Cancer Epidemiology in American Indian/Alaska Native (AI/AN) Populations in California

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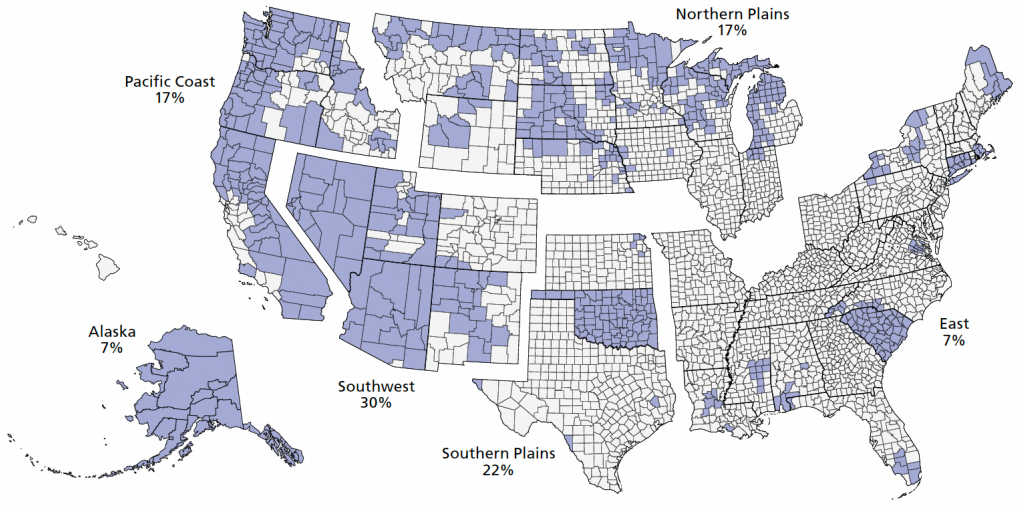
We pay respect to the elders, past and present, and acknowledge the ongoing history and presence of the Luiseño/Payómkawichum and other neighboring Indigenous peoples who have cared for and stewarded this land since time immemorial

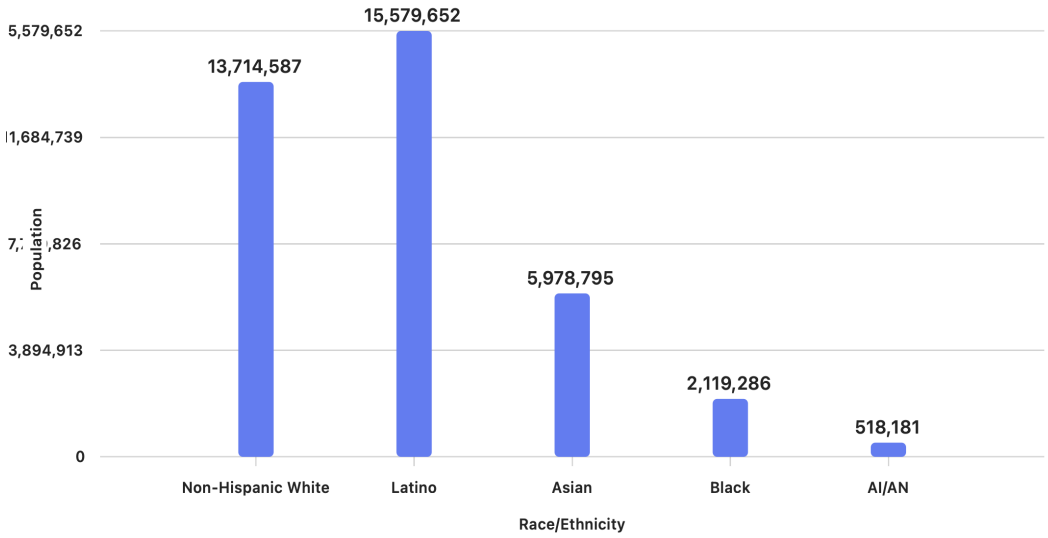
California's AI/AN Demographics

Figure S1. PRCDA Counties and the Distribution of American Indian and Alaska Native Persons by Region

