

Cancer 101

Spring Family Cancer Retreat 4/18/15

Amish Shah, M.D.

New Mexico Cancer Center



Topics to cover

- What is Cancer?
- Screening
- Diagnosis/Staging
- Treatment Basics
- Clinical Trials
- Surveillance



What is Cancer?

- Large group of diseases, all characterized by cellular malfunction
- Healthy cells "know what to do and when to do it"
- Cancer cells do NOT have this programming, and therefore grow and replicate uncontrollably



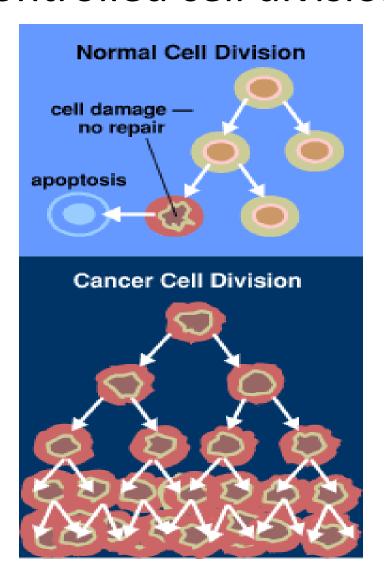
What is Cancer?

- Division
- Growth
- Mutation
- Spread



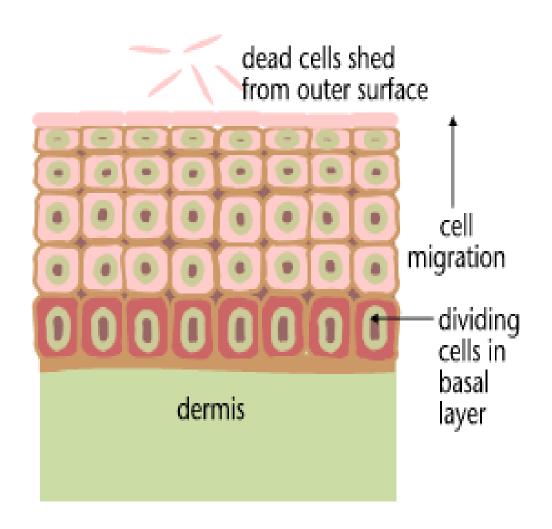
Division – uncontrolled cell division

- Oncogenes
- Tumour suppressor genes p53
- Suicide genes apoptosis
- DNA repair genes



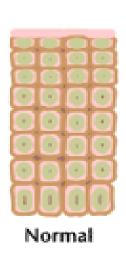


Normal cell growth





Cancerous growth











Carcinoma in situ (severe dysplasia)



Cancer (invasive)



Growth

- Tumor Growth can lead to
 - Pressure on nerves
 - Blocking organs
 - Stopping normal function
 - Altering nerve signals
 - Necrosis



