How to Write a Really Bad Cancer Story

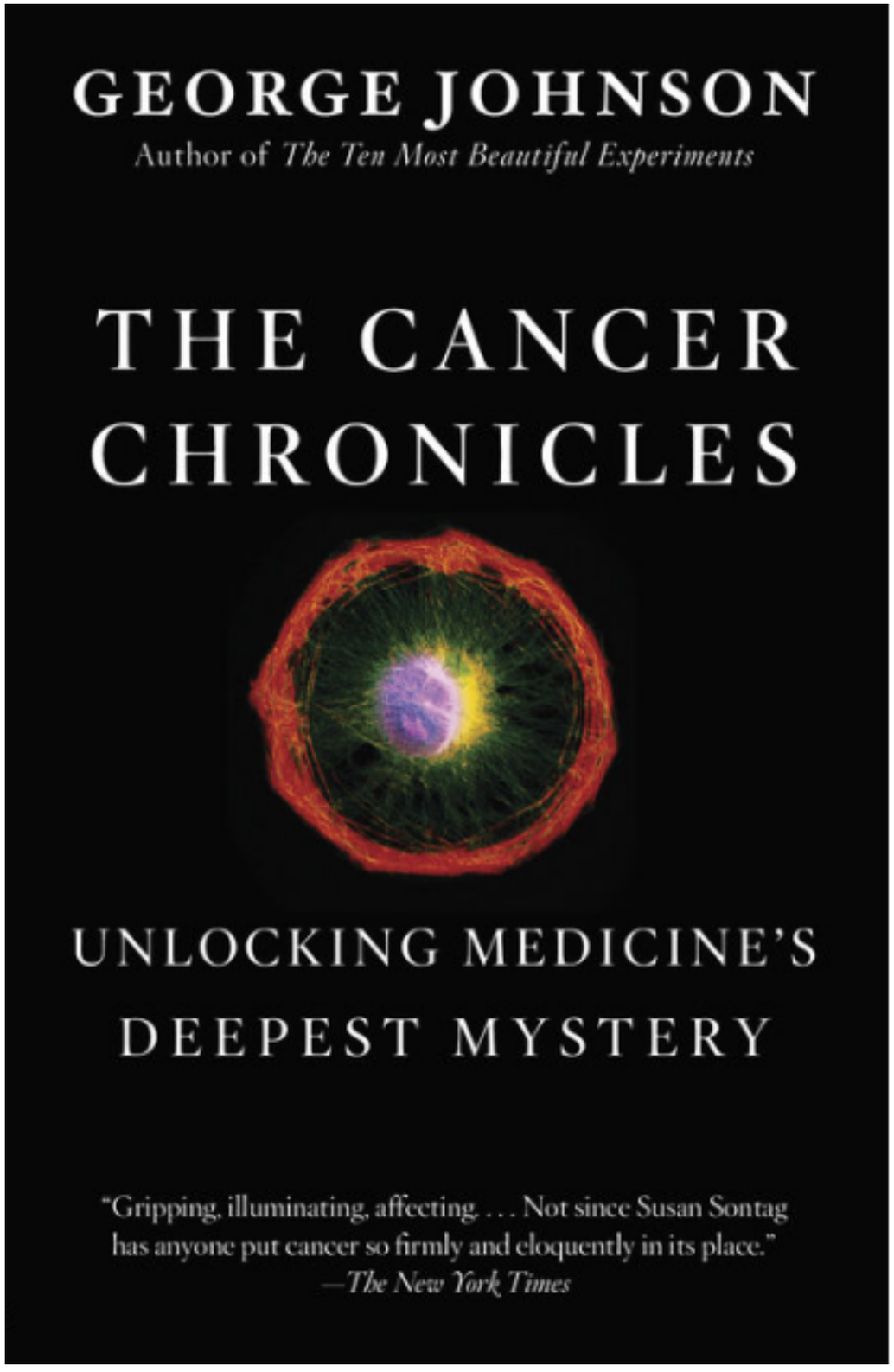
How to Write a Really Bad* Cancer Story

*as in misleading and uninformed

alternate title:

Myths to Avoid When Writing About Cancer

(and many other maddeningly complex things)


GEORGE JOHNSON
Author of *The Ten Most Beautiful Experiments*
THE CANCER CHRONICLES
UNLOCKING MEDICINE'S DEEPEST MYSTERY
"Gripping, illuminating, affecting. . . . Not since Susan Sontag has anyone put cancer so firmly and eloquently in its place."
—*The New York Times*

“Several years ago, for reasons that will become clear in these pages, I was driven to learn everything I could about the science of cancer. How much could I as an outsider, a longtime science writer more comfortable with the sharp edges of cosmology and physics, grasp of this wet, amorphous, and ever-changing terrain? . . .

. . . I imagined the expanse before me as a boundless rain forest whose breadth and diversity could never be captured within a single book or even a single mind. I would find an opening at one of the borders and enter, cutting my own path, exploring where my curiosity led—until I emerged years later at the other side, with a better understanding of what we know and don't know about cancer. I was in for some remarkable surprises."

So much of what I had thought was true about cancer turned out to be very uncertain or even flat-out wrong.

And for all of its unique horror, cancer turns out to be a fascinating intellectual puzzle.