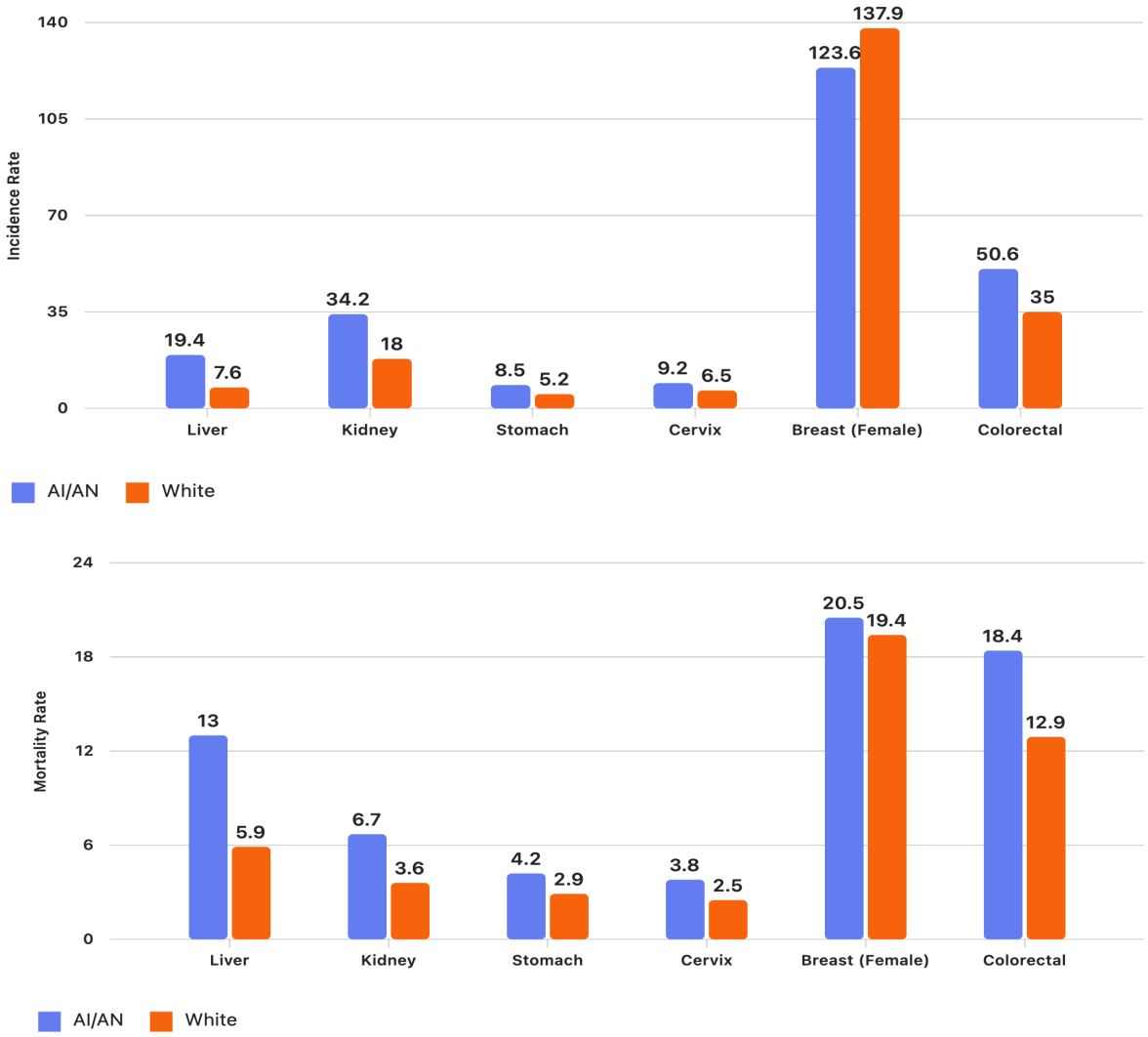


PCRDA: Purchased/Referred Care Delivery Area. Percentages represent the proportion of the non-Hispanic American Indian/Alaska Native PRCDA population that lives in each region (shown in blue).

Source: US Census Bureau, 2019.