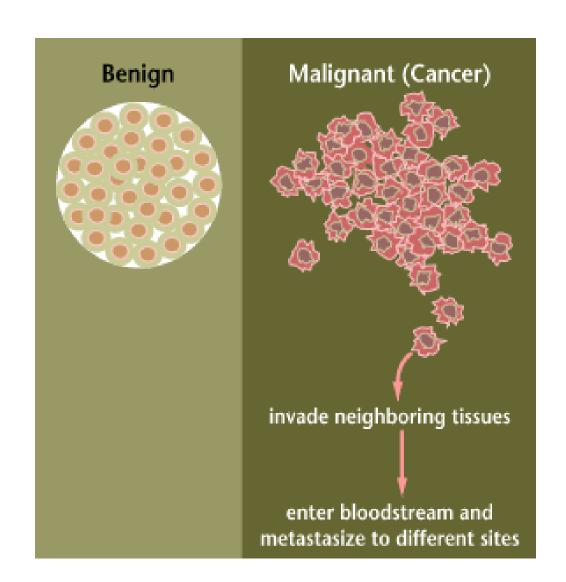
Mutation and Spread

Invasion

Angiogenesis



Malignant versus benign tumours



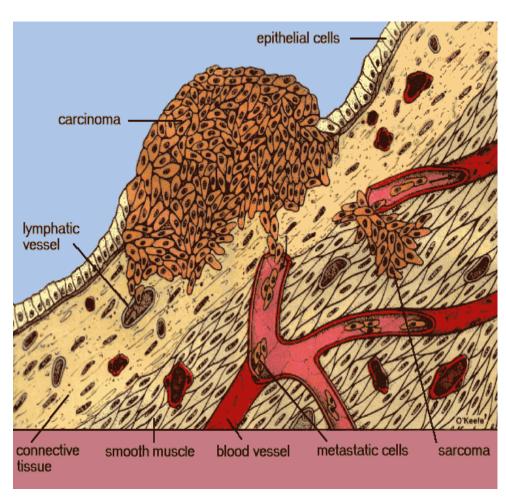


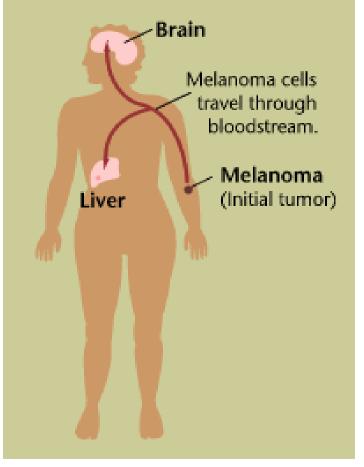
Spread

- Direct Extension:
- Lymphatic Spread
- Hematogenous Spread



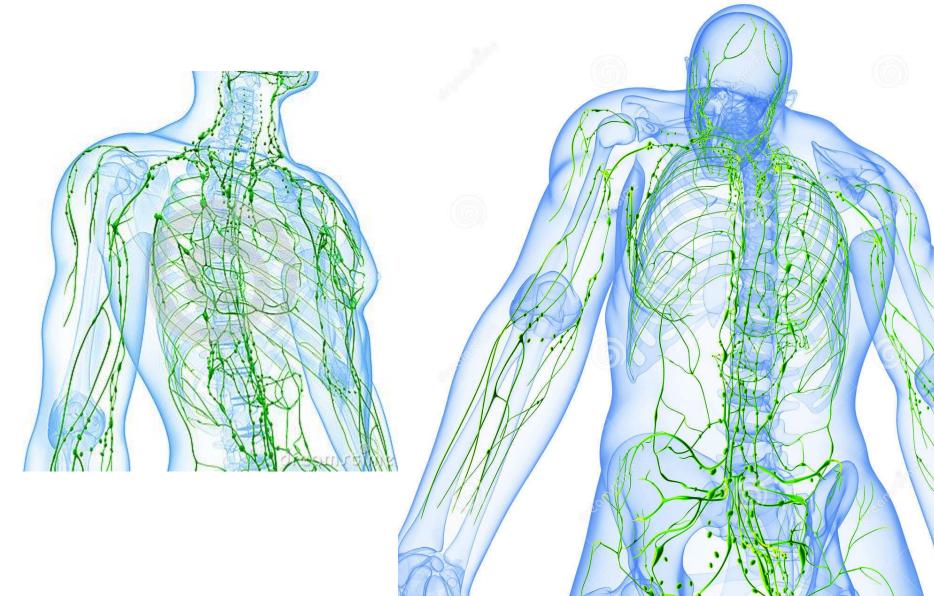
Metastatic cancer





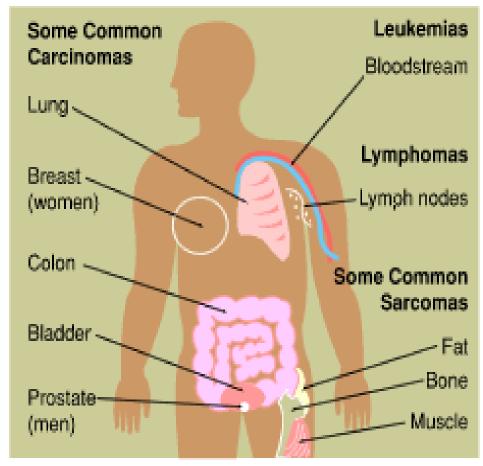


What are Lymph Nodes?





Types of Cancer



Some Prefixes Used in Naming Cancers					
PREFIX	MEANING				
adeno-	gland				
chrondro-	cartilage				
erythro-	red blood cell				
hemangio-	blood vessels				
hepato-	liver				
lipo-	fat				
lympho-	lymphocyte				
melano-	pigment cell				
myelo-	bone marrow				
myo-	muscle				
osteo-	bone				

• (also adenomas)...

Estimated New Cancer Cases* in the US in 2015

Prostate	26%	Men 848,200	Women 810,170		
Lung & bronchus	14%			29%	Breast
Colon & rectum	8%			13%	Lung & bronchus
Urinary bladder	7%			8%	Colon & rectum
Melanoma of skin	5%			7%	Uterine corpus
Non-Hodgkin	5%			6%	Thyroid
lymphoma				4%	Non-Hodgkin
Kidney & renal pelvis	5%				lymphoma
Oral cavity & pharynx	4%			4%	Melanoma of skin
Leukemia	4%			3%	Pancreas
Liver & intrahepatic	3%			3%	Leukemia
bile duct	• 70			3%	Kidney & renal pelvis
All other sites	21%			21%	All other sites

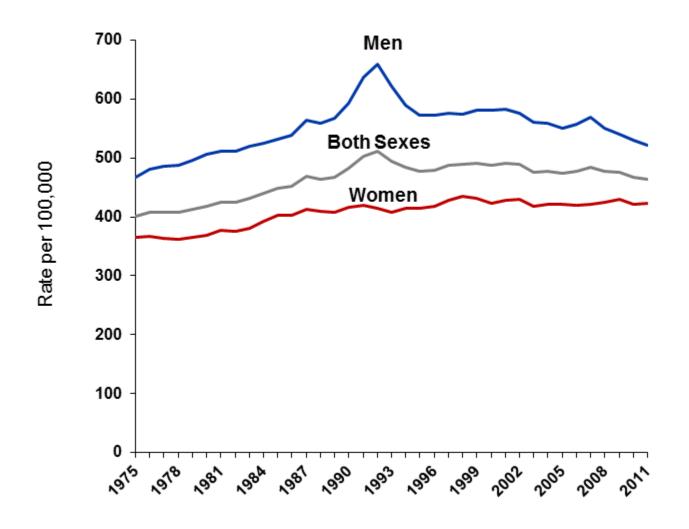
^{*}Excludes basal cell and squamous cell skin cancers and in situ carcinoma except urinary bladder.

Leading Sites of New Cancer Cases and Deaths – 2015 Estimates

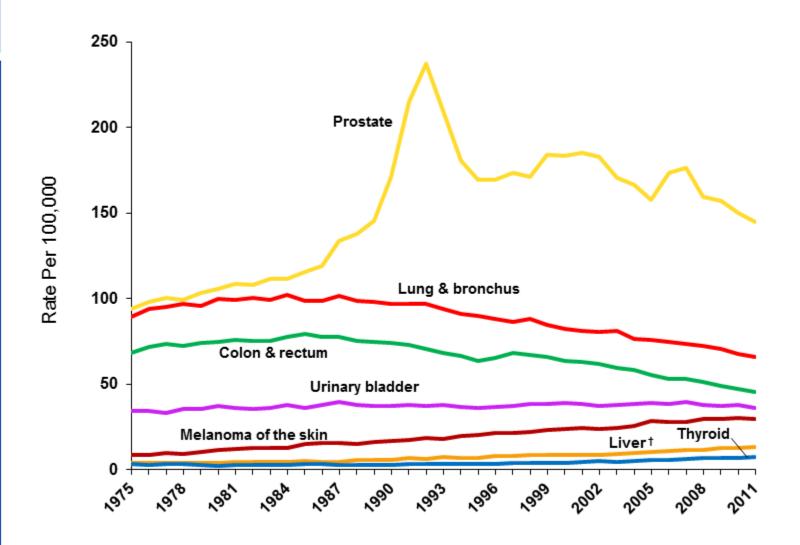
Estimated Ne	ew Cases*	Estimated Deaths					
Male	Female	Male	Female				
Prostate	Breast	Lung & bronchus	Lung & bronchus				
220,800 (26%)	231,840 (29%)	86,380 (28%)	71,660 (26%)				
Lung & bronchus	Lung & bronchus	Prostate	Breast				
115,610 (14%)	105,590 (13%)	27,540 (9%)	40,290 (15%)				
Colon & rectum	Colon & rectum	Colon & rectum	Colon & rectum				
69,090 (8%)	63,610 (8%)	26,100 (8%)	23,600 (9%)				
Urinary bladder	Uterine corpus	Pancreas	Pancreas				
56,320 (7%)	54,870 (7%)	20,710 (7%)	19,850 (7%)				
Melanoma of the skin	Thyroid	Liver & intrahepatic bile duct	Ovary				
42,670 (5%)	47,230 (6%)	17,030 (5%)	14,180 (5%)				
Non-Hodgkin lymphoma	Non-Hodgkin lymphoma	Leukemia	Leukemia				
39,850 (5%)	32,000 (4%)	14,210 (5%)	10,240 (4%)				
Kidney & renal pelvis	Melanoma of the skin	Esophagus	Uterine corpus				
38,270 (5%)	31,200 (4%)	12,600 (4%)	10,170 (4%)				
Oral cavity & pharynx 32,670 (4%)	Pancreas	Urinary bladder	Non-Hodgkin lymphoma				
	24,120 (3%)	11,510 (4%)	8,310 (3%)				
Leukemia 30,900 (4%)	Leukemia 23,370 (3%)	Non-Hodgkin lymphoma 11,480 (4%)	Liver & intrahepatic bile duct 7,520 (3%)				
Liver & intrahepatic bile duct 25,510 (3%)	Kidney & renal pelvis 23,290 (3%)	Kidney & renal pelvis 9,070 (3%)	Brain & other nervous system 6,380 (2%)				
All sites	All sites	All sites	All sites				
848,200 (100%)	810,170 (100%)	312,150 (100%)	277,280 (100%)				

^{*}Excludes basal cell and squamous cell skin cancers and in situ carcinoma except urinary bladder.