I wonder now, though, if the steady presence of music around me didn't contribute importantly to my sense of the cancer as a thing with its own rights. Now it sounds a little cracked to describe, but then I often felt that the tumor was as much a part of me as my liver or lungs and could call for its needs of space and food. I only hoped that it wouldn't need all of me.

—Reynolds Price, *A Whole New Life*

Tuberculosis used to be called "consumption" because it consumes. It dissolved a lung or bone. But cancer produces. It is a monster of productivity.

—John Gunther, *Death Be Not Proud*

Contents

Cancer cluster

"a greater-than-expected number of cancer cases that occurs within a group of people in a defined geographic area over a specific period of time" – U.S. Centers for Disease Control

“Lay a chessboard on a table. Then grab a handful of rice and let the grains fall and scatter where they may. They won’t spread out uniformly with the same number occupying each square. Instead there will be clusters. Now suppose that the chessboard is a map of the United States and the grains are cases of cancer.

“Each year about 1.6 million cases of cancer are diagnosed in the United States, and epidemiologists regularly hear from people worried that their town has been plagued with an unusually large visitation. Time after time, the clusters have turned out to be statistical illusions —artifacts of chance.”

A disclaimer:

I'm not saying that toxic waste isn't an important issue. Or that discharges from various industrial processes are not harming streams, lakes, and the air and can make people sick.

I'm not saying that polluters shouldn't be tracked down and held to account.

What I want to show you is that despite the common wisdom, clusters of cancer caused by environmental carcinogens are so rare that . . .

CRITICAL REVIEWS IN TOXICOLOGY
Taylor & Francis

Crit Rev Toxicol. 2012 Jul; 42(6): 474–490.
Published online 2012 Apr 21. doi: 10.3109/10408444.2012.675315
PMCID: PMC3408895

Cancer clusters in the USA: What do the last twenty years of state and federal investigations tell us?

Michael Goodman,[1] Joshua S. Naiman,[2,3] Dina Goodman,[4] and Judy S. LaKind[2,5,6]

Author information ► Article notes ► Copyright and License information ►

Out of 428 investigations only three "indicated that at least some evidence was found of an association between the cancer(s) of concern and hypothesized exposures, although the level of certainty of these findings differed."
-- Goodman, et al *Cancer clusters in the USA: What do the last twenty years of state and federal investigations tell us?*


She brought a
small town to its feet
and a huge company
to its knees.
Julia
Roberts
is
Erin
Brockovich
Based on a true story.

Preliminary Assessment of Cancer Occurrence in the Hinkley Census Tract, 1996-2008

John W. Morgan, DrPH, CPH Epidemiologist, DSCSP January 10, 2011

Conclusions: These findings identify cancer occurrence in the Hinkley Census Tract that is slightly, but not significantly *below* the number of new cases expected for an average risk population having the same demographic characteristics as the Hinkley Census Tract population. Similar to the previous two cancer assessments that evaluate cancer occurrence in 1988-1993 and 1988- 1998 (1), these 1996-2008 preliminary findings do not identify a generalized cancer excess in the Census Tract encompassing Hinkley, San Bernardino County. Staff in the DSCSP will continue to monitor cancer occurrence in the Hinkley Census Tract and elsewhere in the DSCSP.