California AI/AN cancer statistics



Source: https://health.ucdavis.edu/media-resources/cancer/documents/pdfs/population-health/cancer-burden-among-native-americans-california.pdf

Table 1: Characteristics of Native American and White Cancer Patients in California, 2000-2016

	Native American		White		
Characteristic	N	%	N	%	p-value
All Patients	13669	100.0	1,919,254	100.0	
Sex					
Male	6420	47.0	959,053	50.0	< 0.001
Female	7249	53.0	960,201	50.0	
Age at Diagnosis					
0 – 19	249	1.8	12,556	0.7	< 0.001
20 – 39	979	7.2	73,067	3.8	
40 – 54	2,897	21.2	293,972	15.3	
55 – 69	9,544	40.6	685,731	35.7	
70+	3,992	29.2	853,928	44.5	
Cancer Stage at Diagnosis					
In Situ	924	6.8	202,625	10.6	< 0.001
Localized	5,199	38.0	796,992	41.5	
Regional	2,872	21.0	343,530	17.9	
Distant	3,184	23.3	404,453	21.1	
Unknown	1,490	10.9	171,654	8.9	
Socioeconomic Status					
Low	5,429	39.7	345,464	18.0	< 0.001
Medium	5,560	40.7	684,587	35.7	
High	2,680	19.6	889,203	46.3	
Area of Residence					
Urban	8,790	64.3	1,585,155	82.6	< 0.001
Rural	4,879	35.7	334,099	17.4	
County of Residence					
PRCDA[1]	8,061	59.0	716,989	37.4	< 0.001
Non-PRCDA	5,608	41.0	1,202,265	62.6	
Type of Insurance					
Private/Government	7,625	55.8	1,312,589	68.4	< 0.001
Medicare, no Supplement	2,081	15.2	341,274	17.8	
Medicaid/IHS/Public	2,771	20.3	132,621	6.9	
Uninsured	217	1.6	20,401	1.1	
Unknown	975	7.1	112,369	5.9	

1 PRCDA: Purchased/Referred Care Delivery Area
Source of data: California Cancer Registry, California Department of Public Health. Prepared by the California Cancer Reporting and Epidemiologic Surveillance (CalCARES) Program, Institute for Population Health Improvement, UC D
Health

Cancer is increasing in California AI/AN communities

Table 6. Average Annual Percent Change (AAPC) and 95% Confidence Intervals (CI) in Age-Adjusted Incidence Rates for the top ten cancers among Native Americans and Whites in California, 2000-2015

	Native American			White		
Cancer Type	AAPC	95% CI		AAPC	P-Value	
All Cancers	2.7	2.2 , 3.3	↑	-0.9	- 1.5 , - 0.4	↓
Colon & Rectum	1.7	0.8 , 2.6	↑	-2.2	- 3.2 , - 1.3	↓
Liver	6.2	3.4 , 9.1	↑	3.5	2.6 , 4.4	↑
Lung	1.5	0.3 , 2.7	↑	-2.4	- 2.7 , - 2.1	↓
Female Breast	3.8	2.7 , 5.1	↑	-0.7	- 1.2 , - 0.2	↓
Uterus	5.9	3.7 , 8.1	↑	0.4	- 0.5 , 1.4	-
Prostate	- 1.5	-3.0 , 0.1	-	-4.2	- 5.3 , - 3.0	↓
Urinary Bladder	2.6	-0.1 , 5.3	-	-0.8	- 1.2 , - 0.3	↓
Kidney	4.7	2.5 , 7.1	↑	1.8	1.3 , 2.3	↑
Non-Hodgkin Lymphoma	2.3	-0.7 , 5.4	-	-0.2	- 0.4 , 0	-
Oral and Pharynx	2.9	0.7 , 5.1	↑	0.5	- 0.4 , 1.4	-

↑ Statistically significant increase, ↓ Statistically significant decrease.

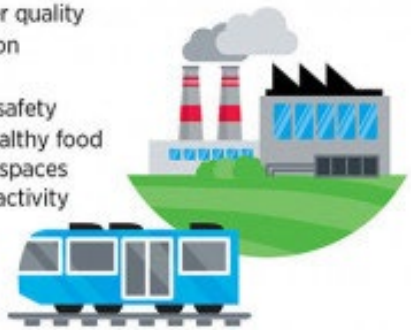
Source of data: California Cancer Registry, California Department of Public Health. Prepared by the California Cancer Reporting and Epidemiologic Surveillance (CalCARES) Program, Institute for Population Health Improvement, UC Davis Health.