Trends in Cancer Incidence Rates*, US, 1975-2011



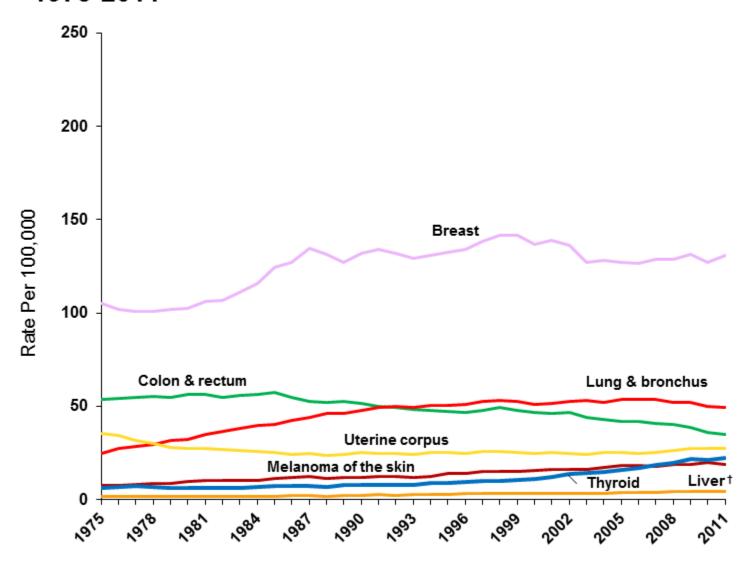
Trends in Cancer Incidence Rates* Among Men, US, 1975-2011



^{*}Age-adjusted to the 2000 US standard population and adjusted for delays in reporting.
†Includes the intrahepatic bile duct.

Source: Surveillance, Epidemiology, and End Results (SEER) Program, National Cancer Institute, 2014.

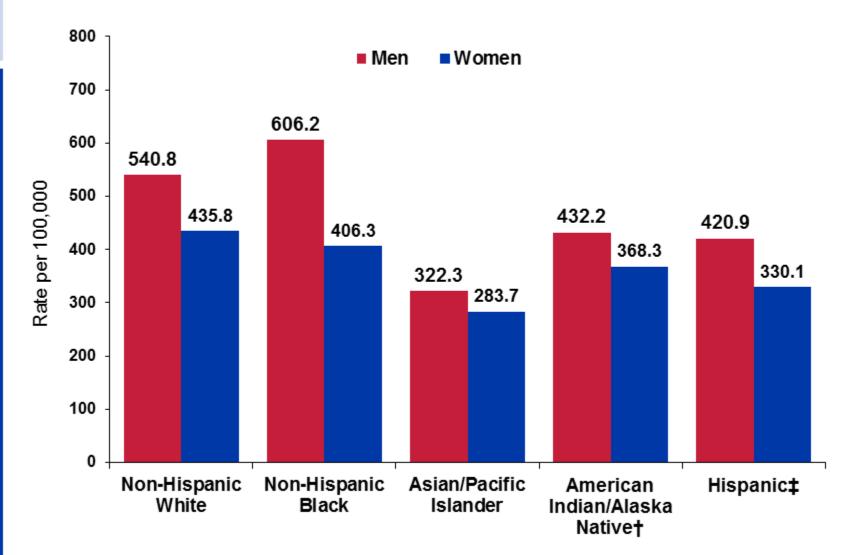
Trends in Cancer Incidence Rates* Among Women, US, 1975-2011



^{*}Age-adjusted to the 2000 US standard population and adjusted for delays in reporting. †Includes the intrahepatic bile duct.

Source: Surveillance, Epidemiology, and End Results (SEER) Program, National Cancer Institute, 2014.

Cancer Incidence Rates* by Race and Ethnicity, 2007-2011



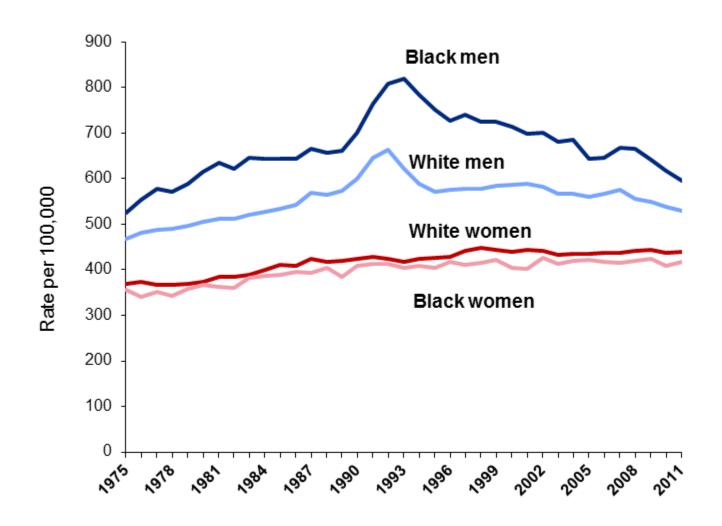
^{*}Age-adjusted to the 2000 US standard population.

Source: National American Association of Central Caner Registries, 2014.

[†]Data based on Indian Health Service Contract Health Service Delivery Areas. Rates exclude data from Kansas.

^{*}Persons of Hispanic origin may be of any race.

Trends in Cancer Incidence Rates* by Sex and Race, US, 1975-2011



^{*}Age-adjusted to the 2000 US standard population. Incidence rates are adjusted for delays in reporting. Source: Surveillance, Epidemiology, and End Results (SEER) Program, National Cancer Institute, 2014.

The Lifetime Probability of Developing Cancer for Men, 2009-2011*

Site	Risk
All sites†	1 in 2
Prostate	1 in 7
Lung & bronchus	1 in 13
Colon & rectum	1 in 21
Urinary bladder [‡]	1 in 26
Melanoma of the skin [§]	1 in 34
Non-Hodgkin lymphoma	1 in 42
Kidney & renal pelvis	1 in 49
Leukemia	1 in 59
Oral cavity & pharynx	1 in 65
Pancreas	1 in 66

^{*} For those free of cancer.

[†] All sites exclude basal cell and squamous cell skin cancers and in situ cancers except urinary bladder.

[‡] Includes invasive and in situ cancer cases

[§] Statistic for white men.

The Lifetime Probability of Developing Cancer for Women, 2009-2011*

Site	Risk
All sites†	1 in 3
Breast	1 in 8
Lung & bronchus	1 in 16
Colon & rectum	1 in 22
Uterine corpus	1 in 37
Non-Hodgkin lymphoma	1 in 52
Melanoma of the skin [‡]	1 in 53
Thyroid	1 in 60
Pancreas	1 in 67
Ovary	1 in 75
Leukemia	1 in 84

^{*} For those free of cancer.

