The San Francisco Cancer Initiative

SF CAN

November 16, 2016

*Partnering with the City and County of San Francisco, its Department of Public Health, community groups and cancer care institutions in the city, our **goal** is to reduce the cancer burden and particularly address inequities in the occurrence and outcome of cancer by harnessing innovative science, new technologies and our knowledge of needs of all the citizens of San Francisco.*

From the UCSF Helen Diller Family Comprehensive Cancer Center –
Robert A. Hiatt, MD, PhD and Alan Ashworth, PhD

Table of Contents

I. Introduction

Cancer kills more San Franciscans than any other cause (1). In 2014 there were 3,806 new cases and 1,342 deaths from cancer in San Francisco (2). Great progress has been made against cancer nationally and mortality rates have dropped since the 1990's (3). Since 1991 when age-adjusted cancer incidence rates peaked at 578 cancer cases for every 100,000 people (578/100,000 population), rates of new cancers in San Franciscans have dropped by 33% to 385/100,000 in 2014 and age-adjusted mortality rates have decreased 40% from 222 to 133/100,000 (2) *.[*] These rates and the associated decrease in the absolute numbers of new cancers and deaths are encouraging trends overall, but behind these numbers, cancer remains the most common and a feared cause of death for San Franciscans. Its burden is distributed unevenly among racial/ethnic and socioeconomic groups, underscoring persistent and unacceptable disparities that remain a challenge in this diverse city. Much more work is needed to reduce the cancer burden in San Francisco. We believe an approach with a new perspective and new energy will accelerate the decline in new cancers and cancer mortality in our city.

We are introducing a new long-term team initiative, called the San Francisco Cancer Initiative (SF CAN), to reduce morbidity and deaths from cancer in San Francisco. SF CAN is organized and coordinated by the University of California, San Francisco and its cancer experts with the broad participation by partners across the city and county in a "collective impact" effort with multiple stakeholders who are concerned about the ravages of cancer on our citizens. The UCSF Helen Diller Family Comprehensive Cancer Center (HDFCCC), which is supported by the National Cancer Institute, is recognized as one of the top cancer centers in the country with scientists and health professionals making critical new discoveries, providing pioneering care and leading the way in prevention activities. Dr. Alan Ashworth, the new president of the HDFCCC and an internationally recognized cancer scientist, will spearhead this new initiative

---

[*] * Mortality data available up to and including 2013 for most of the report. Total mortality available for 2014 2. Cancer Prevention Institute of California (CPIC), *Incidence and Mortality Data for San Francisco, CA, 1988-2012*. 2015.

with leadership from Dr. Robert A. Hiatt, who is a national leader in cancer prevention and control research and associate director of the HDFCCC. Partnering with the City and County of San Francisco, its Department of Health, community groups and other cancer care institutions in the city, our *goal is to reduce the cancer burden and particularly address disparities of incidence occurrence and outcome of cancer by harnessing innovative science, new technologies and our knowledge of the needs of all the citizens of San Francisco.* We seek to *accelerate progress* in reducing the cancer burden in the city and county by targeting the specific actions that we know can make a measurable difference in preventing cancer and its early detection. These practices will improve the chances for effective treatments and enhance the post-treatment care people receive as they go on living their lives.

Cancer does not affect all populations equally and we will work to identify, reduce, and ultimately eliminate the inequities between communities and subpopulations in the city so that all citizens benefit from effective new scientific discoveries, programs, and policies that we know to be effective. We know, for example, that for most cancers, African Americans have the highest mortality rates. For example, black men in San Francisco had an age-adjusted mortality rate of 76/100,00 for lung cancer in the period 2009-2013 compared to a rate of 45/100,000 for men in the city overall (2). Colorectal cancer death rates were 20/100,000 for black men compared to 16/100,000 for the general male population in the same period (2). Liver cancer is the 5th most common cause of cancer death in San Francisco causing an average of 81 deaths per year and disproportionately strikes our Asian American community that comprises 35% of the population. Rates of new liver cancer in our large Latino population have risen dramatically in the last 20 years, approaching rates in the Asian American community. The rate of new melanoma cases has doubled among white men over the last 25 years in San Francisco (2) but not among other groups. These and many other examples of disparities between population subgroups in San Francisco represent both challenges and opportunities to better understand their origins, and when they reflect inequities in social conditions or the access to and quality of care, they are differences we work to eliminate.

Science has entered the era of 'precision medicine' (4) and we advance the concept of 'precision population health', which refers to having the data and the capability to tailor preventive interventions precisely for communities to more directly meet their needs. Biomedical science is also developing the means to understand and analyze very large amounts of information (referred to as "Big Data") from genetics and biology to electronic health records to large scale population databases derived from surveys, state record systems, the census, geographic information systems and social media (5). These new developments can be harnessed to make cancer more easily prevented and better treated in San Francisco and beyond.

The task before us is large and complex. SF CAN will take a comprehensive view of the causes of cancer in San Francisco and the "causes of the causes" (6, 7). It will examine access to and the quality of care provided to patients as well as the best ways to move forward with prevention practices and policies. And it will require a deep appreciation of the expressed needs of the people of San Francisco and a thorough understanding of the decision-making processes required to create measureable change. We will take a population-based, multi-level, transdisciplinary approach that integrates cancer research, prevention activities, improvements in cancer health care and health systems, community involvement and political leadership across the city (8). The feasibility of SF CAN is enhanced by San Francisco being a relatively contained geographic space, having centralized governance and being close to sources of scientific and technical innovation. But it will require a long-term commitment to making a measureable difference in the cancer burden on the citizens of San Francisco. This is an evidence-based initiative that will harness existing knowledge, but there are many areas where research is still needed. Our intent is that what is learned from SF CAN will be applied to other counties in the Greater San Francisco Bay Area and beyond, and we will include stakeholders from other regions in our effort to ensure that scalability.

This report describes the cancer burden in San Francisco today, catalogs the previous work of UCSF HDFCCC scientists in San Francisco-based population research, advances a number of

options to address the cancer burden, some of which are already exist. Finally, the report identifies five special task forces charged with developing an action plan for specific programs that can make a difference in the cancer burden sustained by the people of San Francisco.

II. The Cancer Burden in SF

There are excellent sources of information that help us paint a detailed picture of cancer's impact at the population level. We can describe how many new cases are seen each year, the deaths that occur, trends in the frequency of cancers of all types and the differences we observe between men and women by age, by race and ethnic subgroups and other subgroups in the city. We can also describe the behaviors related to tobacco use, diet, alcohol use, lack of physical activity and other factors that can lead to cancer. Although in less detail, we can describe cancer care costs and look to ways to measure access and quality of care in our medical clinics and institutions. Finally, we can gather data on the social determinants of cancer in San Francisco, the policies and practices of government, business, and communities that lead to unhealthy environments and give rise to the "causes of the causes" of cancer (7).

This next section will summarize some of these characteristics of cancer in San Francisco. This is a new, updated synthesis of existing data and may provide additional insights into the challenges facing us.

II. A. Absolute Numbers & Rates

The total population of the City and County of San Francisco was 849,774 in 2015 (9). The 3,806 new cases of cancer in San Francisco in 2014, which is the most recent year for which we have cancer data, translates into a rate of new cases of 385/100,000 people per year (2). This compares to an age-adjusted rate of 383/100,000 for the state of California. There were 1,342 deaths from cancer in 2014 for an age-adjusted mortality rate of 133/100,000 people per year compared to 143/100,000 for California as a whole. These rates have been adjusted for the age of the population so it can be compared to other populations on whom the same type of age-adjustment has been made. It is very important to take age into account in these comparisons

since cancer is so much more common the older we get. However, these rates are not adjusted for differences in racial/ethnic distributions, which we present for specific cancers later in this report.

II. B. Cancer Sites

Cancer is not just one disease. At least 130 different types of cancer are listed by the National Cancer Institute [www.cancer.gov/types], and it is important to understand the burden of these different types of cancer to San Franciscans. Remarkably, the four most common cancers - prostate, breast, lung and colorectal - account for 47% of all new cases and 44% of deaths. The top fifteen cancers (Table 1 for incidence and Table 2 for mortality) account for a full 86% of new cases and 81% of deaths.

Table 1. Invasive cancer incidence case counts and rates in San Francisco County, 2010-2014, by top 15 sites (2)

Site	Count	Rate[a]	95% Confidence Interval		Population at Risk
All Sites	19,602	410.8	(404.9 ,	416.7)	4,145,362
Breast[c] (invasive)	2,856	120.8	(116.3 ,	125.4)	2,038,241
Lung and Bronchus	2,254	47.4	(45.5 ,	49.5)	4,145,362
Prostate[b]	2,148	94.5	(90.4 ,	98.7)	2,107,121
Colon and Rectum (invasive)	1,868	38.9	(37.1 ,	40.8)	4,145,362
Non-Hodgkin Lymphoma	953	20.2	(18.9 ,	21.6)	4,145,362
Melanoma of the Skin (invasive)	894	18.7	(17.5 ,	20.)	4,145,362
Breast (in situ)	883	38.8	(36.2 ,	41.5)	2,038,241
Liver	797	16.2	(15.1 ,	17.4)	4,145,362
Bladder	720	14.9	(13.8 ,	16.)	4,145,362
Corpus Uteri[c]	655	26.7	(24.6 ,	28.9)	2,038,241
Pancreas	615	12.7	(11.7 ,	13.7)	4,145,362
Kidney and Renal Pelvis	593	12.5	(11.5 ,	13.6)	4,145,362
Oral Cavity and Pharynx	562	11.6	(10.6 ,	12.6)	4,145,362
Thyroid	540	11.5	(10.5 ,	12.5)	4,145,362
Leukemia (All types)	527	11.5	(10.5 ,	12.6)	4,145,362

[a] Incidence rates are per 100,000 and age-adjusted to the 2000 US Standard Population; and calculated for males and females combined, unless otherwise indicated

[b] Calculated among males only

[c] Calculated among females only; breast cancer is exceedingly rare in men.

The relationship of cancer incidence to mortality varies by cancer site and reflects the variability in aggressiveness of different types of cancers and their ability to be treated with modern therapies. A comparison of the most common cancers (Table 1. Incidence) with the most common causes of cancer deaths (Table 2. Mortality) illustrates how much more lethal some cancers can be than others. For example, breast is the most common cancer diagnosis followed by lung cancer, but lung cancer, often diagnosed at a late stage, is more lethal and hard to treat, so it rises to the top of the most common causes of cancer deaths. Breast cancer, for which there are effective treatments, on the other hand drops to the 4th most common cause of cancer death.

Table 2. Cancer mortality in San Francisco County, 2009-2013, by top 15 sites. (2)

Site	Count	Rate[a]	95% Confidence Interval		Population at Risk
All sites	6,906	141.1	(148.1 ,	144.6)	4,087,504
Lung and bronchus	1,616	32.6	(36.1 ,	34.3)	4,087,504
Colorectal	645	12.3	(14.5 ,	13.4)	4,087,504
Pancreas	521	10.1	(12. ,	11.)	4,087,504
Breast[c]	450	16	(19.4 ,	17.6)	2,011,042
Liver	414	7.8	(9.5 ,	8.7)	4,087,504
Prostate[b]	307	13.6	(17.1 ,	15.2)	2,076,462
Leukemia (all types combined)	277	5.3	(6.8 ,	6.)	4,087,504
Stomach	236	4.3	(5.6 ,	4.9)	4,087,504
Non-Hodgkins Lymphoma	230	4.1	(5.4 ,	4.7)	4,087,504
Bladder	165	2.8	(3.8 ,	3.3)	4,087,504
Esophageal	155	2.7	(3.8 ,	3.2)	4,087,504
Ovary[c]	154	5	(7. ,	6.)	2,011,042
Brain	153	2.8	(4. ,	3.4)	4,087,504
Oral Cavity and Pharynx	145	2.5	(3.6 ,	3.)	4,087,504
Kidney	115	2.4	(2. ,	2.9)	4,087,504

[a] Mortality rates are per 100,000 and age-adjusted to the 2000 US Standard Population; and calculated for males and females combined, unless otherwise indicated

[b] Calculated among males only

[c] Calculated among females only

The potential for cancer prevention is substantial and has not been realized. It has been estimated that as much as 50-60% of cancers could be prevented, if what we currently know about the causes of cancer and their prevention could be put into practice (10, 11). It will be in this area that SF CAN will focus.