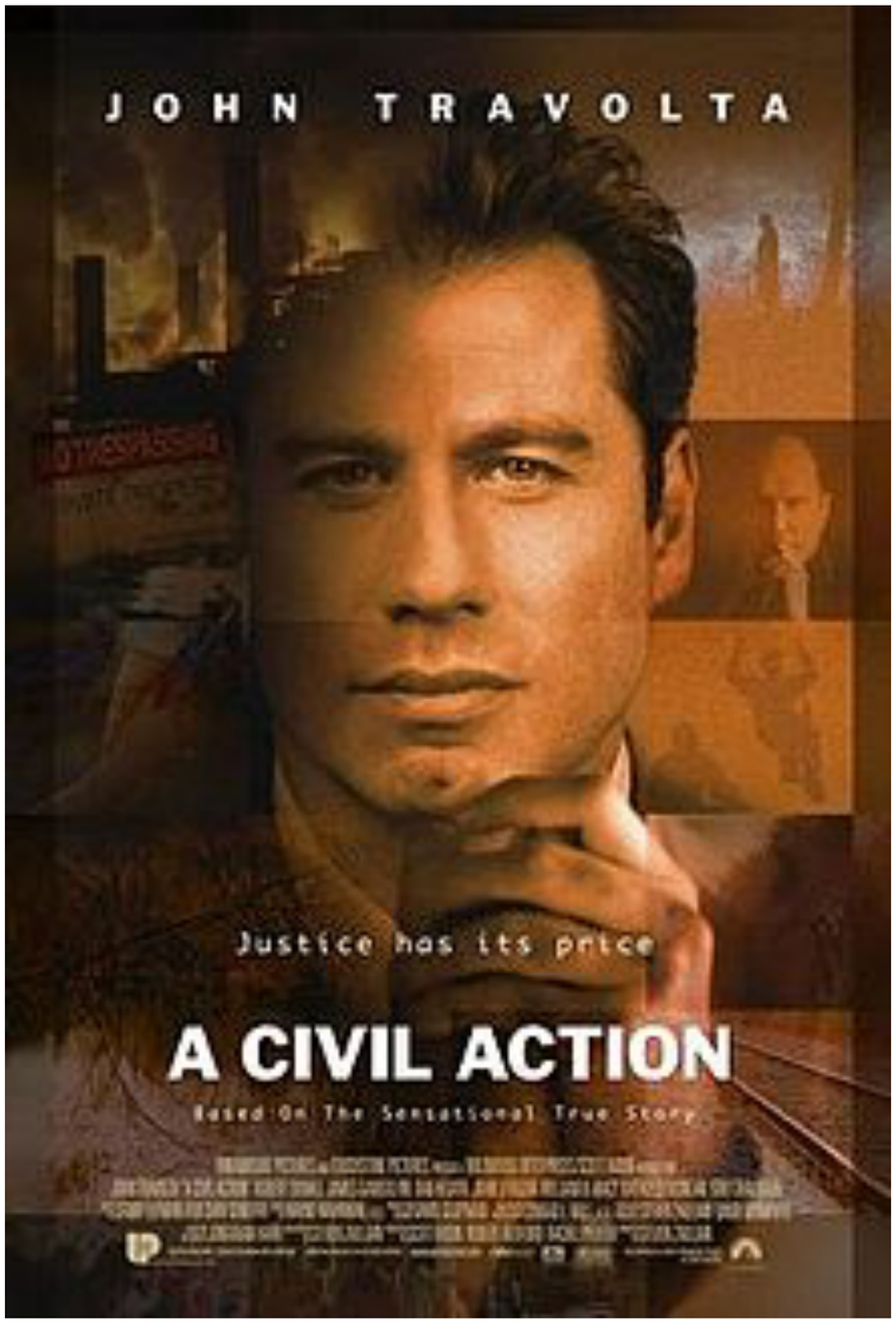
ENVIRONMENT JUNE 3, 2013

Erin Brockovich's Biggest Debunker, Debunked

MIND

Debunking the Debunker's Debunker

Fire in the Mind | By George Johnson | Jun 19, 2013 5:27 AM


JOHN TRAVOLTA
Justice has its price
A CIVIL ACTION
Based On The Sensational True Story

Woburn, Massachusetts

21 childhood leukemia cases over a period of 17 years when 5.5 would be expected.

The suspect: Drinking water tainted with trichloroethylene (TCE) and perchloroethylene

Class-action lawsuit settled out of court

“a non-significant association between potential for exposure to contaminated water during maternal pregnancy and leukemia diagnosis, (odds ratio = 8.33, 95% CI 0.73-94.67). However, a significant dose-response relationship (P < 0.05) was identified for this exposure period. In contrast, the child's potential for exposure from birth to diagnosis showed no association with leukemia risk. Wide confidence intervals suggest cautious interpretation of association magnitudes.” -- ***A case-control study of childhood leukemia in Woburn, Massachusetts: the relationship between leukemia incidence and exposure to public drinking water.*** **Costas K1, Knorr RS, Condon SK.**

Found for boys but not girls -- no biological explanation for why that would be.

TOMS RIVER, NEW JERSEY

between 9 and 10 cases was considered normal

Final conclusion:

Among 8 girls whose mothers had drunk most often from a contaminated well, 5 had leukemia, and 3 did not. "However, it is important to note that there is considerable uncertainty in the findings." -- ***Case-control Study of Childhood Cancers in Dover Township (Ocean County), New Jersey, January 2003***

Boys were not affected -- the opposite of Woburn and again no biological explanation.

This case too was settled out of court for many millions.

Danny DeVito optioned the movie rights.

Erin Brockovich? Very probably not.

Woburn, Massachusetts? Maybe if you squint pretty hard.

Toms River? Keep squinting . . .

CRITICAL REVIEWS IN TOXICOLOGY
Taylor & Francis

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So why do so many people continue to believe that cancer clusters are a major problem? Or that environmental toxins are driving a modern cancer epidemic?

1. A resident of a town near a chemical factory, an abandoned waste dump, or some industrial plant becomes distraught that they or their child or a neighbor has been diagnosed with cancer.

2. They canvass the town and, sure enough, there are other cancer cases too.

They probably don't inquire whether any of the cancer victims smoke cigarettes, or whether they are obese, or drink excessive amounts of alcohol -- established risk factors for cancer.)

Or take into account the cancer victims' age. (60 percent of cancers diagnosed in people 65 or older -- the result of the load of cellular mutations that accumulates in all of us as we go through life.)

The baked-in assumption is that, in the absence of some chemical contaminant, there would be no childhood cancer in the community.

Since there are several children with cancer there must be a common cause.

They demand an investigation, and they call the press.

CARRIE BORTZ

LEUKEMIA STRIKES A SMALL TOWN

Anne Anderson, whose child died of leukemia, stands by the map of Woburn, with pushpins indicating the sites of leukemia victims and toxic waste.

In Woburn, Mass., a town with one of the 10 most hazardous waste sites in America, 16 children have died of the disease.

A STIFF MORNING breeze rolls a basketball from one yard to the next in a neighborhood of newly shingled homes with asphalt driveways just wide enough for one car. Inside a maroon ranch house, a bedroom door still bears the name "Jim" in black and gold metal letters. Anne Anderson, tall and blonde, with soft Norwegian features and smoky blue-gray eyes, sits in her son's room, reading in a deep velvet chair.

desk is a glossy street map spotted with blue plastic pushpins, 16 of them, each representing a child who has died of leukemia since 1969. One of those children was Jimmy Anderson.

