

Partnerships and linkages to enhance SEER data

Genomic/ genetic pathology labs

- ***Biomarkers are***
 - Predictive (treatment) and prognostic (outcomes)
 - Required as ***standard of care*** for many cancers
 - Key for monitoring quality of care and understanding differences in outcome
- ***Current linkages include:***
 - Genomic Health (Oncotype 21 and 16 gene assays for breast, Prostate multigene assay)
 - Decipher multigene panel for prostate
 - Castle – melanoma multi gene panel
 - Caris Life Science (70 markers)
 - Demonstration CA and GA linking 4 major genetic testing companies (Myriad, Ambry, etc.) for breast and ovarian cancers (2013-2018)
 - Working towards all SEER all tumor linkage

Example: Evaluating standards of care- BRCA testing among patients with ovarian (and breast) cancer - CA & GA (2013-2015) *

Characteristics	Breast Cancer			Ovarian Cancer		
	Total Cases	Tested* Cases	Proportion Tested* % (95% CI)	Total Cases	Tested* Cases	Proportion Tested* % (95% CI)
State and year of diagnosis						
California^s						
2013	30,367	7,314	24.1 (23.6-24.6)	2,388	707	29.6 (27.8-31.5)
2014	30,012	6,951	23.2 (22.7-23.6)	2,390	732	30.6 (28.8-32.5)
2013-2014	60,379	14,265	23.6 (23.3-24.0)	4,778	1,439	30.1 (28.8-31.4)
Georgia						
2013	8,296	2,066	24.9 (24.0-25.9)	618	206	33.3 (29.6-37.2)
2014	8,410	2,270	27.0 (26.0-28.0)	605	209	34.5 (30.8-38.5)
2013-2014	16,706	4,336	26.0 (25.3-26.6)	1,223	415	33.9 (31.3-36.7)
Race/Ethnicity						
Non-Hispanic (NH) White	48,063	11,635	24.2 (23.8-24.6)	3,701	1,251	33.8 (32.3-35.3)
NH Black	9,039	2,095	23.2 (22.3-24.1)	523	113	21.6 (18.1-25.4)
NH American Indian	207	51	24.6 (18.9-31.1)	19	5	26.3 (9.1-51.2)
NH Asian	9,061	2,034	22.5 (21.5-23.3)	728	229	31.5 (28.1-35.0)
Hispanic	10,715	2,786	26.0 (25.2-26.8)	1,030	256	24.9 (22.2-27.6)

Overall testing (2013-2015) **24% breast cancers and 31% ovarian cancers.**

Substantial variation for ovarian cancer testing ranging from 22% in Black women to 34% in white women

* Kurian et al. JCO April 9, 2019

Partnerships and linkages to enhance SEER data

Technology companies aggregating and using clinical data

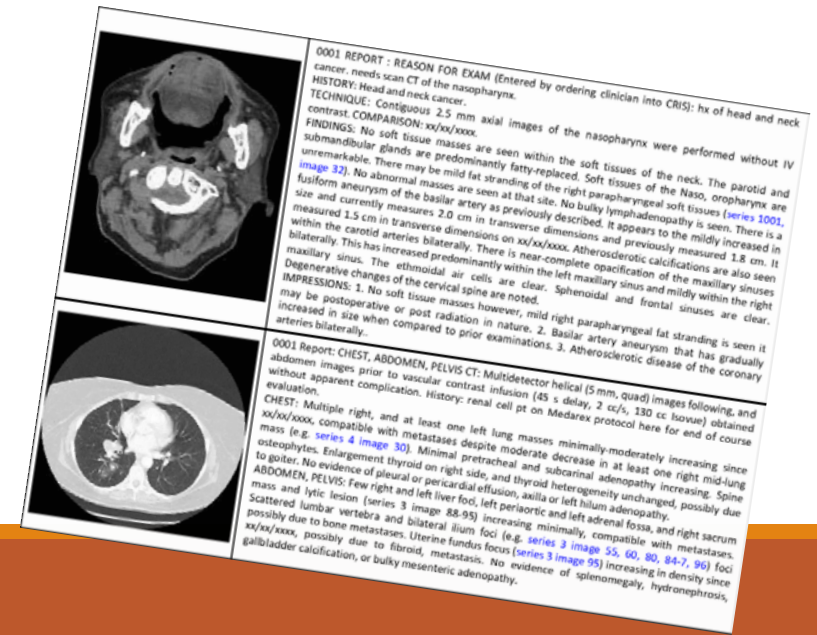
- CancerLinQ, Syapse, Tempus and HealthVerity
- Varian/Elekta (radiation oncology)
- Ambra Health (radiology)

Linkages with Radiology Reports/Images

Radiology reports and images

- Important for recurrence, progression of disease
- May be the only method for diagnosing recurrence

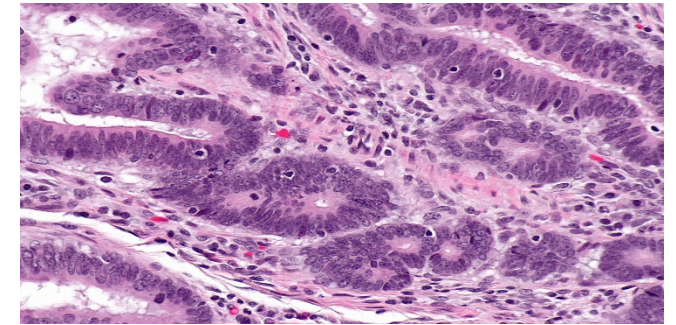
Beginning work leveraging existing reporting for some SEER registries to access and leverage radiology reports targeting recurrence and case finding for non-pathologic confirmed cancers (CNS and HCC)



Exploration of new technologies

Digital Pathology Images

- Provide important information typically missing from pathology report
 - Tumor Infiltrating Lymphocytes – strong prognostic marker
 - Nuclear Pleomorphism
- We are currently developing a pilot to evaluate a whole slide imaging (WSI) to:
 - assess the ability of registries to capture WSI
 - de-identify and
 - submit for linking with the abstract
- Ultimately to be made available for researchers and AI experts



Ultimate goal for SEER – representing each patient's trajectory over the disease course

	SEER Diagnostic Data	SEER Surgery/ Rad Rx Data	Treatment Claims Data	Treatment Pharmacy Data	Outcome SEER
HR+/HER 2- Breast	49 YO Stage IA ductal Oncotype Score=36	Lumpectomy (7/15) Beam Radiation	Docetaxel, Cyclo- Phosphamide (OCT NOV 2015)	Anastrozole 1 prescription 4/18	Vital Status Alive- 4/18
ER+/HER2+ Breast	70 YO Stage IA Invasive breast	Lumpectomy (1/15) Beam Radiation	Trastuzumab (3/15-3/16) Docetaxal/Carbo (3/15-3/16)	Letrizole 10/15- present 4/18	Vital Status Alive- 5/18
Lung	83 YO F Stage IIB adeno EGFR + Exxon19 ALK -	No Surg No Rad	No systemic chemo)	Gefitinib Nov 2016-Jan 2017 Erlotinib (Feb 2017)	Vital Status Dead 6/17
Stage III Melanoma	23 YO M Stage IIIC Melanoma BRAF V600E/V600K mutation Groin Mets- Node dissection 10/16	Biopsy/ Wide excision/ (9/15)	Ipilumimab 12/15	Dabrafenib/ Tretinitinibt Begun 11/16	Vital Status Alive 8/20



Time since Diagnosis

Thank You