[†] All sites exclude basal cell and squamous cell skin cancers and in situ cancers except urinary bladder.

[‡] Statistic for white women.

Trends in Five-year Relative Cancer Survival Rates (%), 1975-2010

Site	1975-1977	1987-1989	2004-2010
All sites	49	55	68
Breast (female)	75	84	91
Colon	51	60	65
Leukemia	34	43	60
Lung & bronchus	12	13	18
Melanoma of the skin	82	88	93
Non-Hodgkin lymphoma	47	51	71
Ovary	36	38	45
Pancreas	3	4	7
Prostate	68	83	100*
Rectum	48	58	68
Urinary bladder	72	79	79

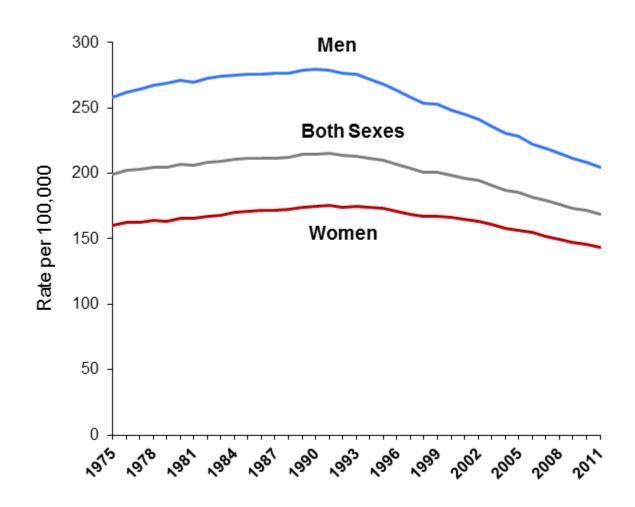
5-year relative survival rates based on patients diagnosed in the SEER 9 areas from 1975-1977, 1987-1989, and 2004-2010, all followed through 2011.

Five-year Relative Cancer Survival Rates (%) by Race, 2004-2010

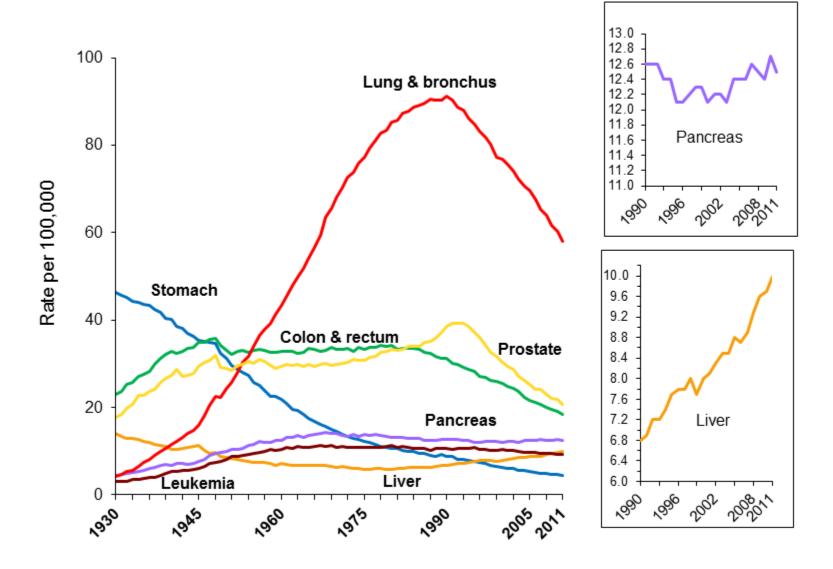
White	Black	Absolute Difference
69	62	7
92	80	12
67	56	11
21	13	7
61	54	7
73	63	10
67	45	22
100*	98	2
68	63	5
80	64	16
71	62	9
85	65	20
	69 92 67 21 61 73 67 100* 68 80 71	69 62 92 80 67 56 21 13 61 54 73 63 67 45 100* 98 68 63 80 64 71 62

 $⁵⁻year\ relative\ survival\ rates\ based\ on\ patients\ diagnosed\ in\ the\ SEER\ 9\ areas\ from\ 2004\ to\ 2010,\ all\ followed\ through\ 2011.$

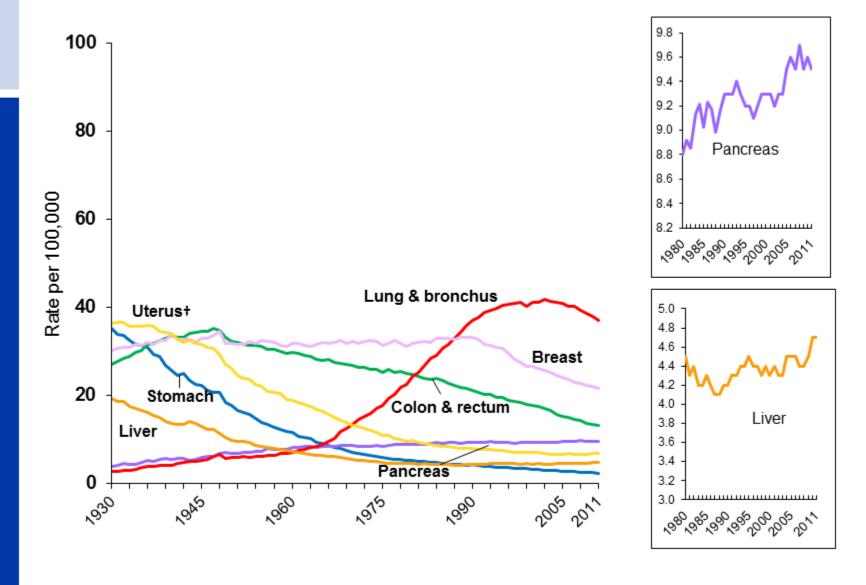
Trends in Cancer Death Rates* by Sex, US, 1975-2011