The (absolute) numbers of persons with cancer in San Francisco when categorized by race/ethnicity groups are predominately in the white and Asian American populations. For new cancers in the period 2010-2014, 47% were among Non-Hispanic whites and 34% among Asian Americans, while only 9% were diagnosed in African Americans and 9% in Latinos. (Figure 1) For cancer deaths, again, most were among whites (43%) and Asian Americans (36%), while 10% occurred among blacks and 9% among Latinos. (Figure 2) Thus the efforts of SF CAN need to emphasize reducing the cancer burden in white and Asian American populations in terms of raw numbers, whereas for measures of disparities, as discussed below, another picture emerges.
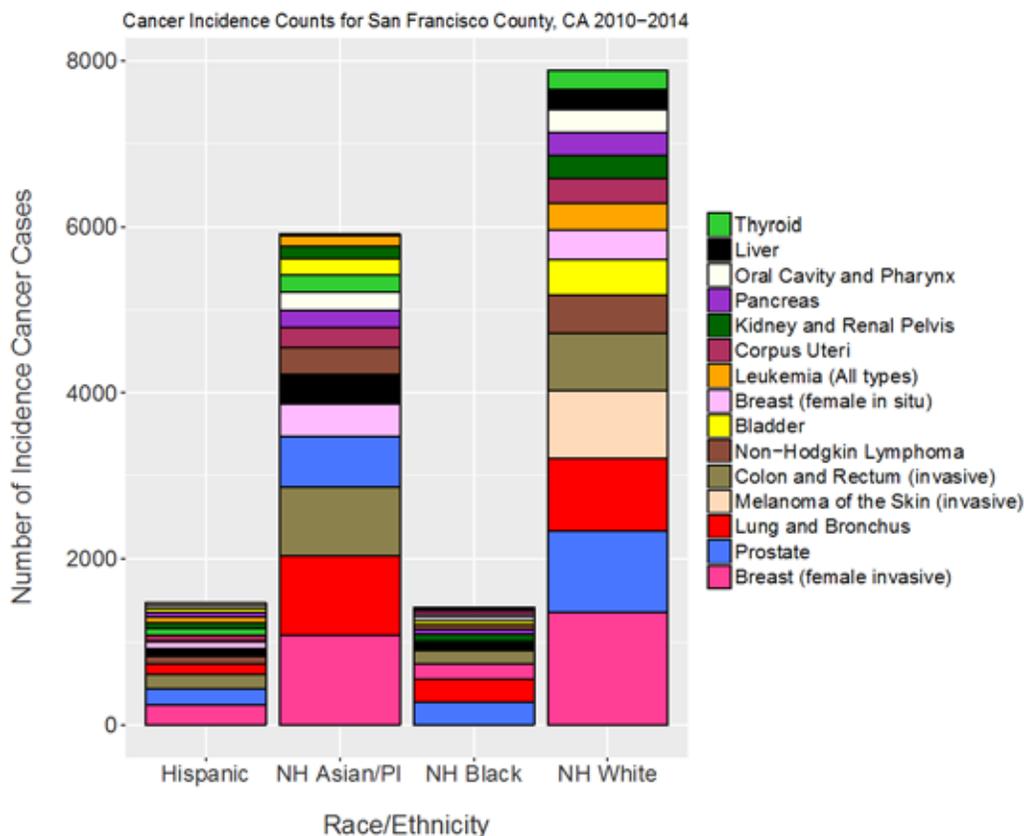
Fig. 1 Counts of new cancer cases for San Francisco, CA 2010-2014
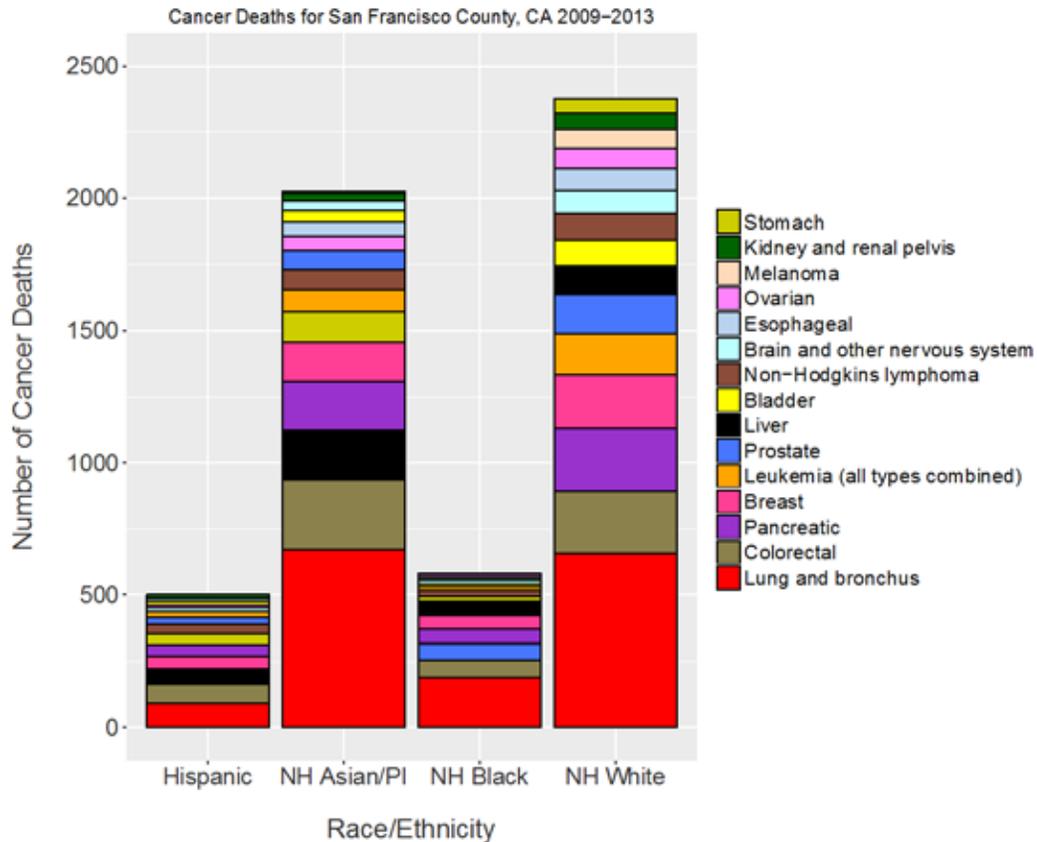
Fig 2. Counts of cancer deaths for San Francisco, CA 2009-2013

II. C. Trends

As mentioned above, overall incidence rates have been dropping since the mid 1990s. In the last 25 years, 1988-2014, the rate of new cancers has decreased 30% from a peak of 578/100,000 in 1991 to 443/100,000 in 2008 to 379/100,000 in 2014. (Figure 3) (2). This was actually a more rapid decrease than in California as a whole, which decreased 19% from 1988-2014. Likewise, cancer death rates decreased by 37% in San Francisco, which was greater than the 29% decrease for the state as a whole. (Figure 4) We aim to contribute to the acceleration of this decline over the next ten-year period.
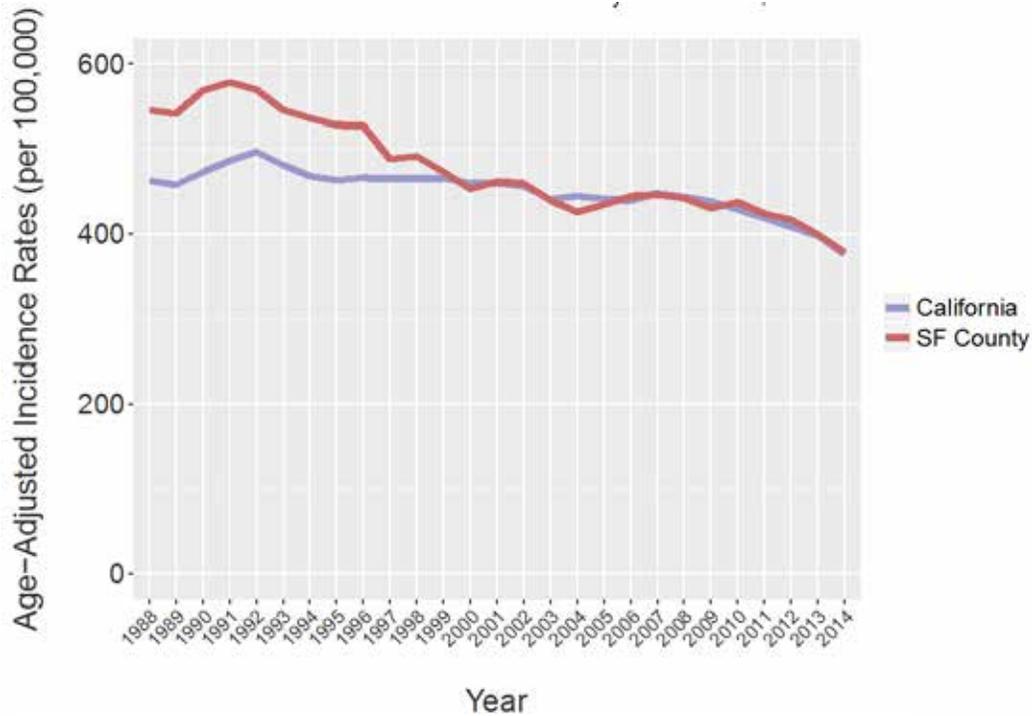
Fig 3. Trends in incidence rate in San Francisco, 1988-2014 (2).

.
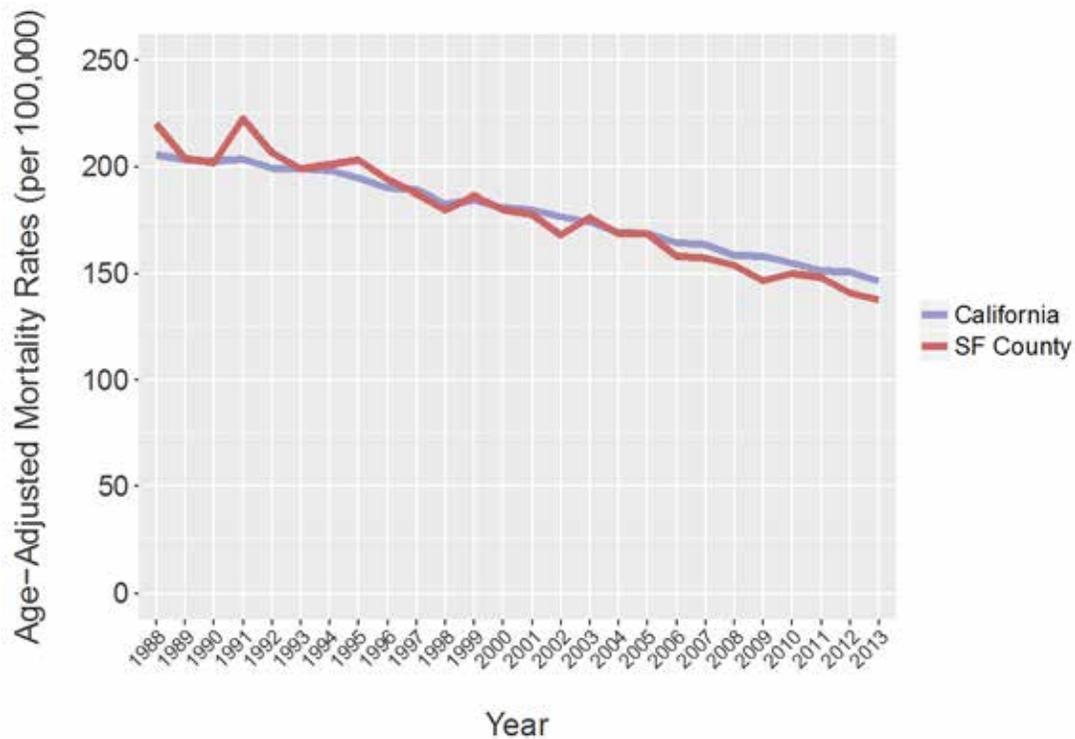
Fig 4. Trends in cancer mortality rates, men and women combined, San Francisco County vs. California, 1988-2013 (2).