According to the National Cancer Institute, the average incidence of leukemia is 3.74 cases per 100,000 children. In Woburn, a town of 36,000, in addition to the 16 blue pins on the map, there are eight red ones for children now ill with the disease. In Anne Anderson's neighborhood of East Woburn alone, there have been 12 cases, six within a few blocks of her home. The odds

and tanneries no longer operating in the area. The Environmental Protection Agency has listed this tract among the 10 most hazardous waste sites in the United States. And studies have shown that the children struck by leukemia in Woburn had only one relevant factor in common: They lived in a neighborhood that drew its water from two wells contaminated by toxic carcinogenic chemicals.

A clear case of cause and effect? A layman might assume so, but traditional medical epidemiology, the science of causes of epidemics, cannot prove what the

“A STIFF MORNING breeze rolls a basketball from one yard to the next in a neighborhood of newly shingled homes with asphalt driveways just wide enough for one car. Inside a maroon ranch house, a bedroom door still bears the name "Jim" in black and gold metal letters. Anne Anderson, tall and blonde, with soft Norwegian features and smoky blue-gray eyes, sits in her son's room, reading in a deep velvet chair.

More often, though, she can be found downtown in Woburn, a commuter suburb 10 miles north of Boston, where she works in the storefront office of a volunteer organization called For A Cleaner Environment. Not far from her desk is a glossy street map spotted with blue plastic pushpins, 16 of them, each representing a child who has died of leukemia since 1969. One of those children was Jimmy Anderson.

The New York Times

What's Wrong in Toms River?

June 1, 1996

In Linda Gillick's living room is a large county map covered with red pushpins. One pin marks her house, and her son, Michael, who at 3 months was diagnosed with a rare cancer. Another highlights the house of Linda Pascarella, whose toddler daughter died a few years ago of another rare cancer. There is also a pin for Amber Dering, a tiny redhead who came down with childhood leukemia.

There are many more, all representing children under the age of 20 who have come down with all sorts of cancers, and Gillick and many others in this community are convinced that something in the air, or water, or soil of this seaside town is to blame.

Now, state and federal officials are starting to acknowledge that Gillick and the others may be right.

Ocean County, which includes Toms River, had a rate of childhood brain and central nervous system cancer nearly 70 percent above the state average for the years 1979 to 1991, according to a recent New Jersey Department of Health study. In Toms River alone, these two cancers were diagnosed at a rate three times higher than the state average in children under age 20, and seven times higher in children under age 5.

How good reporters can write bad cancer stories.

Your editor wants human interest. People in the story. So you lead with one of the victims. If you're not careful you may already be conveying them as victims even though that is far from having been established — and maybe never will be.

Because you are an empathetic human you lean toward giving each victim the benefit of the doubt. They are suffering, whether physically or psychologically, and deserve our sympathy. You feel compelled to honor their personal truth.

As a reporter you also want to tell a compelling story. We journalists often think of ourselves as rebels. ("All the President's Men"). One of the great mythological archetypes is David vs Goliath. The people fighting the chemical company.

We also pride ourselves as skeptics, who question — as well we should — the self-serving pronouncements of corporations and politicians. Too often we don't bring the same skepticism to the victims and their advocates.

Naomi Oreskes and Erik Conway's book *Merchants of Doubt*. How corporations like tobacco companies try to breed uncertainty about the science — for their own benefit.

But so do personal injury and mass-tort lawyers looking for the deepest pockets when they represent plaintiffs with cancer. So do advocacy organizations that have their own agendas. The hard part of journalism is closing in on something resembling truth — one that lies between the extremes.

Jurors give $289 million to a man they say got cancer from Monsanto's Roundup weedkiller

By Holly Yan, CNN

Updated 9:28 PM

The New York Times

Roundup Maker to Pay $10 Billion to Settle Cancer Suits

Bayer faced tens of thousands of claims linking the weedkiller to cases of non-Hodgkin's lymphoma. Some of the money is set aside for future cases.

NATIONAL

Jury Awards $80 Million In Damages In Roundup Weed Killer Cancer Trial

March 27, 2019 · 8:31 PM ET

ELSEVIER

Mutation Research/Reviews in Mutation Research

Volume 781, July–September 2019, Pages 186-206

Review

Exposure to glyphosate-based herbicides and risk for non-Hodgkin lymphoma: A meta-analysis and supporting evidence

Luoping Zhang [a] ✉, Iemaan Rana [a], Rachel M. Shaffer [b], Emanuela Taioli [c], Lianne Sheppard [b, d]

9. Conclusions and Future Directions

The rise of glyphosate as the most widely used herbicide raises serious health concerns, given its potential links with NHL. Using our high-exposure *a priori* hypothesis and including the recently updated AHS cohort in a meta-analysis for the first time, *we report that exposure [to glyphosate-based herbicides] is associated with increased risk of [nonHodgkin lymphoma] in humans. . . . However, given the heterogeneity between the studies included, the numerical risk estimates should be interpreted with caution*.

The International Agency for Research on Cancer , World Health Organization of the United Nations.

Group 2A: "Probably carcinogenic to humans" There is strong evidence that it can cause cancer in humans, but at present it is not conclusive.