Why Do U.S. Cancer Health Disparities Exist?

Complex and interrelated factors contribute to cancer health disparities in the United States. Adverse differences in many, if not all, of these factors are directly influenced by structural and systemic racism. The factors may include, but are not limited to, differences or inequalities in:

ENVIRONMENTAL FACTORS

- Air and water quality
- Transportation
- Housing
- Community safety
- Access to healthy food sources and spaces for physical activity



BEHAVIORAL FACTORS

- Tobacco use
- Diet
- Excess body weight
- Physical inactivity
- Adherence to cancer screening and vaccination recommendations

SOCIAL FACTORS

- Education
- Income
- Employment
- Health literacy

CLINICAL FACTORS

- Access to health care
- Quality of health care

CULTURAL FACTORS

- Cultural beliefs
- Cultural health beliefs

PSYCHOLOGICAL FACTORS

- Stress
- Mental health

BIOLOGICAL AND GENETIC FACTORS

Why should we focus on CRC screening?

Table 2. Estimates of Current and Increased Use of US Preventive Services Task Force–Recommended Cancer Screenings Over the Lifetime of Study Cohort, United States, 2018

Preventive Service	Current Use, %[a]	Current Impact (Deaths Prevented)[b]	Incremental Impact (Deaths Prevented) With Increased Screening	
			Increase Screening by 10 Percentage Points[b]	Increase Screening to 90%[b]
Breast cancer screening of 50-year-old women until the age of 74	78.3	10,179	1,300	1,521
Cervical cancer screening of 21-year-old women until the age of 65	79.9	27,166	3,400	3,434
Colorectal cancer screening of 50-year-old adults until the age of 75	67.7	74,470	11,000	24,530

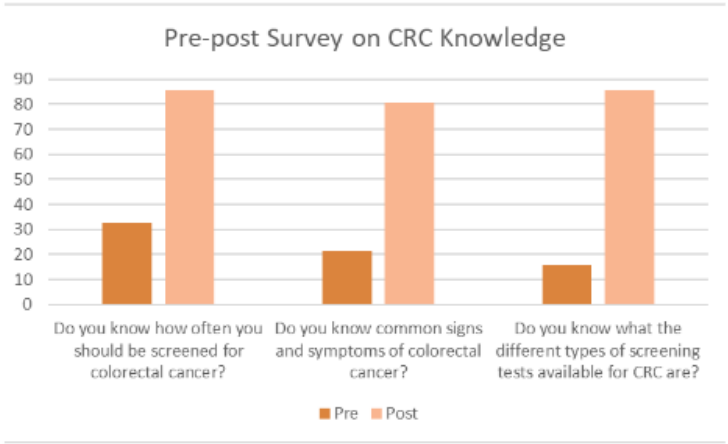
[a] Source: Behavioral Risk Factor Surveillance System Prevalence and Trends Data (7).
[b] Model-based estimates by authors.

Source: Krishna et al, Prev Chronic Dis, 2020

We implemented a culturally- and linguistically-appropriate model for CRC education in farmworker communities.

- **6** Community health fairs
- **>40** Community organizations, partners and clinics participated at events
- **>900** community members reached
- **173** CRC knowledge surveys collected
- **41** Colorectal cancer screening kits distributed

*screening kits only distributed at 3 health fairs with partner clinics



The figure above describes the top 3 questions observed with highest pre to post difference in knowledge gained from participants who took part in the survey after receiving colorectal cancer education through the inflatable colon.

900
Community members reached

173
CRC knowledge Surveys collected

>40
Community organizations participated

Poverty increases CRC mortality

Table 2. Comparisons of 2007–2011 cancer mortality rates for the entire United States versus counties defined by persistent poverty.