The trends above are for all cancers taken together. However, all cancers do not have the same individual population patterns of incidence and mortality. For three of the common cancers (lung, colorectal and prostate cancers) both incidence and mortality are decreasing for all the race/ethnic groups but African Americans consistently have the highest rates for all three of these cancers.

Lung Cancer Incidence, 1988–2014

Lung Cancer Mortality, 1988–2013
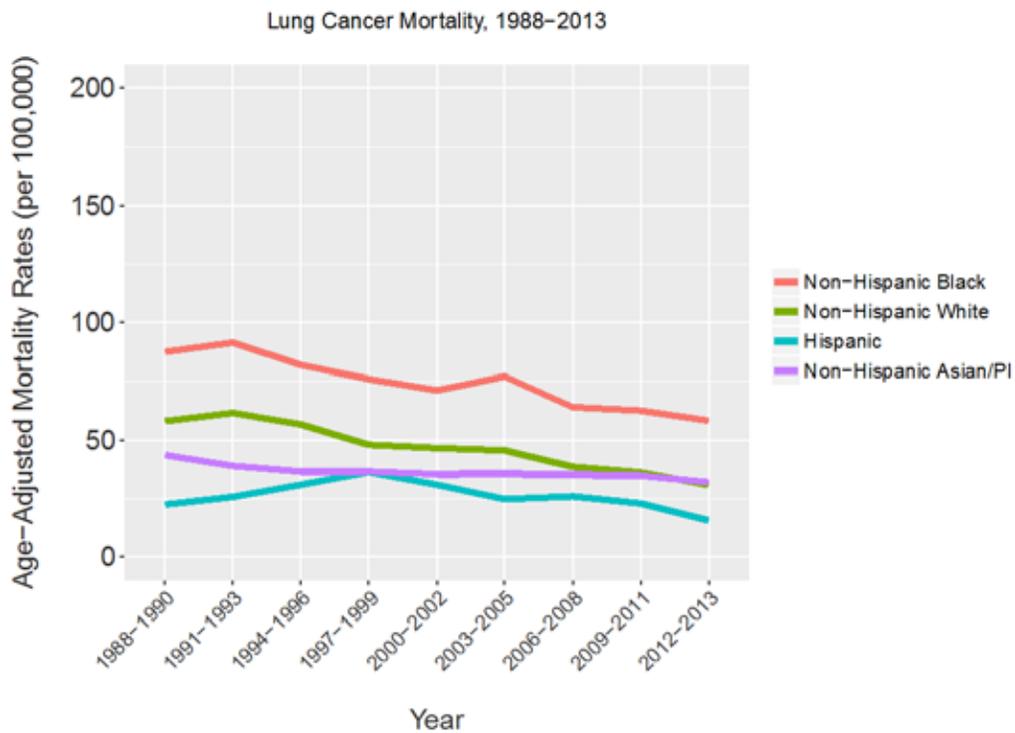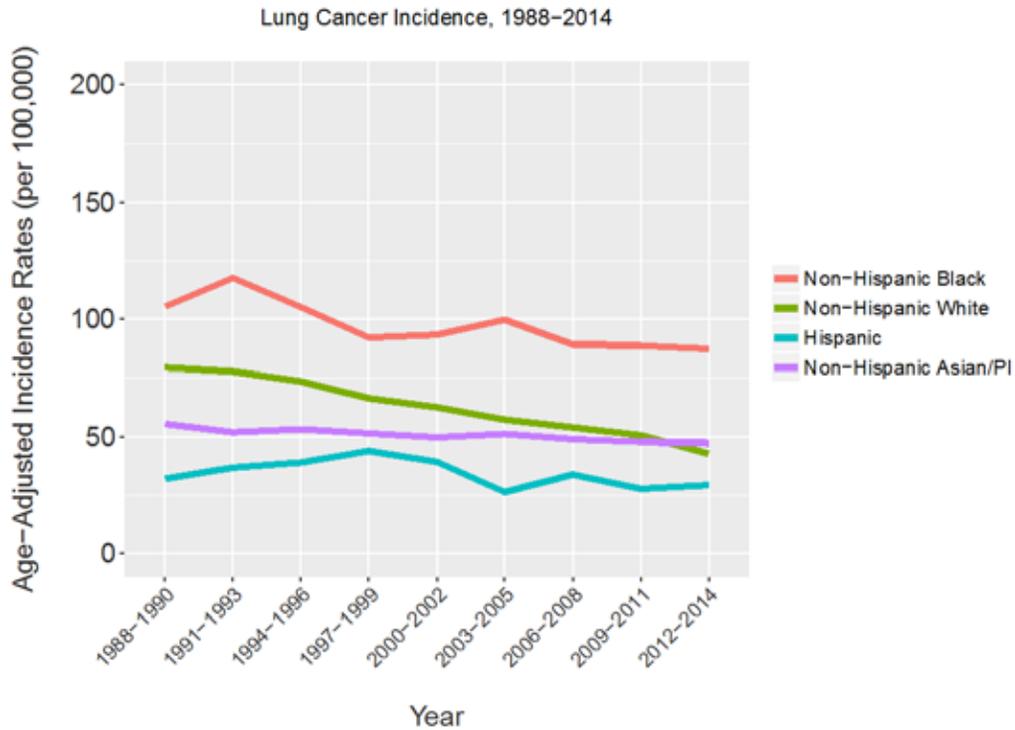
Fig 5 a b. Cancer incidence and mortality trends for lung cancer, 1988-2014, San Francisco, CA (2).
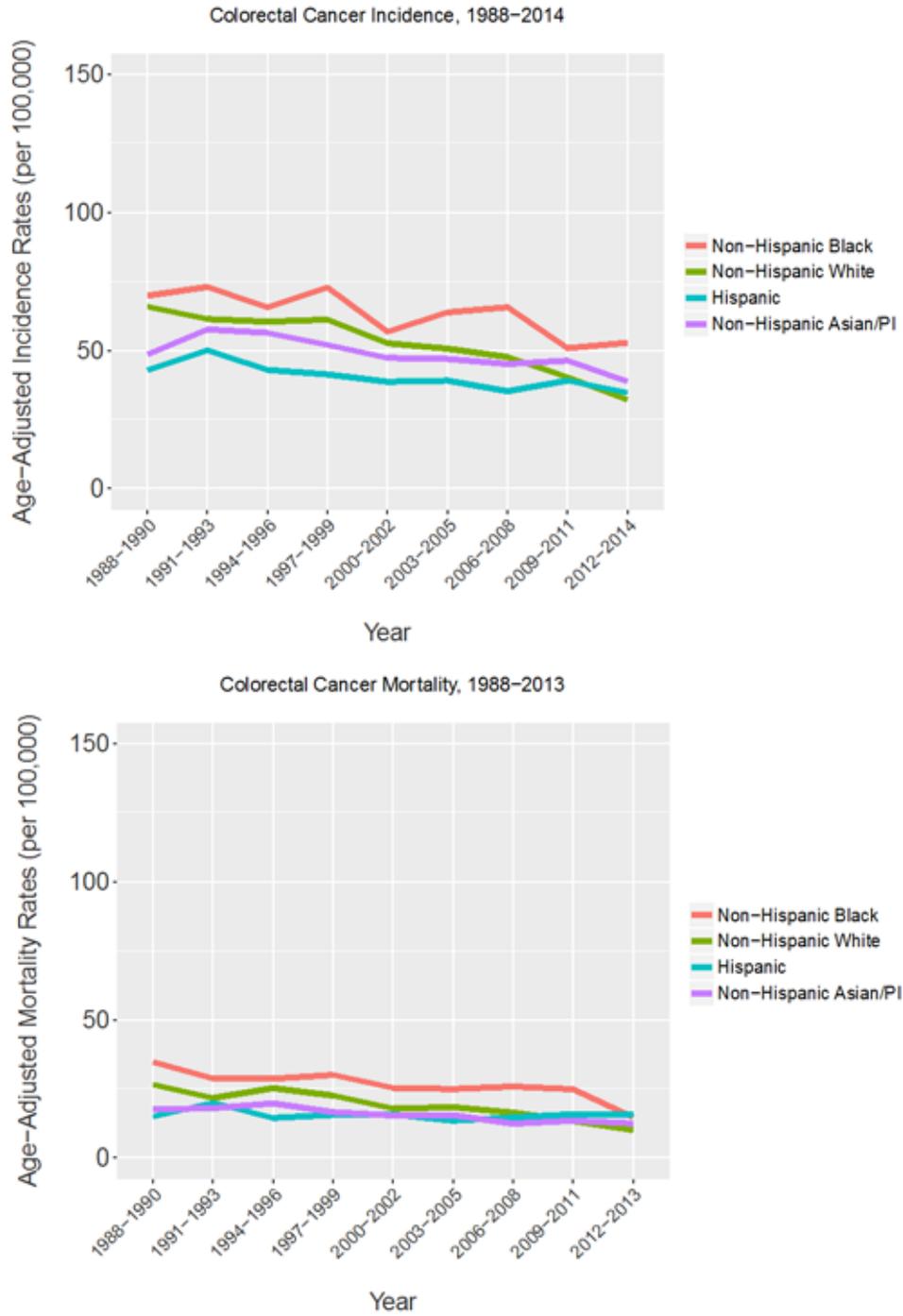
Fig 5 c d. Cancer incidence and mortality trends for colorectal cancer, 1988-2014, San Francisco, CA (2)