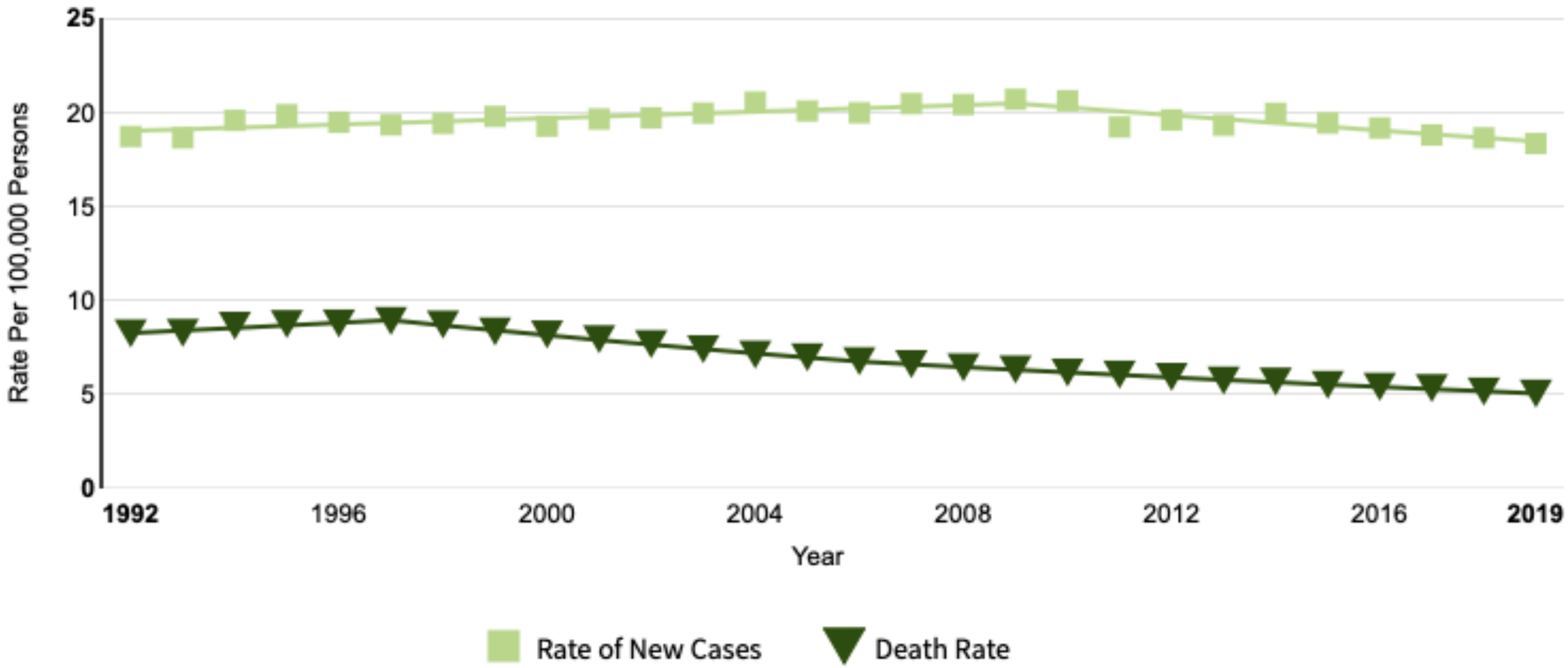
The EPA

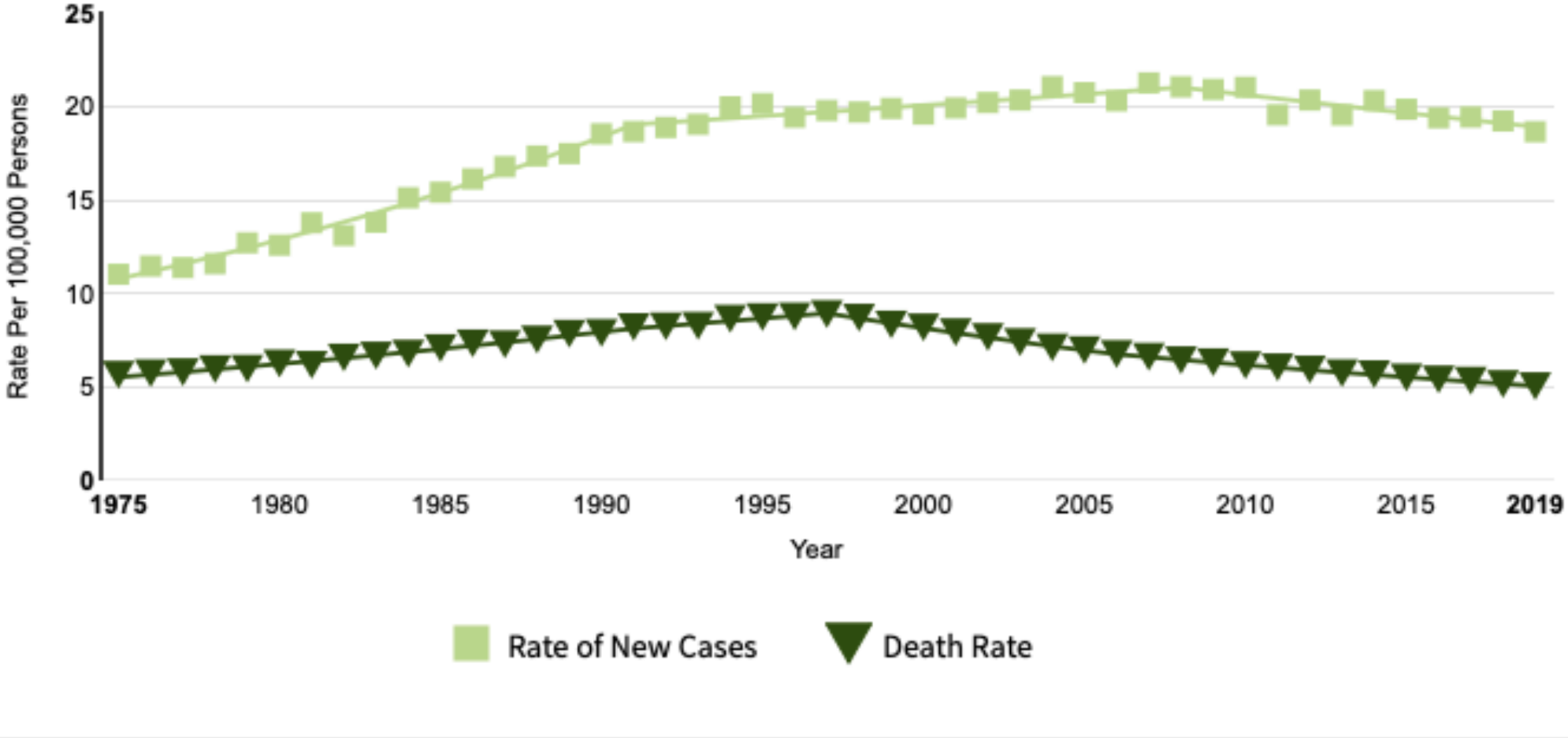
- **No risks of concern to human health from current uses of glyphosate. Glyphosate products used according to label directions do not result in risks to children or adults. . . .**