	Nonpersistent poverty (ref)		Persistent poverty			Unadjusted difference		Adjusted difference	
	Mean	SE	Mean	SE	% Diff	Est.	*P*	Est.	*P*
All cancer types	179.3	0.6	201.3	1.8	12.3	22.0	<0.0001	8.3	<0.0001
Lung and bronchus	52.3	0.3	60.9	1.0	16.5	8.6	<0.0001	2.9	<0.001
Colorectal	17.1	0.1	20.1	0.3	17.7	3.0	<0.0001	1.7	<0.0001
Breast	21.6	0.2	24.1	0.5	11.9	2.6	<0.0001	0.9	0.10
Prostate	22.8	0.2	28.2	0.7	24.0	5.5	<0.0001	1.1	0.08
Cervical	2.5	0.1	3.7	0.2	50.1	1.2	<0.0001	0.4	0.07
Oropharyngeal	2.5	0.0	3.2	0.1	29.6	0.7	<0.0001	0.1	0.38
Stomach	2.9	0.0	4.1	0.2	43.2	1.3	<0.0001	0.4	0.01
Liver and intrahepatic bile duct	5.0	0.1	6.3	0.2	27.6	1.4	<0.0001	0.5	<0.01

Note: Cancer mortality rates are expressed as deaths per 100,000 people per year except breast and cervical cancers (deaths per 100,000 females per year) and prostate cancer (deaths per 100,000 males per year). Two-sample *t* tests were used to estimate unadjusted differences in cancer mortality rates for counties not in persistent poverty (reference category) versus counties in persistent poverty, and multivariate linear regressions were used to estimate adjusted differences in cancer mortality rates. Adjusted models controlled for county-level metropolitan status; Census region; percentage of residents who are female, non-Hispanic black, Hispanic, with a bachelor's degree or higher, and unemployed; and median household income.
Abbreviations: Diff, difference; Est., estimate; ref, reference; SE, standard error.

Table from Moss et al, CEBP, 2020, doi: 10.1158/1055-9965.EPI-20-0007

We are studying the impact of income support programs on CRC patterns

Upstream Research Center
Co-led by Stanford, UC Davis and UC San Francisco

ABOUT | OUR WORK | MEET THE TEAM | PILOT GRANTS | FELLOWSHIPS

Research Project 2: CalEITC and Colorectal Cancer

The Center is also evaluating the impact of increased income support through the Earned Income Tax Credit (EITC). The project will estimate the effect of the 2015 CalEITC expansion policy on colorectal risk factors. The examination of these effects in California is notable because the state has one of the most generous EITC policies for lower-income individuals and having a social security number is no longer required to receive benefits, opening eligibility up to non-US citizens with an Individual Taxpayer Identification Number (ITIN).

Investigators

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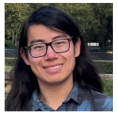

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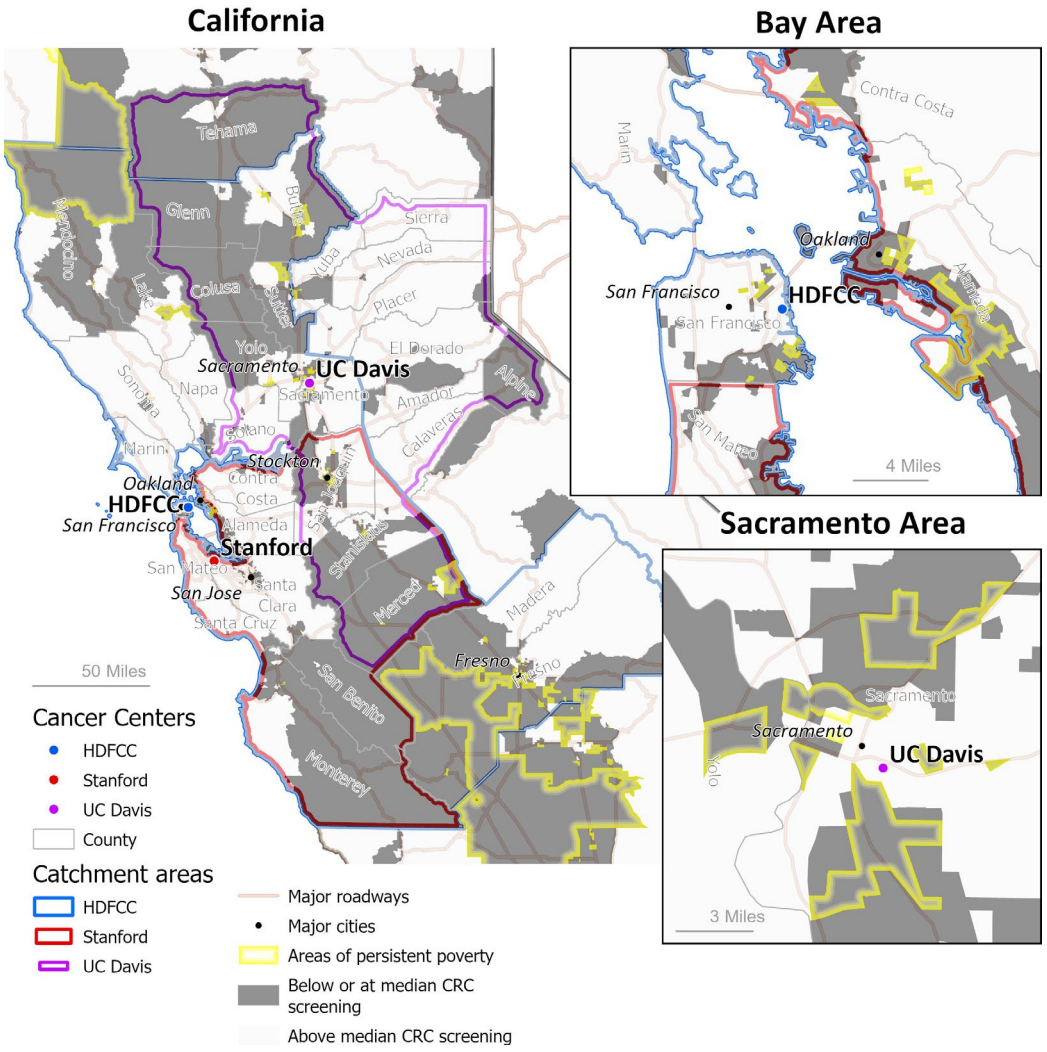