Prostate Cancer Incidence, 1988–2014

Prostate Cancer Mortality, 1988–2013
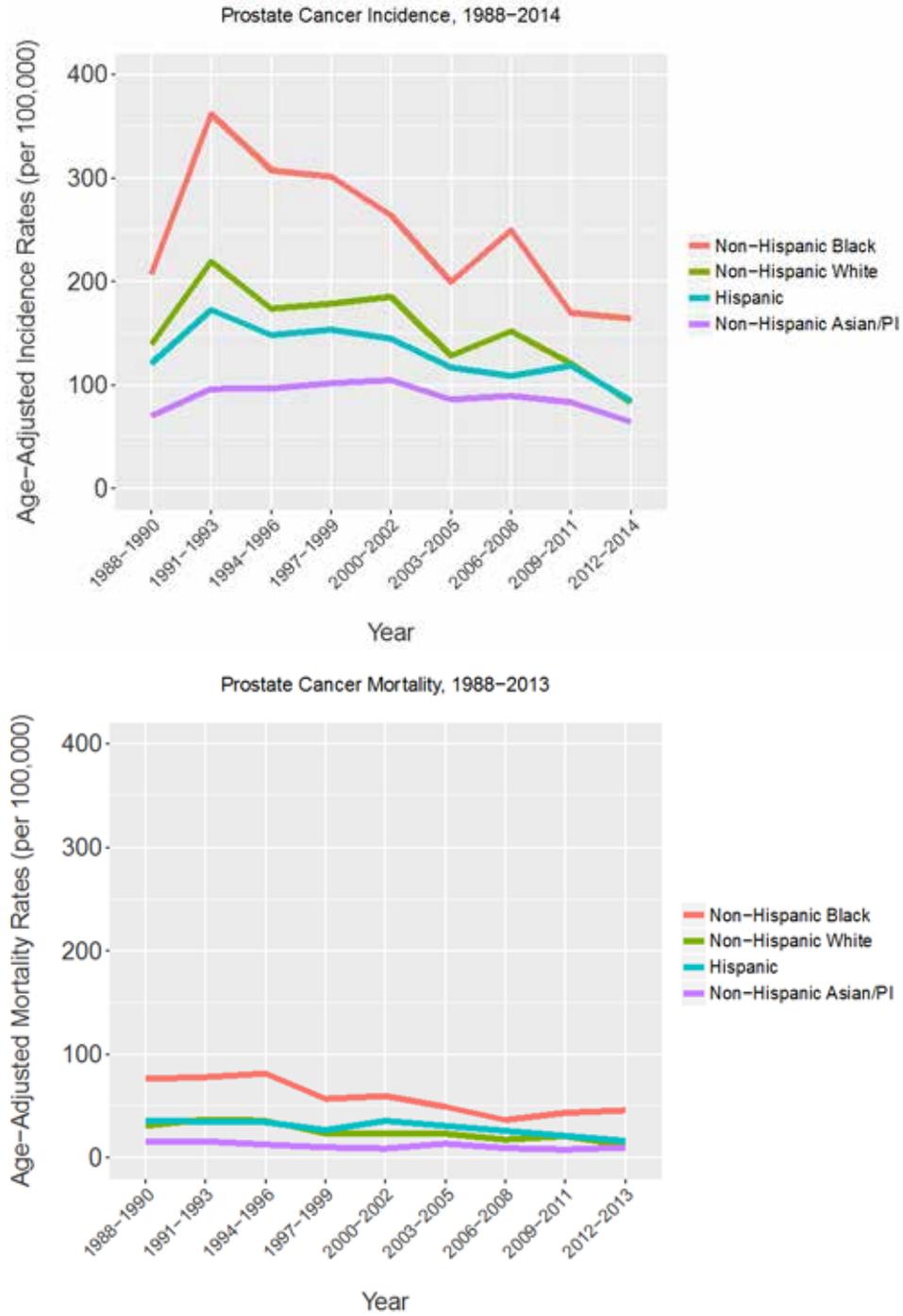
Fig 5 e f. Cancer incidence and mortality trends for prostate cancer, 1988-2014, San Francisco, CA (2).
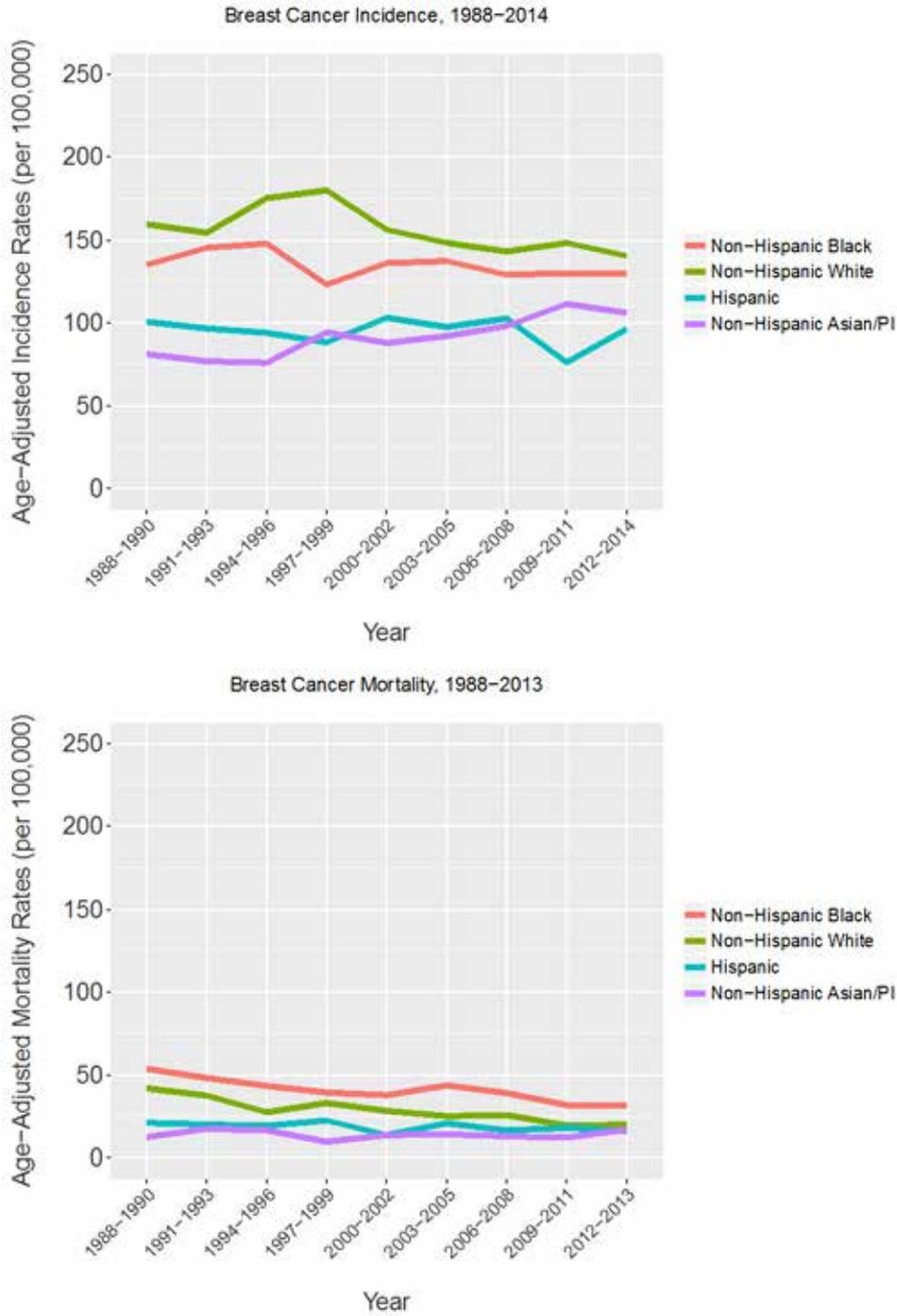
Fig 5 g h. Cancer incidence and mortality trends for breast cancer, 1988-2014, San Francisco, CA (2)

However, several cancers have increased dramatically in the number of new cases. One example of an increasing trend is liver cancer incidence rates, which have always been high

among the Asian American population and are now increasing among African American and Hispanic men. The explanation is not clear but is likely to be a combination of Hepatitis B and C infection, increased rates of obesity, diabetes and non-alcoholic fatty liver disease (12). Another cancer on the increase is melanoma of the skin among white men over 65 years of age. Here the explanation may be from accumulated DNA damage from sun exposure patterns, over the life course (13). Thus, while some cancers are not nearly as common as the top five, their rapid increase makes them a top priority for prevention and treatment as the next line of attack.

Close scrutiny for trends going in the "wrong" direction and for those reflecting increased inequities are both challenges for cancer control efforts in SF CAN.