Trends in Cancer Death Rates* Among Men, US,1930-2011

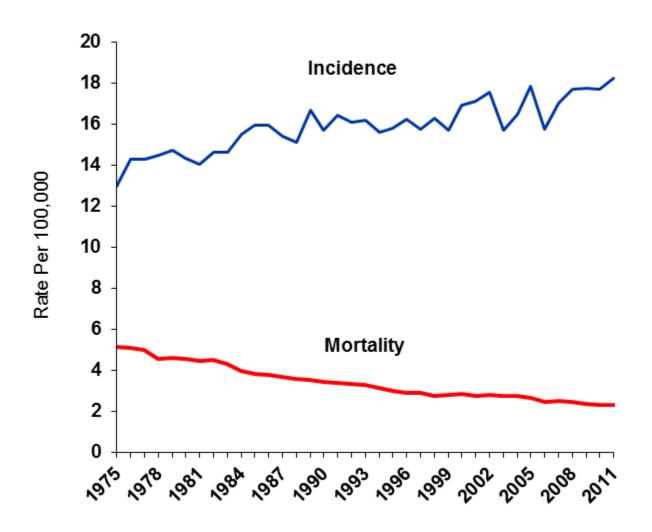


Trends in Cancer Death Rates* Among Women, US, 1930-2011



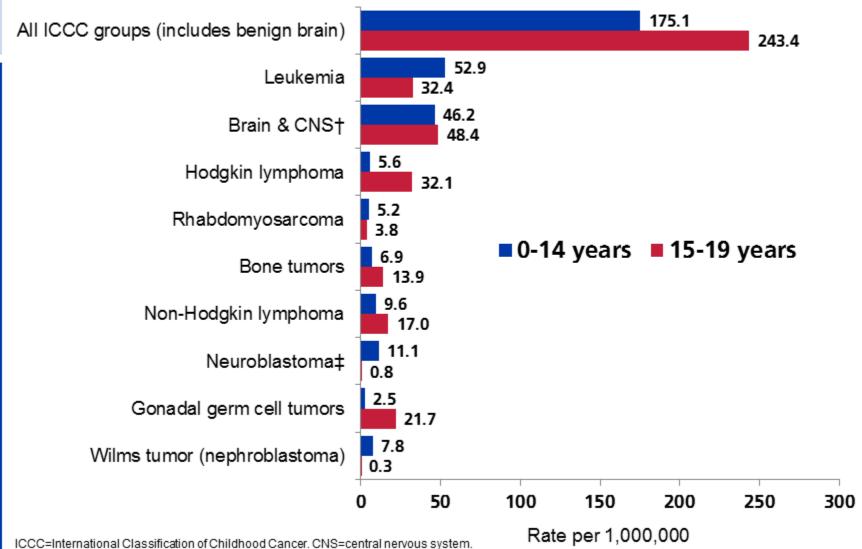
^{*}Age-adjusted to the 2000 US standard population.
†Uterus includes uterine corpus and uterine cervix combined.
Source: National Center for Health Statistics, Centers for Disease Control and Prevention, 2014.

Trends in Cancer Incidence and Death Rates* in Children and Adolescents (0-19 Years), 1975-2011



^{*}Age-adjusted to the 2000 standard population. Incidence rates are adjusted to account for delays in reporting. Sources: Incidence: Surveillance, Epidemiology, and End Results (SEER) Program, National Cancer Institute, 2014. Mortality: National Center for Health Statistics, Centers for Disease Control and Prevention, 2014.

Cancer Incidence Rates* Among Children (0-14 years) and Adolescents (15-19 years), 2007-2011



Source: North American Association of Central Cancer Registries, 2014.

^{*}Rates are age-adjusted to the 2000 US standard population.

[†] Includes benign brain and CNS tumors.

Includes other peripheral nervous system tumors.

Estimated Number* of New Cases for Selected Cancers by State, US, 2015

Colon &

Rectum

Uterine

Cervix

Female

Breast

All Sites

51,410

9,970

7,310

1,320

410

80

4,260

820

1,850

300

1,610

360

5,830

990

2,520

480

2,310

410

7,270

1,290

2,530

390

State

New Jersey

New Mexico

									, ,		
Alabama	26,150	3,680	230	2,150	660	730	4,150	1,380	1,020	3,590	1,000
Alaska	3,700	470	†	290	100	110	420	100	140	490	180
Arizona	32,440	4,750	200	2,440	940	950	3,740	1,400	1,300	4,090	1,580
Arkansas	15,830	2,090	150	1,420	420	480	2,620	360	670	2,050	630
California	172,090	25,270	1,490	14,510	5,800	5,970	18,430	8,560	7,870	21,060	7,150
Colorado	24,540	3,640	170	1,800	740	870	2,560	1,400	1,090	3,600	1,080
Connecticut	21,970	3,190	130	1,580	810	660	2,870	780	920	3,170	1,140
Delaware	5,280	780	t	400	180	160	860	280	220	740	250
Dist. of Columbia	2,800	430	†	230	100	70	310	80	100	490	80
Florida	114,040	15,470	980	9,330	3,550	3,930	16,810	5,480	5,340	15,480	5,670
Georgia	48,070	7,170	430	3,820	1,330	1,430	6,460	2,350	1,870	7,450	1,720
Hawaii	6,730	1,140	50	720	280	230	890	420	310	710	220
Idaho	8,080	1,070	t	620	240	300	910	470	380	1,270	410
Illinois	65,460	9,570	550	5,720	2,470	2,200	8,920	2,380	2,890	8,140	2,970
Indiana	35,620	4,600	280	2,890	1,180	1,100	5,510	1,460	1,490	4,040	1,590
lowa	17,140	2,390	100	1,490	640	640	2,440	1,070	830	2,170	800
Kansas	14,440	2,130	90	1,080	500	480	1,930	850	640	1,860	620
Kentucky	26,490	3,300	220	2,090	730	820	4,680	1,530	1,030	3,040	1,070
Louisiana	24,100	2,900	220	2,150	570	690	3,380	540	950	3,980	910
Maine	8,810	1,010	50	610	340	320	1,360	320	390	1,100	540
Maryland	30,050	4,730	230	2,360	1,080	780	3,980	1,410	1,230	4,620	1,250
Massachusetts	37,790	5,890	210	2,550	1,460	1,130	5,150	1,310	1,620	5,420	2,000
Michigan	57,420	7,780	350	4,190	2,090	1,870	8,350	2,630	2,500	8,110	2,870
Minnesota	29,730	3,900	130	2,140	990	1,120	3,250	1,190	1,330	3,740	1,270
Mississippi	16,260	2,050	140	1,460	390	450	2,340	540	550	2,150	500
Missouri	34,680	4,610	260	2,840	1,120	1,100	5,380	1,510	1,450	3,900	1,500
Montana	5,950	830	t	500	190	200	760	300	270	1,000	310
Nebraska	9,540	1,230	60	850	340	320	1,200	500	450	1,190	440
Nevada	13,640	1,690	120	1,110	350	440	1,770	470	530	1,640	660
New Hampshire	8,090	1,120	+	540	310	260	1,140	280	350	1,080	450

Uterine

Corpus

Non-

Hodgkin

Lymphoma

Urinary

Bladder

Prostate

Melanoma

of the

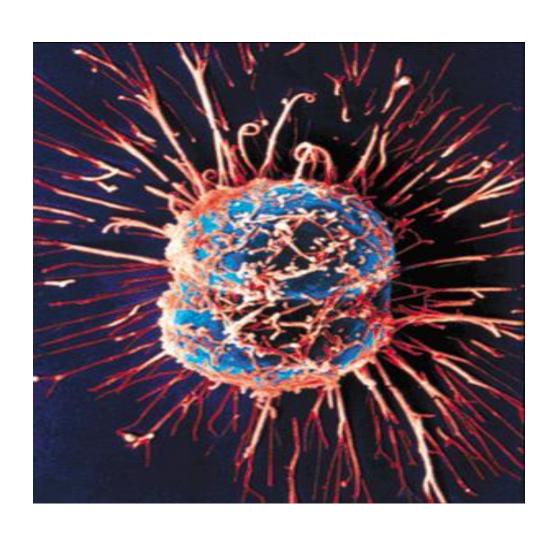
Skin

Lung &

Leukemia Bronchus



What causes cancer?