- **No evidence that glyphosate causes cancer in humans. The Agency concluded that glyphosate is not likely to be carcinogenic to humans. *EPA considered a significantly more extensive and relevant dataset than the International Agency on the Research for Cancer (IARC)*.**

SEER stats on nonHodgkin lymphoma

NIH NATIONAL CANCER INSTITUTE
Surveillance, Epidemiology, and End Results Program




25
20
15
10
5
0
Rate Per 100,000 Persons
1975
1980
1985
1990
1995
2000
2005
2010
2015
2019
Year
Rate of New Cases
Death Rate

Roundup Claims

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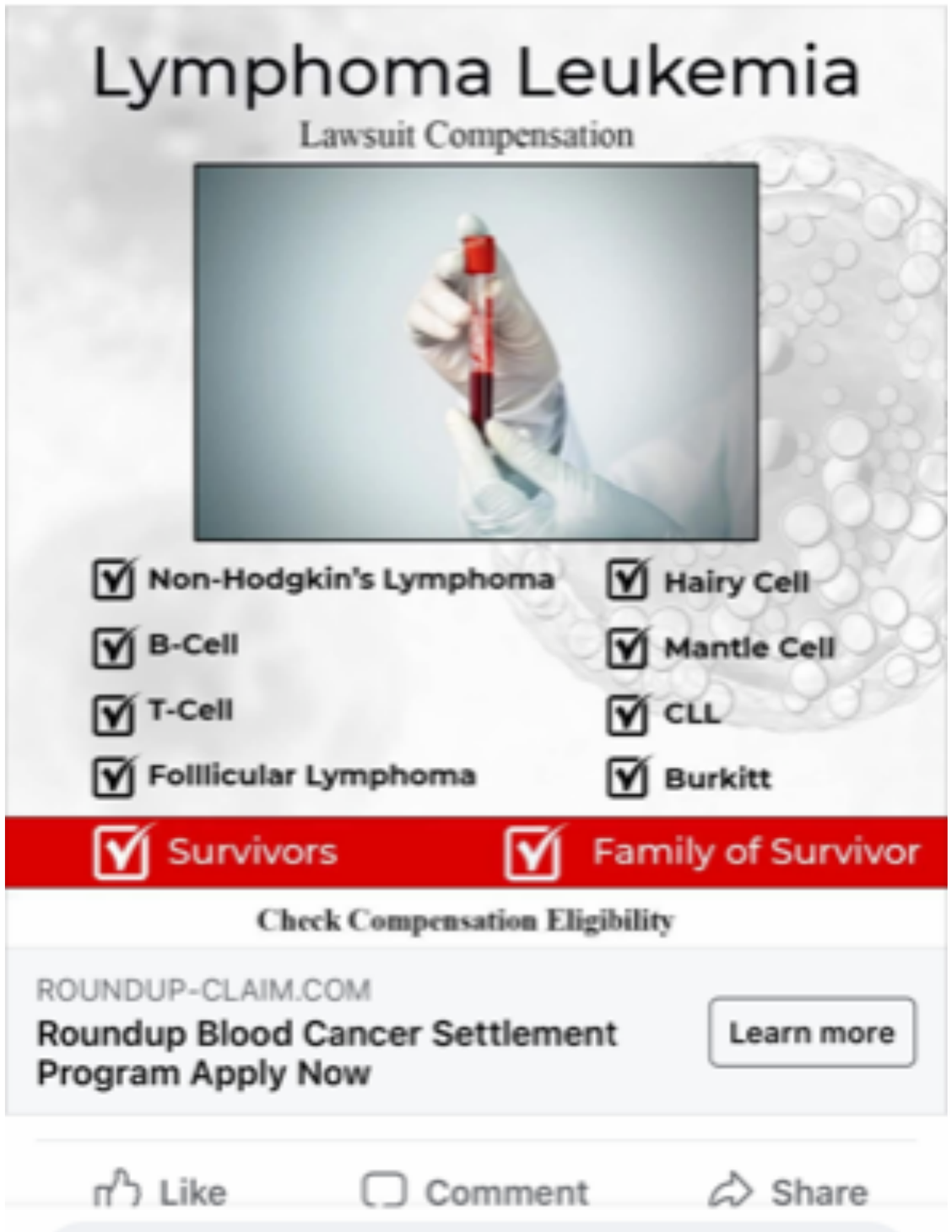
Roundup Blood Cancer Settlement Program. 11 Billion Dollar Settlement. Victims and their families may be owed compensation. No cost or obligation, the review only takes 2 minutes.