II. D. Disparities/Inequities

San Francisco is well-known for the richness of its diverse population. In 2015, of its 849,774 residents, less than half were reported as white (404,835 or 47.6%). Asian Americans comprised 34.2% (290,901) of the population compared to 13.8% statewide. African Americans were 5.4% (46,156) and American Indians/Alaska Natives (4,262) and Native Hawaiians and Pacific Islanders (3,601) made up another 0.9%; 15.7% (133,513) were reported as Hispanic (9). This diversity is important for the picture of cancer in San Francisco because, as mentioned above, both the numbers and the rates of new cases and mortality differ, sometimes markedly, by race and ethnicity. In general, and for many years, African American men have had the highest rate of new cancers followed by white men, and Asian American women have had the lowest rate. (Figure 6 & 7) In terms of deaths from cancer, black men again and also black women have the highest mortality rates and Asian Americans the lowest.
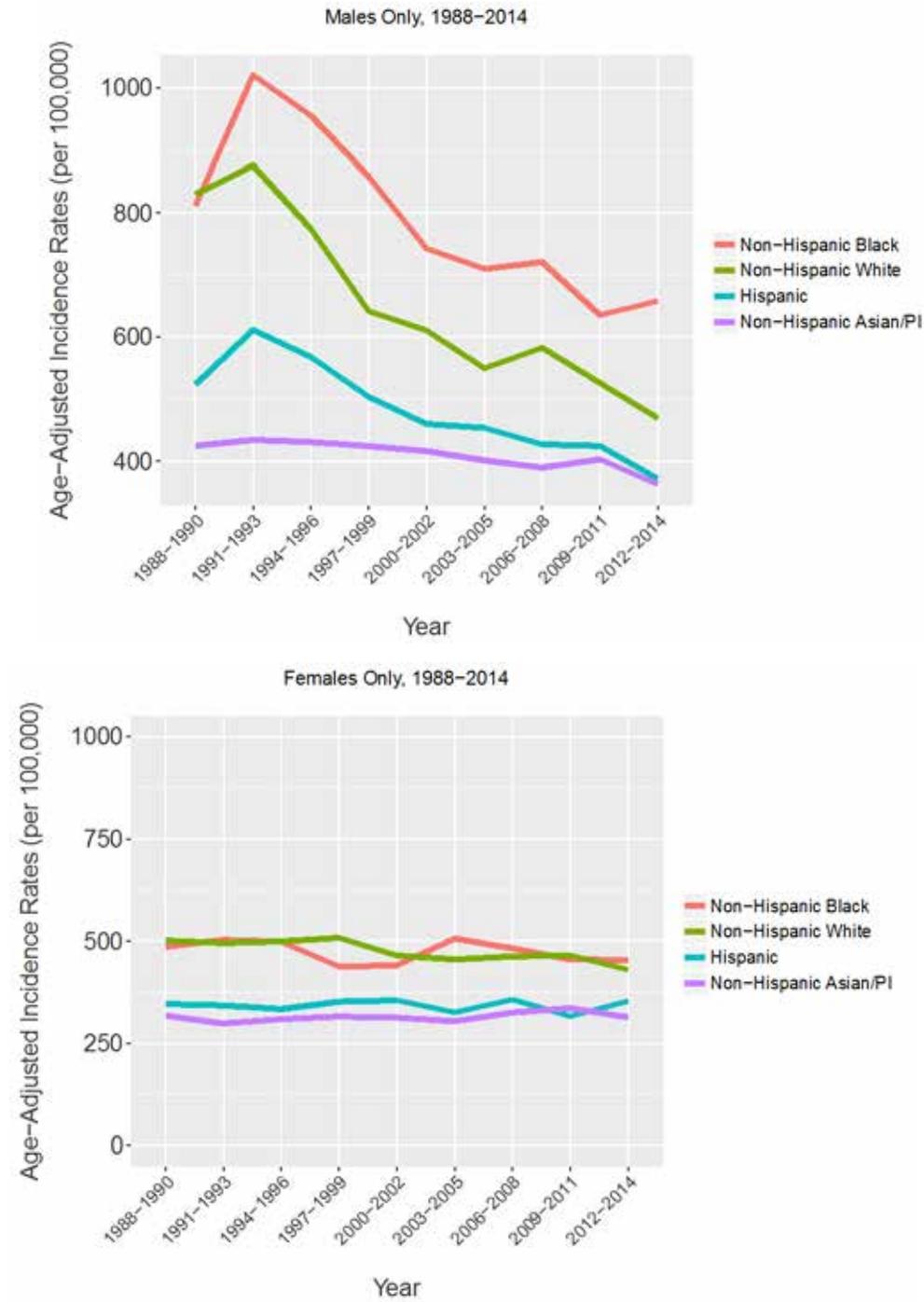
Figure 6. Incidence rates for all cancer sites by major race/ethnic groups, 1988-2014, San Francisco County (2).
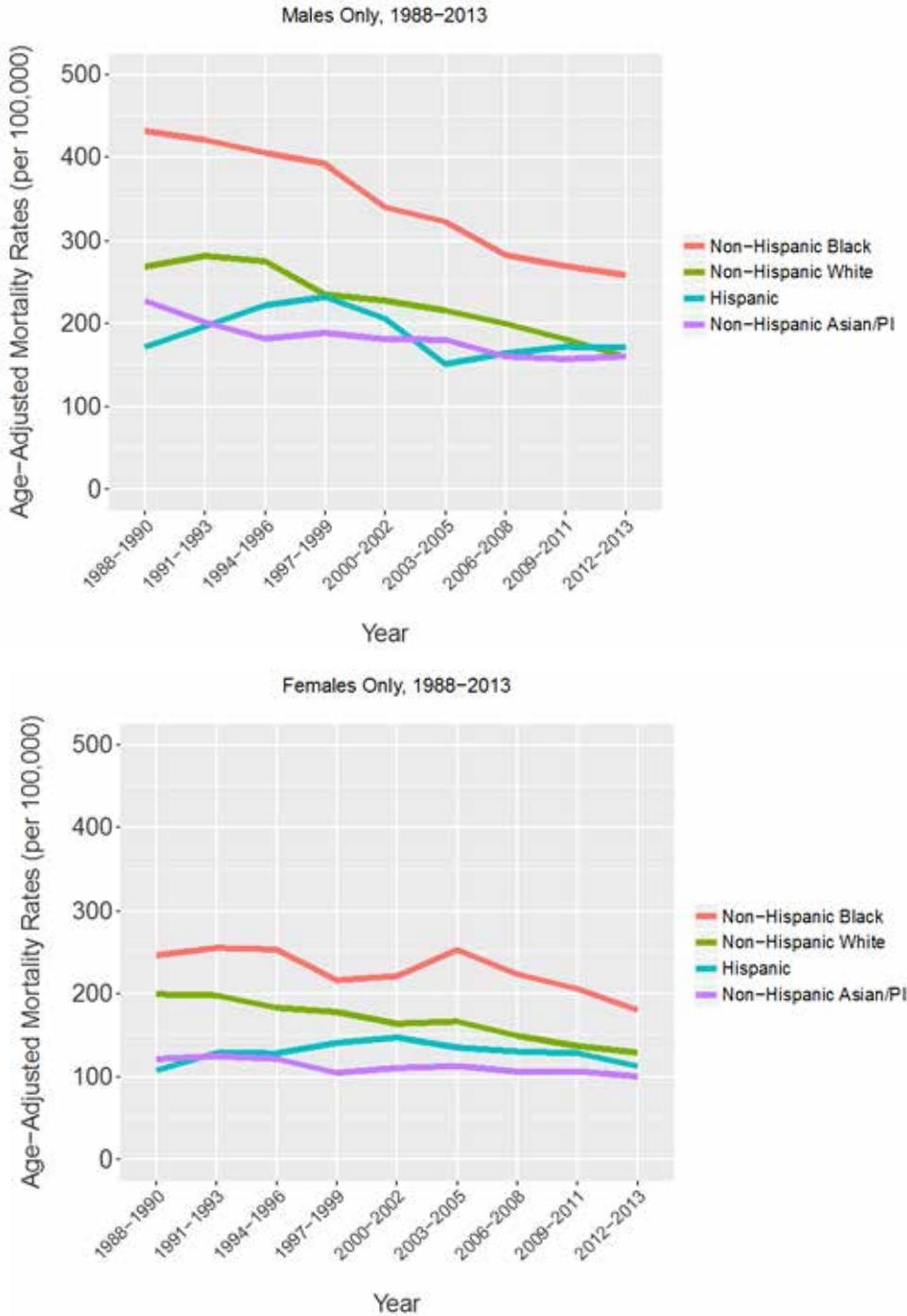
Fig 7. Mortality rates for all cancer sites by major race/ethnic groups, 1988-2013, San Francisco County (2).

Age-specific mortality rates for the most common cancers in the 2009-2013 period (Table 3) further illustrate the extremely high rates of cancer affecting the African American community.

The disparities figure in the last column shows the ratio of the highest rate for any ethnicity to the lowest rate for each cancer site.

The largest of these is for prostate cancer where the mortality rate among black men is 5.1 times that of Asian/Pacific Islander men.

Table 3. Leading causes of age-adjusted cancer death rates by sex and race/ethnicity, San Francisco, 2009-2013 (2).

Cause of Death	San Francisco (All Races/Ethnicities)				Non-Hispanic White				Asian/Pacific Islander				Hispanic				Non-Hispanic Black				Dis-parity
	Count	Rate	LCI	UCI	Count	Rate	LCI	UCI	Count	Rate	LCI	UCI	Count	Rate	LCI	UCI	Count	Rate	LCI	UCI	
a. Men																					
All Cancers	3661	**173.7**	168.0	179.5	1602	**172.3**	163.7	181.2	1317	**158.4**	149.8	167.3	325	**172.8**	153.7	193.4	389	**264.8**	238.1	293.8	1.7
Lung and bronchus	928	**44.8**	41.9	47.8	340	**36.9**	33.0	41.2	421	**50.5**	45.8	55.7	49	**27.2**	19.8	36.1	113	**76.2**	62.3	92.4	2.8
Colorectal	328	**15.5**	13.9	17.3	117	**12.8**	10.5	15.4	139	**16.7**	14.0	19.8	40	**21.5**	15.1	29.4	29	**19.9**	13.1	29.2	1.7
Liver	312	**13.6**	12.1	15.2	86	**8.3**	6.6	10.4	135	**16.3**	13.6	19.3	42	**19.2**	13.6	26.2	43	**24.3**	17.3	33.4	2.9
Prostate	307	**15.2**	13.6	17.1	148	**17.1**	14.4	20.2	73	**8.6**	6.7	10.8	25	**15.9**	10.2	23.2	60	**44.1**	33.3	57.4	5.1
Pancreatic	240	**11.4**	10.0	13.0	118	**12.5**	10.3	15.1	75	**8.8**	6.9	11.1	23	**12.9**	8.0	19.3	24	**15.6**	9.8	23.8	1.8
b. Women																					
All Cancers	3245	**122.5**	118.2	127.0	1385	**133.7**	126.4	141.4	1193	**103.4**	97.5	109.7	326	**121.3**	108.3	135.4	327	**195.2**	174.0	218.5	1.9
Lung	688	**26.1**	24.2	28.2	315	**31.3**	27.8	35.2	251	**21.4**	18.8	24.4	42	**15.4**	11.1	20.9	77	**47.1**	37.0	59.4	3.1
Breast	450	**17.6**	16.0	19.4	204	**19.8**	17.1	22.9	146	**14.1**	11.8	16.7	46	**17.1**	12.5	22.9	53	**31.5**	23.2	42.1	2.2
Colorectal	317	**11.5**	10.2	12.9	121	**11.1**	9.1	13.5	124	**10.1**	8.3	12.1	34	**12.2**	8.4	17.1	37	**20.7**	14.4	29.1	2.0
Pancreatic	281	**10.7**	9.4	12.1	119	**11.8**	9.6	14.3	110	**9.4**	7.7	11.5	22	**8.3**	5.2	12.6	29	**17.8**	11.8	26.0	2.1
Ovarian	154	**6.0**	5.0	7.0	77	**7.5**	5.9	9.5	54	**4.9**	3.7	6.5	13	**4.8**	2.6	8.3	10	**6.2**	2.9	11.8	1.6

Rate (in bold): directly age-adjusted to US 2000 population standard; Green: lowest rate among the four ethnicities shown;
Red: highest rate among the four ethnicities shown

LCI: lower 95% confidence interval of rate
UCI: upper 95% confidence interval of rate   Analyzed by Cancer Prevention Institute of California (CPIC
Disparity: Ratio of highest rate (in red) to lowest rate (green)   Data sources: California Cancer Registry

II. E. Behaviors

It has been estimated that up to 50-60% of cancers could be prevented if efforts were focused on eliminating individual behaviors known to increase the risk of cancer (10, 11). Data on cancer-related behaviors are available from existing monitoring systems at the city, regional, state and national level. The most detailed of these is the California Health Interview Survey (CHIS) (14), which is patterned after the National Health Interview Survey (NHIS) conducted by the National Center for Health Statistics. The CHIS, however, provides a larger sample size than does the NHIS for the state and also detailed data by race and ethnicity.

Foremost among the risky behaviors common in San Francisco citizens is the use of tobacco. Much progress has been made in protecting San Franciscans from the tobacco industry using population-level interventions including clean indoor and outdoor air laws (including e-cigarettes), tobacco-free pharmacies, retail licensing (including density limitations), banning advertising and sales on City property (including Muni), banning free distribution of tobacco products and coupons in public areas (including bars and nightclubs), all of which have contributed to lower tobacco use. The City has also been committed to providing tailored quitting services beyond the State Quit line (including in Russian and Chinese,). However, tobacco use is still the single most important contributor to cancer risk in our population, and more can be done. The most recent CHIS data reports that 13.6% of San Franciscans are current smokers, compared to 12.7% in the whole state, though not a large or statistically significant difference (14). Tobacco use contributes not only to lung cancer, which is the primary cause of cancer mortality in the City, but also to cancers of the bladder, pancreas, cervix, esophagus, and breast among the most frequent sites (15).

Dietary practices are also linked to cancer risk. Obesity has been linked to many cancers including postmenopausal breast cancer and cancers of the endometrium, pancreas, colon and rectum, esophagus and kidney. Overall the NCI estimates that 7% of cancers

in women and 4% in men can be linked to obesity, although for endometrium (corpus uteri) and esophagus the percentage attributable to obesity is substantially higher (~40%). In San Francisco in 2014, 46% of adults were either overweight (BMI $\geq$25) or obese (BMI $\geq$ 30) (14). Red meat and processed meats have been linked to colorectal cancer (16), but, unfortunately CHIS does not collect data on meat consumption. On general principles, a healthy diet should include the consumption of at least five fruits and vegetable servings a day, although the beneficial impact on cancer incidence is weak (17) or non-existent (18). Alcohol consumption puts people at higher risk of a number of cancers including head and neck, esophageal, liver, breast and colorectal cancer. For example, breast cancer risk is modestly increased by 1.5 times for women who consume approximately three drinks per day of any type of alcohol (19). The CHIS data indicate that 6% of women and 18% of men in San Francisco report 3 or more drinks a day.

Closely tied to healthy eating habits is our physical activity, the lack of which is known to increase both the risk of some cancers and the length and quality of life after a cancer diagnosis. Cancers that are less common among physically active individuals include colorectal, breast, endometrium and prostate cancer. In San Francisco our physical activity levels are relatively low with only 22.7% of CHIS respondents reporting more than 30 minutes of exercise a day for 5 days a week. This compares to 26.6 % of Californians statewide.