Persistent Poverty Map

- The risk of dying from cancer is greatly influenced by your zip code.
- If you live in a poor neighborhood, you face cancer death rates that are 12% higher than if you live in a wealthy neighborhood.

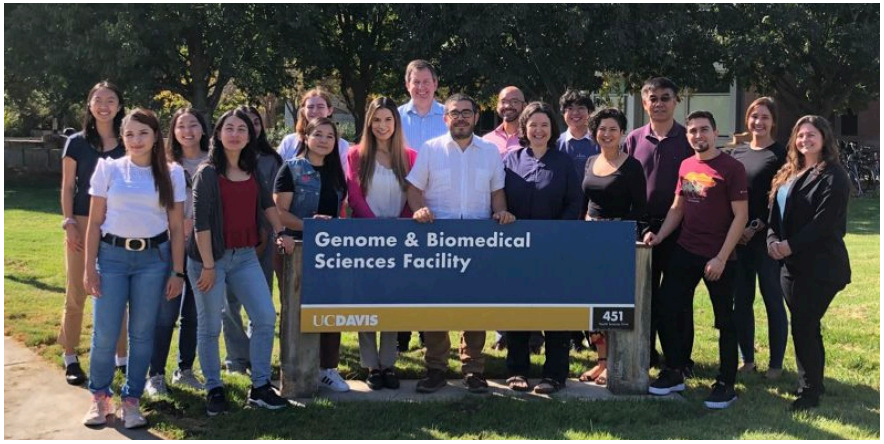
Thanks to Scarlet Gomez for providing the figure

Concluding Remarks

- AI/AN communities in California face higher rates of certain cancers and later-stage diagnoses.
- Survival gaps persist, driven by socioeconomic and healthcare access barriers.
- Data limitations and misclassification hinder accurate monitoring and research.
- Community-driven, culturally tailored interventions are essential to reduce disparities.

Acknowledgements

The Health Equity Leadership, Science and Community Laboratory (The LCC Lab)



Funding:

- NIH/NCI:
  - R01CA223978 (DCCPS)
  - R21CA199631 (CRCHD)
  - U54CA233306 (CRCHD)
  - U54CA283766 (CRCHD)
  - U54CA280911 (DCCPS)
  - D43CA260869 (Global Health)
  - Diversity (Cuellar-Vitte, Diaz, Halmai, Morales, Quino, Vang) and Administrative (Global health, CRCHD) Supplements
- Gilead, Genentech
- Our collaborators and trainees