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Roundup Blood Cancer Settlement Program Apply Now

Learn more

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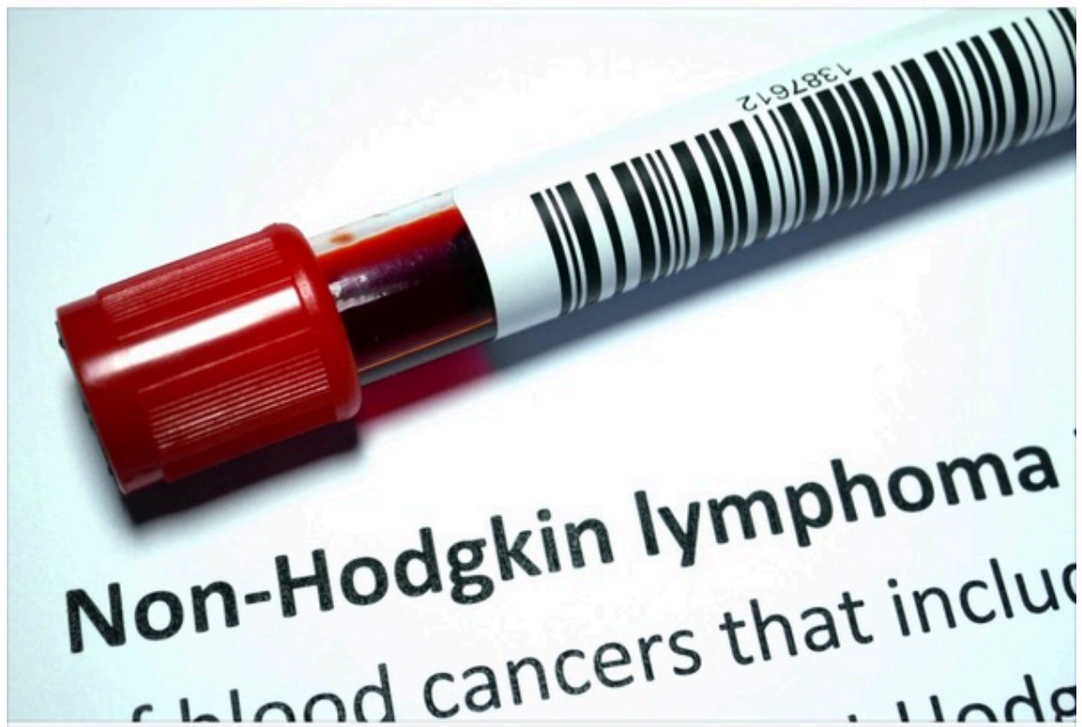
Those affected by Non-Hodgkin's Lymphoma or Chronic Lymphocytic Leukemia (CLL) after spraying Roundup may be entitled to compensation.



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Most relevant

3:05

Roundup Injuries Settlement

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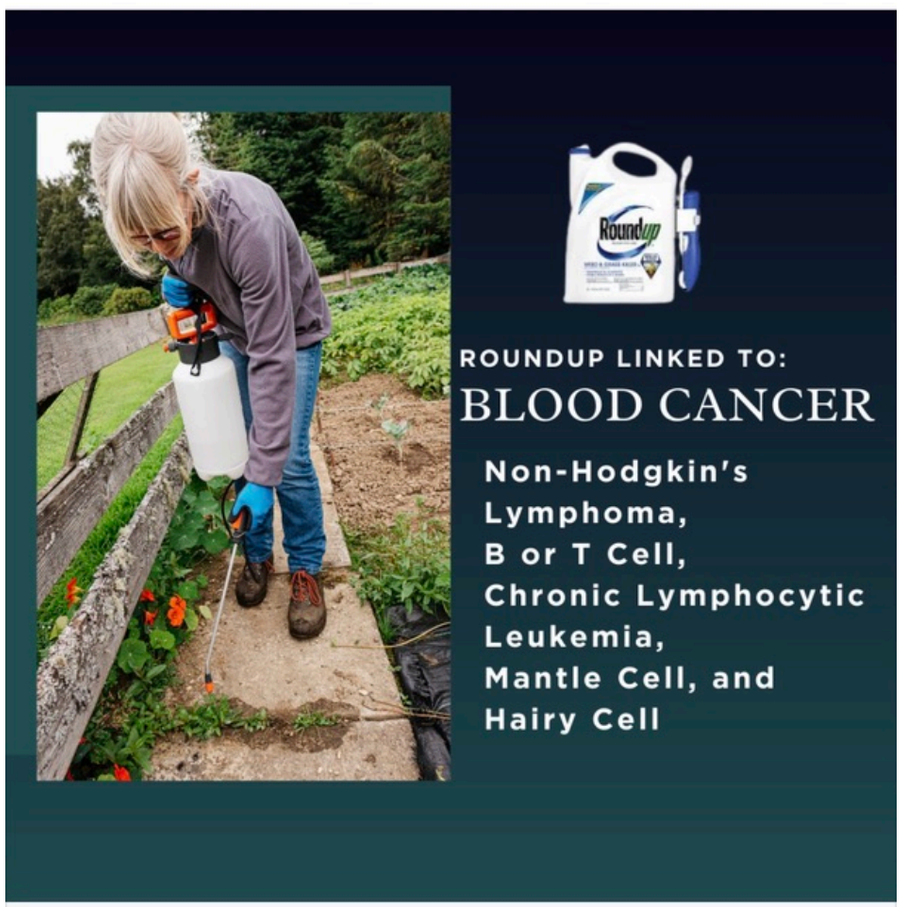
Individuals Diagnosed With Non-Hodgkin's Lymphoma, B or T Cell, Chronic Lymphocytic Leukemia, Mantle Cell, and Hairy Cell A... See More