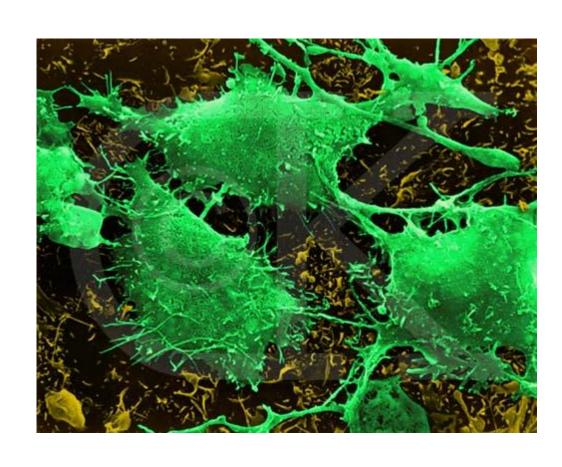


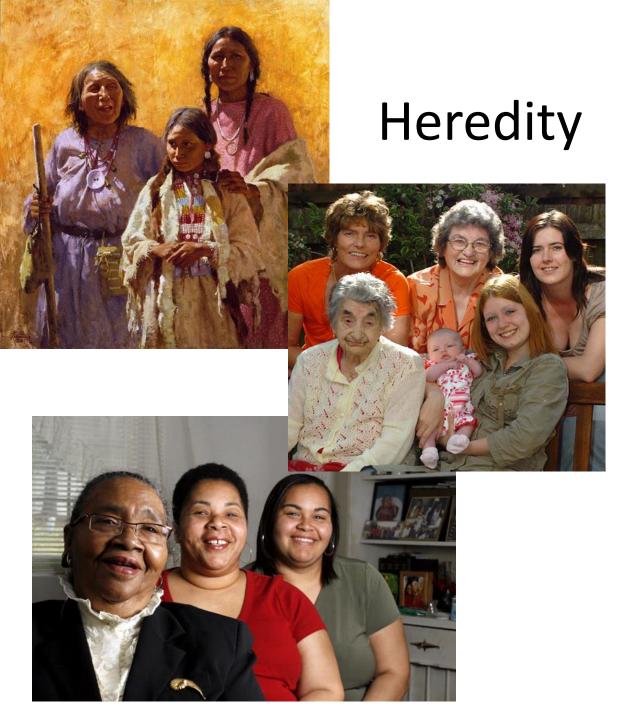




Carcinogenesis. Some factors to consider...

- Heredity
- Immunity
- Chemical
- Physical
- Viral
- Bacterial
- Lifestyle







• 5-10% of Cancers

• ?15% of all cancers

 Molecular Biology and Human Genome Project



Heredity



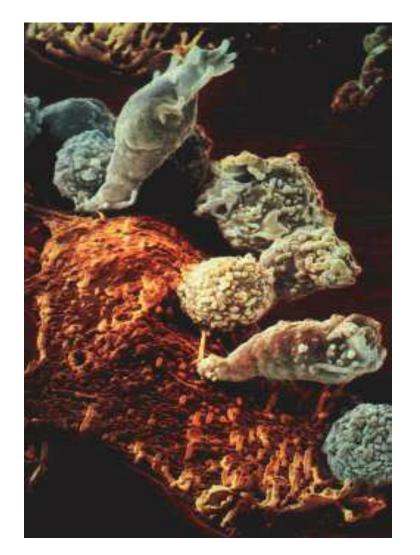
- Genes isolated for several classic familial cancer syndromes:
 - RB1 (retinoblastoma)
 - APC (familial polyposis)
 - Human Non Polyposis
 Colon Cancer (HNPCC)
 - BRCA 1&2 (breast cancer)
 - p53 (many cancers)





Immunity

- HIV / AIDS
- Immunosuppression

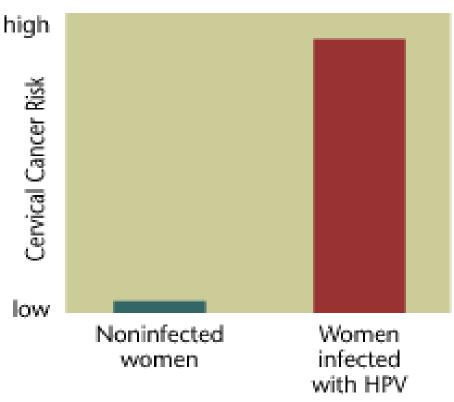




Viruses

- Hepatitis B
- Human T-cell Leukemia
 Virus
- Epstein Barr Virus
- Human Papilloma Virus (HPV)





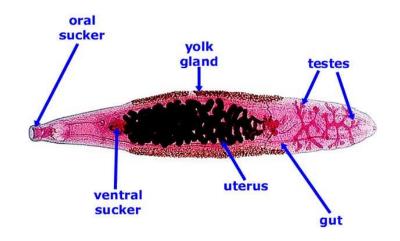


Bacterial



H. pylori

- Other Parasites:
 - Schistosoma spp
 - Clonorchis sinensis





Estimated Burden of Cancer from Infection Worldwide in 2000

New Mexico Cancer Center New Mexico Onesiggs Breatlegs Cresilizate, Ltd.	No. of cases	Agent	% World cancer
Liver	509,000	HBV, HCV, flukes	5.1
Cervix	471,000	HPV	4.7
Stomach	442,000	H. pylori	4.4
Kaposi's (HIV related)	134,000	HHV-8	1.3
Non Hodgkin lymphoma	72,000	H. pylori, EBV, HIV	0.7
Ano-genital	65,000	HPV	0.6
Nasopharyngeal	63,000	EBV	0.6
Hodgkin disease	33,000	EBV, HIV	0.3
Bladder	10,000	Schistosoma	0.1
Leukaemia	3,000	HTLV1	0.03
Total	1,801,000		17.9



Chemical





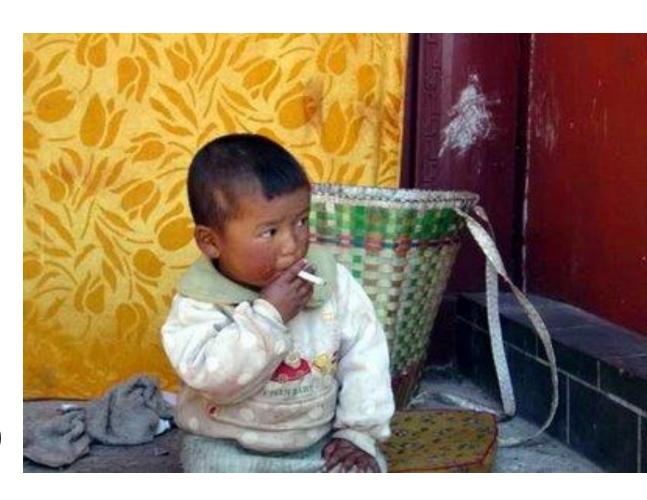


- Alcohol
- Asbestos
- Wood dust
- Rubber, plastics, dyes
- Tar / bitumen
- Aflatoxin
- Alkylating agents
- Tobacco