Screening for cancer in its early stages when it is detectable but undiagnosed is one way of reducing mortality from certain cancers where good evidence exists for the effectiveness of screening. The most common forms of early detection are those recommended for breast, colorectal, cervical and prostate cancer. Methods for early detection of ovarian and some other cancers are under investigation. Breast cancer early detection using conventional mammography is recommended at least for women over 50 years and for those over 40 years in certain circumstances (20). In San Francisco,

52.4% of eligible women have had a mammogram in the last two years, but as many as 32.2% have never even had one. This is substantially higher than the statewide estimate of 22.5% and indicates that there is work to be done. Colorectal cancer screening by any method has been followed by 78.8% of San Franciscans over the age of 50 years, but improvements should be made especially since this is a particularly successful means of reducing both colorectal cancer incidence and mortality. PSA screening for prostate cancer is not recommended by all authorities but is nevertheless common in practice. Data from CHIS in San Francisco indicates that in 2009, 30.9% of all men over 40 had been screened in the last year, in contrast to 50.7% of African American men, among whom prostate cancer is both more common and more lethal. However, primary care providers who serve the black community are confused by the changing and controversial guidelines, and many are pulling back from screening, which may have adverse consequences for African American men.

II. F. Infectious Agents and Cancer

A number of infectious agents are important causal factors in certain cancers and are important to San Francisco because of our large population of Asian Americans, in which cancers associated with infectious agents are more common, and other subpopulations at high risk of infection because of behavioral patterns, such as sexually transmitted infections and injection drug use.

Hepatitis B

Hepatitis B virus (HBV) accounts for about 43,000 new infections per year in the United States (www.cdc.gov/hepatitis/pdfs/iom-hepatitisandlivercancerreport.pdf) and in 2010, 3,630 were reported in San Francisco (Report SFHD 2010). HBV is one of the major causes of liver cancer, which is now the fifth most common cause of cancer deaths in the city and responsible for 414 deaths in the 2009-13 period. HBV infection can be transmitted by sexual contact as well as needle stick injuries and injection drug use. HBV infection has been more common in foreign-born Asian populations and their offspring because of transmission from mothers who are chronic carriers of HBV to

their children during delivery, but rates are now increasing in Latino and black populations, who are more likely to be infected as injection drug users (IDU). This is a preventable infection through vaccination of newborns and measures to control IDU.

Hepatitis C

Hepatitis C virus (HCV) is the other major cause of liver (or hepatocellular) cancer. In 2010 there were over 3,101 cases of HCV infection reported in San Francisco. This is probably an underestimate since infection can be subclinical without symptoms. Both chronic HCV and HBV are asymptomatic and carriers are unaware that they harbor the viruses. HCV, like HBV, is transmitted by sharing of blood with an infected individual via injection drug use, blood transfusions or needle stick injuries. There is no vaccine for HCV. However, there are now a number of highly effective antiviral drugs on the market with a high cure rates. However, the extremely high cost of these drugs remains a barrier to controlling this major cause of liver cancer.

Human Papilloma Virus

Human papilloma virus (HPV) is now thought to cause more than 90% of cervical and anal cancers and for 60-70% of oropharyngeal, vulvar, vaginal and penile cancers. These are less common cancers in San Francisco. The most common of them is cervical cancer, which is responsible for 36 deaths in San Francisco in the 5-year period 2009-13. However, these are cancers that can be prevented in future generations by HPV vaccination, which has been shown to be highly effective. Its application in young people before the onset of sexual activity has been controversial and more needs to be done to realize the full extent of its preventive potential. As HPV vaccination is not recommended for adults after the onset of sexual activity, more research is needed to understand how to screen for or otherwise prevent HPV-related cancers in adults.

Human Immunodeficiency Virus (HIV)

HIV infection is associated with certain cancers. People infected with HIV have a dramatically higher risk of these cancers than those without HIV infection. Three of these cancers are known as "AIDS-defining malignancies" because they can define the

transition from HIV infection to AIDS: Kaposi's sarcoma, non-Hodgkin's lymphoma and cervical cancer. Several other cancers are more common in HIV infected individuals including anal, liver, lung cancer and Hodgkin's lymphoma. (21). Although HIV is less prevalent now than earlier in the AIDS epidemic, San Francisco is still 21st in among the U.S. cities with the highest rates of persons aged 18-64 living with HIV. HIV-related malignancies are an important part of the cancer burden in San Francisco citizens. Non-Hodgkins lymphoma, for example, is the 5th most common new cancer and 9th most common cause of cancer mortality. Continuing efforts to eliminate HIV infection citywide could eliminate contributions to the cancer burden in San Francisco.

II. G. Social Determinants

As with overall mortality and other major chronic diseases, overall cancer incidence is more common in the less advantaged in society and decreases continuously in a gradient as one goes up the socioeconomic ladder (22, 23). There are important exceptions to this observation, notably breast cancer and melanoma, but overall most cancer occurs in more disadvantaged populations (24). Cancer incidence reflects etiologic factors prior to diagnosis and provides valuable information for prevention practices. Cancer mortality is confounded by access to and the quality of cancer care, which are not etiologic factors for cancer onset but nevertheless reflect social factors important to understand when seeking ways to reduce health inequalities in cancer survival (25). Social gradients for all cancers taken together are not as strong as for cardiovascular disease, but they can be documented in large populations and for specific cancers and beg for an explanation. More work is needed to determine if there are social gradients in cancer in San Francisco and if so, we will seek explanations for their existence and methods to intervene. Working with our partners in the city we can address these social factors and policies that contribute to the cancer burden.

Many questions need answers. Can the social gradient be explained by tobacco use alone? Tobacco use is certainly a major cause of cancer, not only of the lung, but also for several other sites. However, some preliminary data suggests that even without

tobacco related cancers, the inverse gradient is still observable. If this observation is confirmed, then a whole series of important questions follows. What is it about socioeconomic position (SEP) that might influence cancer incidence? Is it purely behavioral differences with better-educated and better-resourced individuals able to follow a healthier lifestyle associated with lower cancer incidence? Is this explanation helpful for cancer sites for which behaviors or known risk factors are still unknown? If not explained by behavioral gradients, is there something else about higher SEP that is protective? Finally, what might be the biological or psychological mechanism for this effect? Knowing the answers to these questions will help focus prevention efforts in San Francisco where they will be most effective, whether it be smoking cessation programs, improvements in lifestyle behaviors, including better adherence to screening recommendations, or more basic research to understand the influence of social factors and health related policies on the cancer burden.

II. H. The Costs of Cancer

According to a study by the Agency for Healthcare Research and Quality (AHRQ), the costs of cancer in the U.S. in 2011 were $88.7 billion, 50% of which was for hospital outpatient or doctor office visits, 35% for inpatient hospital days, and 11% for prescription drugs. In 2020 the projected cost of cancer in California will be the highest in the nation at $28.3 billion. For San Francisco, our own analysis for the costs of care by cancer site in 2012 (Table 5) indicates substantial variability by individual cancer site and a total cost of over $200M a year for these most common cancers. This does not take into account time lost from work and other productive activities, but the financial burden of cancer even without these costs is clearly substantial for San Francisco.

Table 5. Healthcare costs of cancer, San Francisco, CA 2012

Cancer	(1) ICD-9 Code	(2) Hospital Discharges (2009)[1]	(3) Mean Hospital Charge per Discharge (2009)[1]	(4)=(3)* 1.05174 2009 Charges converted to 2012 charges[2]	(5)=(4)* .2717 2012 Charges converted to Costs[3]	(6) Incidence 2008-2012[4]	(7)=(6)/5 Annual Incidence	(8)=(5)*(7) Total Hospital Costs for SF Incident Cases	(9) Ratio of Total US Healthcare Expenditures to US Hospital Expenditures[5]	(10)=(8)*(9) Total Healthcare Costs for SF Incident Cancer Cases[6]
Breast	174	101	$64,765	$68,116	$17,597	2811	562	$9,892,861	8.44	$83,495,750
Colon & Rectum	153-154	299	$108,864	$114,496	$29,578	1984	397	$11,736,644	3.72	$43,660,314
Lung	162	299	$92,846	$97,650	$25,226	2292	458	$11,563,775	3.14	$36,310,254
Prostate	185	134	$60,490	$63,619	$16,435	2379	476	$7,819,774	2.68	$20,956,995
Liver & Intraheptic Bile Ducts	155	122	$63,612	$66,903	$17,283	817	163	$2,824,108	4.29	$12,115,425
Uterus	179	1	$182,535	$191,979	$49,595	634	127	$6,288,616	1.88	$11,822,597
Pancreas	157	90	$104,657	$110,072	$28,435	618	124	$3,514,601	1.41	$4,955,587
TOTAL										**$213,316,922**

[1] From 2009 OSHPD Hospital Discharge Data
[2] Using the ratio of the GDP deflator for 2012:2009 (=105.174/100.0 = 1.05174)
[3] Using the OSHPD 2012 Cost-to-Charge ratio=.2717
[4] From California Cancer Registry
[5] Ratios were derived from the 2011-2012 Medical Expenditures Panel Survey, adjusted to 2012 dollars using the GDP deflator. Separate ratios were calculated for each cancer. Genders were combined due to small sample sizes. Total healthcare expenditures include inpatient hospitalizations, office visits, outpatient visits, ED visits, medications, and home health care.
[6] Estimated as the SF hospital costs times the ratio of US total healthcare expenditures: US hospital costs

III. What Can Be Done?

In this next section we identify what can be done to address the cancer burden just described and summarize activities of HDFCCC scientists who have been working on finding ways forward in this task.

Pathways to cancer prevention through behavioral change have been well documented, and interventions have been tested and applied at the individual, group and population level. As mentioned before, perhaps 50-60% of new cancers could be prevented if known causes and unhealthy behaviors could be eliminated (10). Continuing efforts to achieve just that goal need to be rigorously pursued in San Francisco. However, there may well be more fundamental aspects of cancer causation and mortality that have been overlooked because they are not well understood, their mechanisms unclear and the most effective interventions or policies not yet defined. A fresh look at cancer prevention can and should be more comprehensive to take into account multiple levels of causation, social determinants and a more interdisciplinary approach.

We need a long-term commitment to making a difference in the cancer burden in San Francisco. Some actions can have an effect within a few years, while other efforts must be sustained over a longer period, perhaps 10-20 years to have a measurable impact. Cancer can take many years to develop and may even have its origins in early life development for some types, such as breast cancer. Thus prevention strategies have to take into account this longer timeframe, while other measures that can detect cancers early, improve diagnosis and treatment and the quality of life after cancer may have improvements in a shorter period of time.

One way to organize our thinking and actions is to follow the framework of the cancer continuum (Figure 8) that sees cancer development from the time someone is simply at risk of disease (prevention), to when an early cancer can be detected (screening), to its

proper diagnosis and treatment (clinical care), to finally the quality of life someone experiences after acute treatment (survivorship).
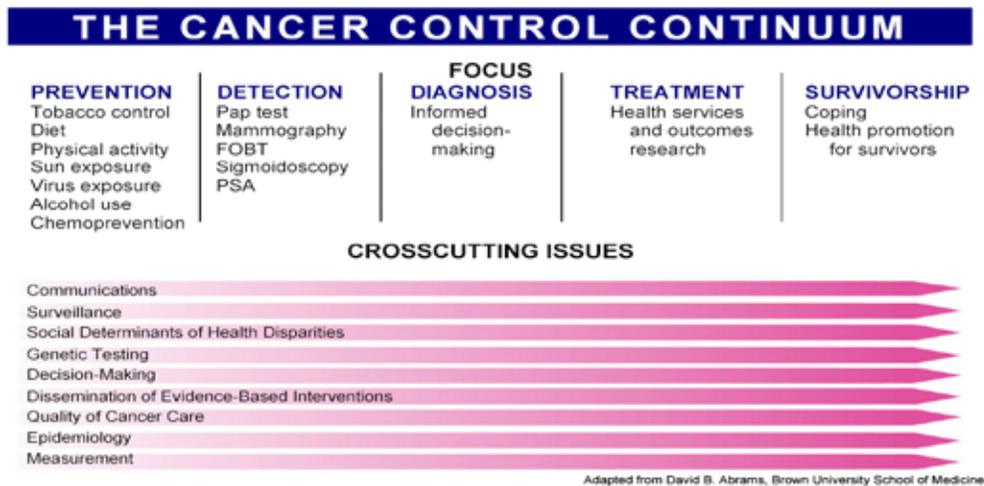
Fig 8. The Cancer Control Continuum

At each stage of the continuum there is both research to be done and interventions to be developed and implemented. Crosscutting issues such as communications, surveillance and social determinants apply to each phase and extend across the continuum.