Smoking

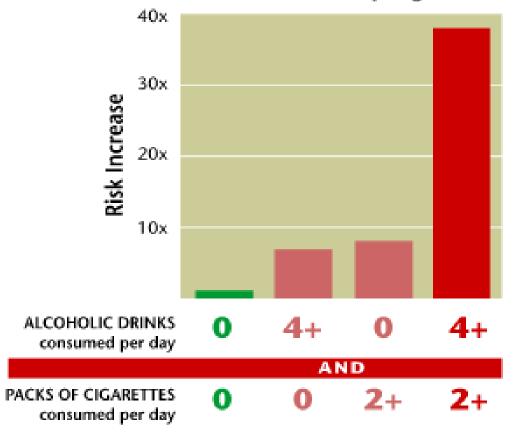
- Single biggest cause of cancer
- 25-40%
 smokers die in middle age
- 9 in 10 lung cancers
- Know to cause cancer in 1950





Smoking and alcohol

Combination of Alcohol and Cigarettes Increases Risk for Cancer of the Esophagus





Physical causes

- Ultraviolet radiation
 - Sunlight
 - Certain industrial sources
- Radiation
 - -Radon
 - -Cancer treatment







Obesity





Lifestyle

- Age
- Occupation
- Ethnicity



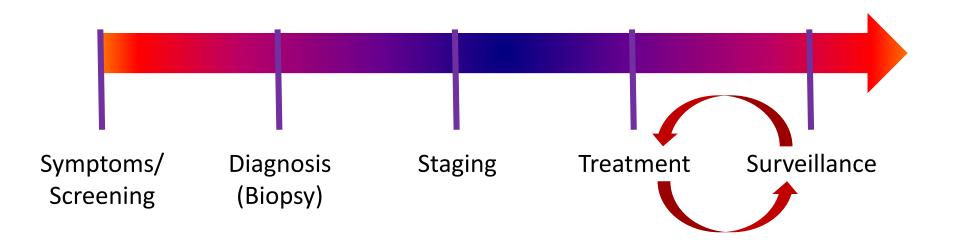


Diagnosis and Staging

Clinical History

- Normal diagnostic procedures
 - Scans, X-Rays
 - Blood tests
 - Biopsy
- Pathological staging

Treatment Timeline



Screening

Cancer Screening

A test on a healthy patient to check for cancer

Standard Tests

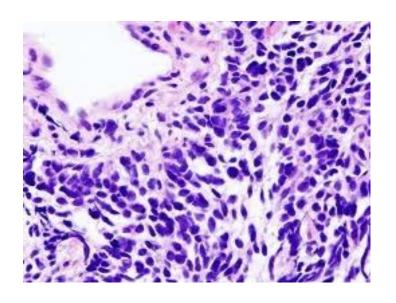
- Mammogram (woman 50-74)
- Colonoscopy (adults 50-75)
- Pap Smear (woman up to 65)

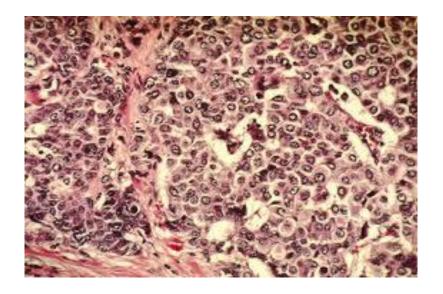
Controversial Tests

- PSA for prostate cancer
- Ultrasound for Ovarian
- CT for Lung Cancer (smokers)
- Mammogram (age <50)
- MRI for Breast Cancer
- Others

Diagnosis

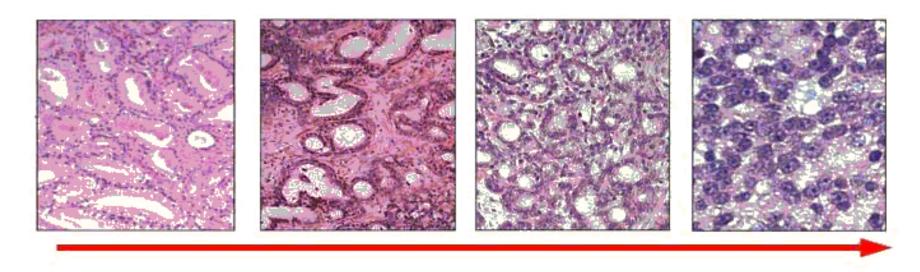
Often diagnosed via biopsy





Diagnosis

Cancer Diagnosis & Grade

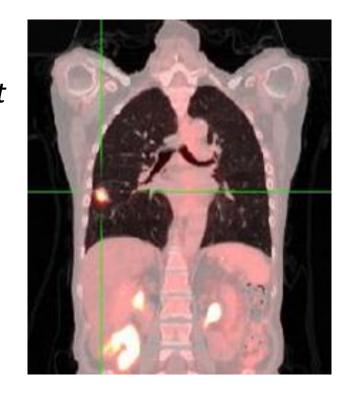


Higher Grade

Staging

Cancer Staging

Examinations performed to see how far the cancer has spread. Sometimes, these are not necessary. Other times, several tests are required. These examinations include: CT scans, ultrasound, PET scans, blood tests, and even surgery.



Staging

Cancer Staging - TNM

A common staging system is the TNM staging system used by the American Joint Committee on Cancer (AJCC)

T Stage

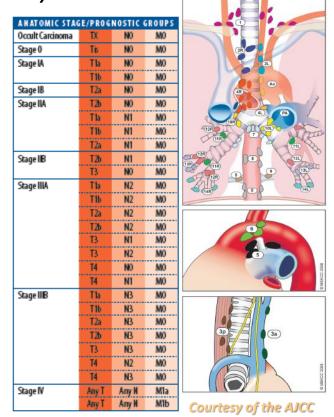
• Primary tumor assessment (size of tumor, depth of invasion, ...)

N Stage

• Lymph node assessment (number nodes involved, location of nodes, ...)

M Stage

• Distant organ assessment (spread to the liver, lung, bone, ...)