IV. Who Can Do It?

A major initiative of this complexity will require the work of talented and committed individuals, team collaborations, and support of institutions and partnerships. The City and County of San Francisco and its Department of Public Health, partnering with the community, local health systems and practitioners will be supported by UCSF cancer researchers as the "backbone" of the initiative. UCSF and the San Francisco DPH are partnering with the community and local health systems and practitioners in a collective impact effort as no one institution can accomplish the goals we have set for ourselves.

There are a number of models of successful partnerships, such as the San Francisco Health Improvement Project (SFHIP), to learn from, but much more work needs to be done to lay the groundwork for a major effort to have a substantial and sustained impact on cancer. Again, the goal is to focus down on the cancer burden in San Francisco and target the specific decisions that we know can make a measurable difference in preventing cancer, its detection and treatment, and the post-treatment care people receive as they go on living their lives.

The UCSF researchers who work in this area and who have already made contributions are many. We have identified numerous individual scientists, clinicians, research teams and community partners who have made great progress in the fields of cancer prevention, early detection, diagnosis and treatment and survivorship. [We have not listed and summarized their work in this document, but this information can be provided on request].

V. Partnerships

In the process of conducting the research referred to above and in other collaborative activities, UCSF investigators have developed extensive partnerships with community organizations and entities that will be critical in advancing a San Francisco wide initiative to accelerate the decline of the cancer burden in our city. Some of these partnerships are:

- **San Francisco Health Improvement Partnership (SFHIP).** Led by Dr. Kevin Grumbach, Chair of Family and Community Medicine, this cross-sector initiative is designed to improve the health and wellness of all San Franciscans. SFHIP has combined into one aligned framework the efforts of non-profit hospitals, Building a Healthier San Francisco, the UCSF Clinical and Translational Science Institute (CTSI) and the Department of Health and its community health improvement process. The

successful SFHIP model has not directed any efforts toward cancer control but provides an example of how a citywide partnership initiative can work.

- **The UCSF Helen Diller Family Comprehensive Cancer Center Community Advisory Board**, established in 2005, comprises representatives from the diverse geographic areas, ethnicities, and lifestyles of San Francisco and Northern California. Members include representatives of community-based organizations, state and local health departments, community hospitals and medical practices, clergy, and cancer survivors and advocates. Its Chair, **Arnold Perkins**, is a key contributor and supporter of SF CAN and the initiative benefits from his years of experience as Director of the Alameda County Health Care Service Agency.

- **Neil Powe, MD, MPH, MBA,** is Vice-Chair of Medicine and Chief of Medicine at the Zuckerberg San Francisco General Hospital, the primary public hospital in San Francisco. His past work has been in patient-oriented research, clinical epidemiology and outcomes and effectiveness research using randomized controlled trials, cohort studies, cost-effectiveness analysis, meta-analysis, retrospective analyses of administrative databases and survey research. He will be key in effecting change and cancer control interventions at ZSFGH and is committed to SF CAN.

- **Dr. Robert Hiatt**, working with **Dr. Kirsten Bibbins-Domingo**, is part of a UCSF faculty group working with faculty from San Francisco State University (SFSU), including Dr. Leticia Marguez-Magana, on the **SF BUILD** project to provide more opportunities for minority students to succeed in science. This partnership will provide many opportunities for students and faculty on both campuses to apply themselves to projects in San Francisco relevant to the needs of the community.

- **Dr. Pamela Ling** has been working on an e-cigarette and youth project with a partnership between **Youth Radio, the California Adolescent Health Collaborative, and UCSF**. The Steering Committee for this partnership includes representatives from the **American Lung Association, Americans for Nonsmokers**

Rights, the **Alameda County Department of Health, and the California Youth Advocacy Network**.

- **Dr. Stan Glantz** and his colleagues in the Center for Tobacco Control, Research and Education have had a long collaboration with the **San Francisco DPH** and their tobacco control activities.

- **Dr. Tung Nguyen**, along with Kevin Grumbach, M.D., is leading the **San Francisco Hepatitis B Quality Improvement Collaborative**, whose express goal is to assess and improve the quality of care provided to patients with chronic hepatitis B in the City and County of San Francisco. They have been working with **Brown & Toland, Hill Physicians, Community Health Network, UCSF, Northeast Medical Center, Chinese Community Healthcare Association, Kaiser-San Francisco, SF Department of Public Health, and SF Hep B Free**.

- **Dr. Nguyen** and others have convened Asian American health researchers in the SF Bay Area through the **Asian American Research Center on Health**. About 80% of the 54 individual and organizational members are based in San Francisco.

- **Dr. Michael Potter** directs the **San Francisco Bay Area Collaborative Research Network (SFBayCRN)**, which is UCSF's core resource for primary health care practice based research. Among many other projects, this network has supported work by **Dr. Nguyen** on the HBV Collaborative.

- **Dr. Rena Pasick, as Director of Education and Outreach for the HDFCCC** has partnered with **70 African American churches in SF, Alameda, Contra Costa and San Mateo** with a range of cancer prevention and early detection programs, and the formation of an initiative designed to build the capacity of church health ministries to promote the health of their own communities. She has also partnered with the **John Hale Medical Society** to conduct a CME needs assessment among African American community physicians related to prostate cancer treatment.

In this final section, based on the information presented above, we identify areas where we think the largest impact on cancer prevention, treatments and follow-up care can be made.

VI. Interventions, Practices and Policies that Could Make a Difference in San Francisco

Given the nature of the cancer burden in San Francisco and the expertise that has been marshaled to work to reduce this burden, what are the likely actions, both short and long term, that will make the biggest difference? We have set as our goals not just the long-term reduction in cancer outcomes, but the more immediate intermediate endpoints that indicate that we are on the right track to success. We know, for example, that certain changes in behavior, such as cessation of tobacco use or following recommended screening practices, will reduce cancer mortality. We must, therefore, begin with ensuring that we are doing all we can to guide all people in San Francisco to follow those behaviors. Likewise, we know that changes in social policies that have an effect on cancer morbidity and mortality in the longer term must first be developed and argued on the basis of the best evidence as an intermediate goal.

In response to the introduction of the SF CAN Initiative to research faculty at the HDFCCC, numerous ideas for action have been generated. From these ideas we have selected areas that are most likely to have a measureable impact on the cancer burden in the City and County of San Francisco in the relatively near term. We are focusing on five of the most common cancers for which we have scientific evidence for the effectiveness of prevention and early detection practices: breast, lung, prostate, colorectal and liver cancer. We have formed five SF CAN Task Forces to develop a strategic approach to these cancers of major concern because of their numbers, their adverse trends or the magnitude of the disparities that exist in onset and outcomes. The charge to these Task Forces is to identify measureable goals, timelines and resources needed for a sustained effort to reverse trends, reduce disparities or

accelerate the overall decline in cancer incidence and mortality. Additional efforts will be directed to less common cancers as SF CAN becomes established. In addition, SF CAN leadership will develop a communication plan pertaining to the development, coordination, and dissemination of information about SF CAN and its projects, informing the San Francisco political leadership and other stakeholders in the city to help shape public opinion about policy interventions.

Finally, in this section we present ideas that cut across cancer sites to support the quality of life after cancer diagnosis and treatment at the community level. There may also be opportunities to use new technologies and the electronic health record (EHR) in particular to take advantage of existing cancer partnerships and build new ones across the city for better communication and overall improvement in cancer care for San Francisco citizens.

VI. A. Lung and Other Tobacco-Related Cancers

The largest impact overall is likely to follow concerted action in tobacco control. The country has already seen a dramatic shift in social norms regarding the use of tobacco. Much of the downward trend in both cancer incidence and mortality since the 1990s can be attributed to decreased consumption following changes in tobacco policy like clean indoor air laws, advertising bans and taxes on tobacco purchases. Tobacco control efforts will not only have an effect on San Francisco's number one cancer killer, lung cancer, in both the intermediate and long term, but also on other common cancers such as pancreas and urinary bladder (15).

The Tobacco Task Force is focused on
- Promoting smoking cessation and smoke-free environments in San Francisco low income and high cancer risk populations, including in homeless shelters, drug and alcohol treatment centers.
- Decreasing tobacco use among high risk young adults

- Restricting sale and distribution of menthol cigarettes and other flavored tobacco products around schools.

Specific efforts can be directed to a number of policy interventions that could have a major impact on San Franciscans as well as other local and state jurisdictions.

VI. B. Colorectal Cancer

According to 2011 California Cancer Registry data, only 45% of colorectal cancers are diagnosed at an early stage. In San Francisco, the rates of early stage diagnosis of colorectal cancer are 51% for women and 45% for men. **Research by UCSF investigators** suggests that community outreach coupled with patient navigation could significantly increase screening rates and early stage diagnosis. The Task Force will work to increase the screening rate to 80% through interventions, training, and technical assistance to the safety net clinics.

Within the safety-net system at SFGH, which is relatively contained, **Dr. Ma Somsouk** finds that people are able to go to other outside health care systems to receive care, but that information does not get updated within our EMR. This problem is less relevant in a contained system such as Kaiser. Consequently, if the clinical activities are not captured, it is challenging to know who needs outreach. A comprehensive patient tracking system would address this problem, although this issue raises privacy concerns that would have to be overcome in a community partnership.

Addressing follow up of abnormal tests, **Dr. Somsouk** and colleagues have data in the safety-net population showing that getting a colonoscopy after an abnormal stool-based screening test is unfortunately low – only 58% undergo a colonoscopy one-year following an abnormal fecal immunochemical test. This is a high-risk population, and the underinsured and low SES disproportionately experience difficulty setting aside time to follow through with their diagnostic examination. This is likely a recurring theme across multiple screening tests. The Task Force long term aim is to have at least

80% of patients with abnormal FIT in the safety net clinics complete a colonoscopy within one year.

VI. C. Liver Cancer

To reduce the burden of liver cancer and viral hepatitis among Asian Americans and other populations in San Francisco, the work of **Dr. Tung Nguyen** and others suggests that the following efforts are needed:

- Better research on the biological and other factors leading to the development of liver cancer among those infected with viral hepatitis, including better elucidation of the effect of known carcinogenic factors such as steatohepatitis, alcohol, and co-infection of hepatitis B and C.
- Better research on patient, provider, and healthcare system factors that play in treatment and survival.
- Improving the monitoring and treatment of patients infected with viral hepatitis B and C from all race/ethnic backgrounds.
- Better communication with healthcare providers who treat patients at high-risk for liver cancer.
- Better patient and community engagement on appropriate monitoring and treatment for those at high-risk for liver cancer.

VI. D. Breast Cancer

Breast cancer is the most common cancer in women and the fourth most common cause of death from cancer. Much progress has been made in understanding the causes of breast cancer, but few options for prevention at the population level exist. Early detection by mammography has proven to lower mortality, especially for women over 50 years, but conventional mammography is unlikely to offer many new opportunities to advance the field.