Treatment

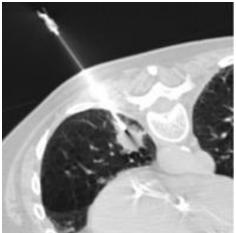
- Surgery
- Chemotherapy
- Radiation Therapy
- Other



Surgery





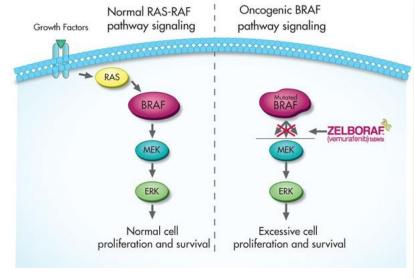


NMCC

Chemotherapy





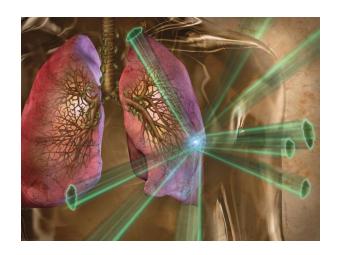


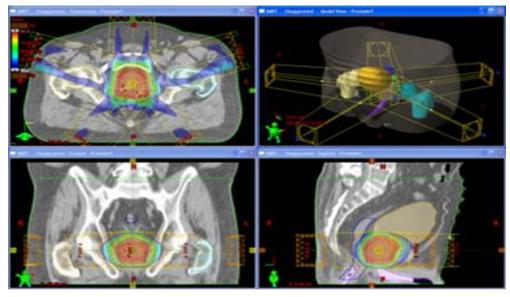


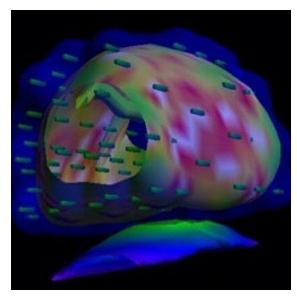


Radiation Therapy



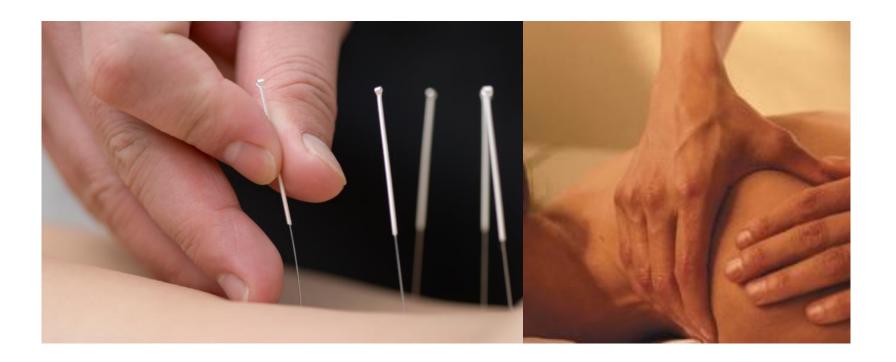






Other

Other Therapies (Complementary)



What are Cancer Clinical Trials?

- Research studies involving people and cancer
- Intended to answer scientific questions to find better ways to diagnose, prevent and treat cancer
- There are different types and phases of trials
- They follow strict scientific guidelines called a protocol

Types of Clinical Studies

- Treatment
- Prevention
- Early-Detection
- Diagnosis
- Quality-of-Life

Phases of Clinical Trials

Phase	Number of Participants	Purpose
1	15-30 people	Looking at Safety, Finding a Safe Dose
2	Less than 100 people	How Well the New Treatment Works
3	100 to thousands of people	Comparing a New Treatment to the Standard Treatment
4	Several hundred to several thousand of people	Continuing Evaluation of side effects, risks, benefits

Barriers to Clinical Trial Participation

Only 3% of adults with cancer participate in clinical trials.

Barriers for the General Populations

- Lack of awareness of clinical trials
- Lack of access to trials
- Fear, distrust, or suspicions of research
- Practical or personal obstacles
- Insurance or cost problems
- Unwillingness to go against personal physician's wishes
- Cultural and ethnic backgrounds
- Language or literacy

Finding Clinical Trials

Clinical Trials open in New Mexico

• New Mexico Cancer Care Alliance: www.nmcca.org

Clinical Trials Open Nationally

• NCI: <u>www.cancer.gov</u>

NIH: <u>www.clinicaltrials.gov</u>

Coalition of Cancer Cooperative Groups:

www.cancertrialshelp.org



Summary



Common Questions

A relative had the same type of cancer I have. Will I have the same prognosis, treatment, and side effects?

- Every person is different.
- Every cancer is different.
- Cancer treatments are evolving fast.

Common Questions

A relative had the same type of cancer I have. Will I have the same prognosis, treatment, and side effects?

- One may have had a treatment for cancer several years ago; since then, new treatments may have developed.
- Side effects could be very different.

Second Opinion:

 A review of the cancer diagnosis and the treatment recommendations by another, independent physician.

Second Opinion: what is reviewed?

- Pathology report (how the cancer looks under the microscope).
- The extent of cancer.
- The physical condition of the patient.
- The proposed treatment.

Second Opinion:

 The reviewing doctor will communicate their opinion regarding treatment to both the patient and the primary physician.

Is Getting a Second Opinion Considered "Bad Etiquette"?

No.

Second opinions are a common practice in any area of medicine that is complex and that has multiple treatment options available.

 Second opinions are a normal part of cancer management.

 Patients, their families and friends should not be concerned about hurting the feelings of the primary physician.

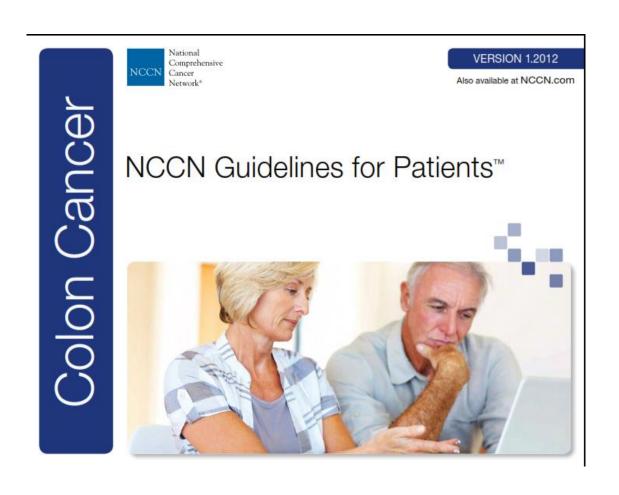
 The more you can learn about your diagnosis and your treatment options, the better chance you have of receiving the most appropriate treatment.



National Comprehensive Cancer Network:

- www.nccn.com
- www.nccn.org/patients/default.aspx











- www.cancer.org 1 800 ACS-2345
- www.cancer.gov 1 800 4-CANCER
- www.nlm.nih.gov/medlineplus/cancer.html



Live Your Life

- Do the things that are important to you.
- Have a durable power of attorney.
- Talk to your loved ones about your feelings.
- Seek help if you feel depressed or anxious.



We are here to help:

New Mexico Cancer Center 4901 Lang Ave. NE, Albuquerque, NM 87109 Phone: 505-842-8171

www.nmcancercenter.org

Other Clinics: Gallup, Silver City, Ruidoso