- A new way to study and treat breast cancer was launched at the University of California, San Francisco (UCSF) in 2011 that is screening women for the disease and providing them with individual assessments of their risk of developing the

cancer. Led by **Dr. Laura Esserman** across the UC system and **Dr. Laura van t 'Veer** at UCSF, this new effort is opening the door for new advances in breast cancer for the women of San Francisco and beyond. Called the ATHENA Breast Health Network, the project is a collaboration among the five University of California medical campuses through which some 150,000 women throughout California will be screened for breast cancer and tracked for decades.

- The WISDOM trial is a new major initiative of the ATHENA Breast Health Network that will test new approaches to breast screening based on detailed risk profiles that will direct the frequency of screening based on the level of risk of individual women. An example of the potential benefits of precision medicine, the WISDOM trial is open to women in San Francisco and is a cutting edge approach to further progress in reducing both the incidence and mortality from breast cancer.

- Other efforts are focused on disadvantaged populations and breast cancer screening in the city. Mammography facilities serving a high proportion of minority and immigrant (limited English proficient) women have substantially longer delays in follow-up of abnormal mammograms than those serving white, higher SES women. This is in part due to fewer resources for tracking and communicating with women and referring physicians, as well as for staffing follow-up imaging and biopsy appointments. Because these delays are a contributor to later stage diagnosis, and thus worse outcomes for breast cancer, **Dr. Leah Karliner** supports an intervention to enhance processes of care (tracking, outreach/communication and care coordination, scheduling availability) for timely follow-up at these resource-strapped facilities, which would lead to improved outcomes for vulnerable women.

VI. E. Prostate Cancer

Prostate cancer is unique among the major cancers appropriate for early detection because of controversy surrounding the efficacy of the only available screening test, prostate specific antigen (PSA), and the fact that major guidelines discourage routine

use of the PSA in favor of informed decision-making between patients and their physicians. However, one population -African American men- should likely be screened more, while other groups, except for those with a family history, are probably better off with less screening.

The problem with the PSA test is that it does not differentiate low risk indolent prostate cancer, which may never spread and threaten life, from the more deadly forms of the disease. Historically all men diagnosed with prostate cancer have been treated aggressively, causing life altering side effects to many who did not need the treatment they received. In this context, African American men face triple jeopardy. First, African American men bear the greatest burden of prostate cancer incidence and mortality, and they are more likely than other groups to be diagnosed at advanced stages, leading many experts to conclude that African American men should be screened to detect aggressive disease detectable on biopsy. Concerns regarding "over-treatment" of men with low-risk disease can be met by instituting "watchful waiting" protocols as part of quality consortia across the city to ensure that these men are given quality care if and when they need it. Second, the fact that this population is disproportionately of low health literacy adds to the communication challenges in underfunded, time-constrained public health clinics. Third, once tested, African American men experience limited access to diagnostic services and treatments that do not meet standard practice guidelines. Other than race and family history, there are no other known risk factors for prostate cancer and primary prevention measures do not exist.

Research is needed to identify a more sensitive and specific test that differentiates prostate cancer levels of aggressiveness. Researchers at UCSF have led the field in refining active surveillance, a less invasive approach to low-risk prostate cancer that avoids over-treatment while tracking any changes that warrant more active treatment.

VI. F. Other Cancers

Other cancer sites also contribute substantially to the cancer burden in San Francisco, but present few targets for cancer control. **Pancreatic cancer** accounts for approximately 104 deaths per year in San Francisco, more deaths than either breast or prostate cancer. However, we still know very little about the causes of pancreatic cancer and have no methods to either prevent it or detect it early for prevention purposes.

Ovarian and Stomach Cancer and Non-Hodgkin Lymphoma are the next three most common causes of cancer death in San Francisco and together account for 124 deaths each year. As with pancreatic cancer, no preventive measures or early detection procedures are proven to be effective. However, the elimination of HIV infection in San Francisco will contribute to decrease rates of Non-Hodgkin Lymphoma in infected individuals.

Other less common cancers are amenable to evidence-based interventions include: **Cervical Cancer** (~7 deaths per year) for which HPV and cytologic screening are well established and effective; **Melanoma** (~16 deaths per year), which is increasing dramatically in older white men and could be stabilized or reduced if appropriate sun protection practices were followed; and **Esophageal** (~31 deaths per year) for which reductions in obesity may have a substantial impact.

The support of HPV vaccination deserves special mention. Eight years after FDA approval of the HPV vaccine for females and three years after approval for males, only 38% of adolescent females and only 14% of adolescent males have completed the three-dose vaccination series. These indicators are well below the Healthy People 2020 HPV vaccination goal of 80% coverage for females and males age 13-15 who complete the three-dose vaccination series. Although low-income and minority adolescents are equally or more likely to start the HPV vaccination series than are white and higher-

income adolescents, they are less likely to complete the three-dose series. Latinas were less likely to complete the series (40.3%) compared to white non-Hispanics (60.4%) and blacks (46.0%).

VI. G. Coordination of Cancer Care

In addition to the cancer-specific Task Forces there will be opportunities to take advantage of electronic health record (EHR)-empowered communication, coordination, and data sharing in the areas of cancer prevention and screening across San Francisco. UCSF, Kaiser Permanente, and Sutter Health are already partially linked through the Epic EHR (the "care everywhere" feature), and this feature could be enhanced if these organizations wanted to work together on a city-wide level. In addition, as the SFDPH switches over to Epic, the potential for such collaboration with settings serving the most vulnerable SF populations would be greatly magnified.

VII. Charge to Task Forces

The Task Forces, which have membership not only from UCSF scientists and clinicians, but from the DPH, other health care systems and community representatives, have formed action plans for specific areas of activity to be integrated into the overall SF CAN Initiative. Initially we are focused on lung and other tobacco-induced cancers, colorectal cancer, liver, breast and prostate cancer. The charge for each of these committees was:

1. Form a committee of about 8 members and identify a chair(s) who will be accountable for leading the Task Force and reporting to the SF CAN Steering Committee. Membership should include a community advisor and member of the SF Department of Public Health.
2. Designate a measureable goal(s) to be reached by the year 2020 with intermediate milestones for each intervening year starting in 2016.

3. Specify discrete activities that can be carried out in this time frame with specific metrics that can be used to monitor progress toward the goal(s).

4. Identify and engage key partners and collaborators to be part of the initiative.

5. Develop estimated annual budgets for each year and totals for the 5-year period 2016-2020.

6. Submit an Action Plan summarizing the goals, activities and estimated budget to SF CAN leadership.

With the recommendations of the Task Forces in hand, an SF CAN Steering Committee, with representation from the San Francisco Department of Public Health, city government, UCSF HDFCCC, other health care systems, and community organizations, will continuously review plans and integrate activities across the initiative. They are developing an approach for communication and evaluation of the initiative as well as directions for research and information dissemination across all specific areas of activity.

VIII. Acknowledgements

Data from the Greater Bay Area Cancer Registry data for San Francisco was generously provided by Meg McKinley, Tina Clarke, and Scarlett Gomez of the Cancer Prevention Institute of California. Caroline Tai and Kaya Balke of the Department of Epidemiology & Biostatistics at UCSF provided assistance with data illustration and review for the report.

IX. References

1. California Department of Public Health, *Death Records 2009-2014.* Available from: https://www.cdph.ca.gov/programs/ohir/Documents/**SANFRANCISCO**.xlsx

2. Cancer Prevention Institute of California (CPIC), *Incidence and Mortality Data for San Francisco, CA, 1988-2012.* 2015.

3. Surveillance, Epidemiology, and End Results Program (SEER), *Cancer Statistics*, N.C. Institute, Editor.

4. Hawgood, S., et al., *Precision medicine: Beyond the inflection point.* Sci Transl Med, 2015. **7**(300): p. 300ps17.

5. Shaikh, A.R., et al., *Collaborative biomedicine in the age of big data: the case of cancer.* J Med Internet Res, 2014. **16**(4): p. e101.

6. Braveman, P. and L. Gottlieb, *The social determinants of health: it's time to consider the causes of the causes.* Public Health Rep, 2014. **129 Suppl 2**: p. 19-31.

7. Marmot, M., *Achieving health equity: from root causes to fair outcomes.* Lancet, 2007. **370**(9593): p. 1153-63.

8. Hiatt, R.A., *Invited commentary: driving for further evolution.* Am J Epidemiol, 2015. **181**(7): p. 459-62.

9. San Francisco Health Improvement Partnership (SFHIP). *San Francisco Data.* 2015 10/31/2015]; Available from: www.sfhip.org.

10. Colditz, G.A., T.A. Sellers, and E. Trapido, *Epidemiology - identifying the causes and preventability of cancer?* Nat Rev Cancer, 2006. **6**(1): p. 75-83.

11. Colditz, G.A. and E.K. Wei, *Preventability of cancer: the relative contributions of biologic and social and physical environmental determinants of cancer mortality.* Annu Rev Public Health, 2012. **33**: p. 137-56.

12. Altekruse, S.F., et al., *Changing hepatocellular carcinoma incidence and liver cancer mortality rates in the United States.* Am J Gastroenterol, 2014. **109**(4): p. 542-53.

13. Linos, E., et al., *Increasing burden of melanoma in the United States.* J Invest Dermatol, 2009. **129**(7): p. 1666-74.

14.   UCLA Center for Health Policy Research. *CHIS. California Health Interview Survey.* 10/31/2015]; Available from: ask.chis.ucla.edu.

15.   Office of the Surgeon General and Office on Smoking and Health, *Reports of the Surgeon General*, in *The Health Consequences of Smoking: A Report of the Surgeon General*. 2004, Centers for Disease Control and Prevention (US): Atlanta (GA).

16.   Bouvard, V., et al., *Carcinogenicity of consumption of red and processed meat.* Lancet Oncol, 2015. **16**(16): p. 1599-600.

17.   Wiseman, M., *The second World Cancer Research Fund/American Institute for Cancer Research expert report. Food, nutrition, physical activity, and the prevention of cancer: a global perspective.* Proc Nutr Soc, 2008. **67**(3): p. 253-6.

18.   Key, T.J., *Fruit and vegetables and cancer risk.* Br J Cancer, 2011. **104**(1): p. 6-11.

19.   Hamajima, N., et al., *Alcohol, tobacco and breast cancer--collaborative reanalysis of individual data from 53 epidemiological studies, including 58,515 women with breast cancer and 95,067 women without the disease.* Br J Cancer, 2002. **87**(11): p. 1234-45.

20.   United States Preventive Services Task Force (USPSTF). *Breast cancer screening draft recommendations.* 11/08/2015]; Available from: screeningforbreastcancer.org.

21.   National Cancer Institute. *HIV Infection and Cancer Risk.* Available from: www.cancer.gov/about-cancer/causes-prevention/risk/infectious-agents/hiv-fact-sheet.

22.   The Marmot Review, ed. *Fair Society, Healthy Lives.* Strategic Review of Health Inequalities in England post 2010.

23.   Singh, G.K., et al., *Area Socioeconomic Variations in U.S. Cancer Incidence, Mortality, Stage, Treatment, and Survival, 1975–1999.* 2003.

24.   Clegg, L.X., et al., *Impact of socioeconomic status on cancer incidence and stage at diagnosis: selected findings from the surveillance, epidemiology, and end*

results: National Longitudinal Mortality Study. Cancer Causes Control, 2009. **20**(4): p. 417-35.

25.   Hiatt, R.A. and N. Breen, *The social determinants of cancer: a challenge for transdisciplinary science.* Am J Prev Med, 2008. **35**(2 Suppl): p. S141-50.