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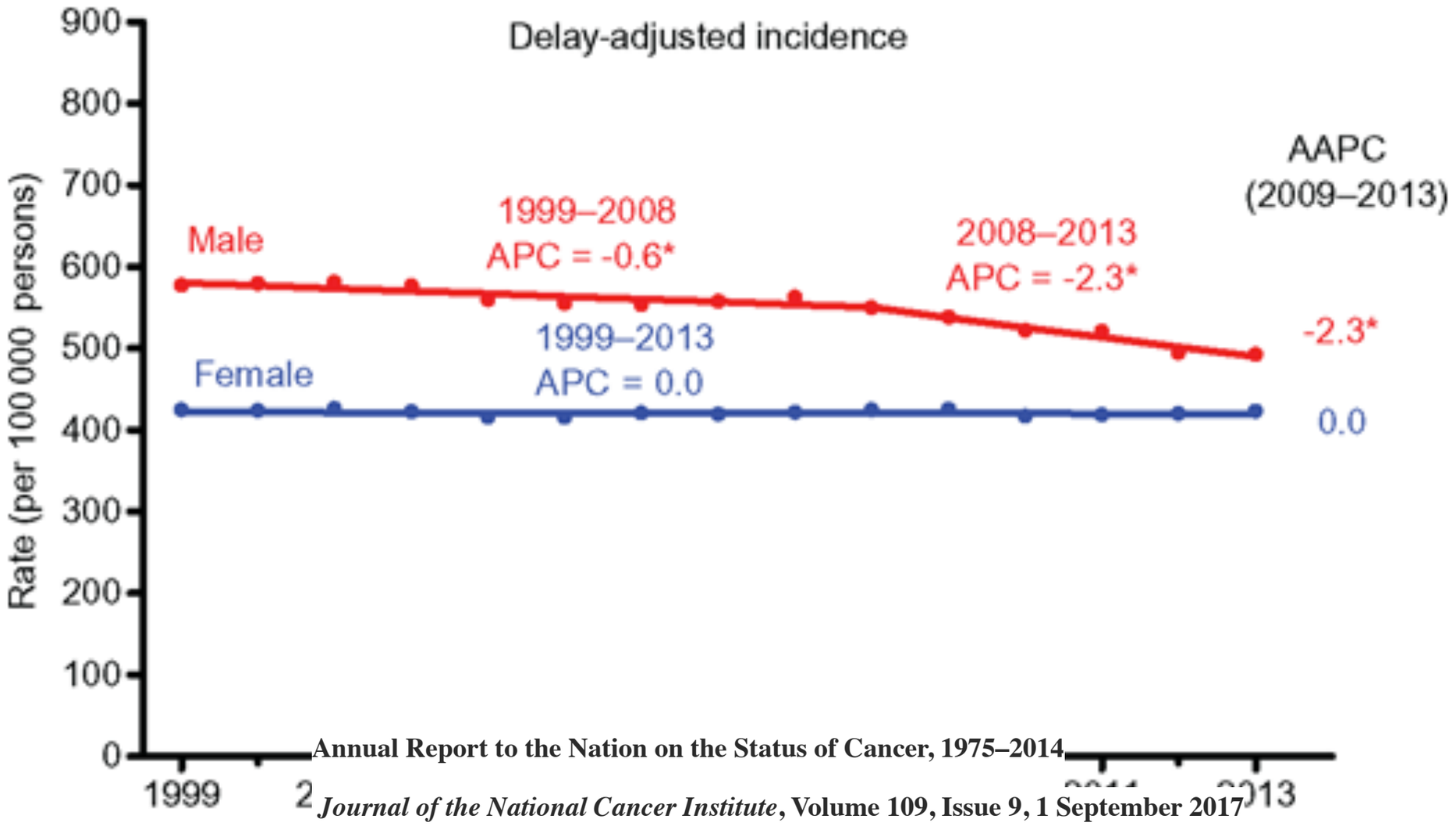
So often with cancer causation what initially seems like a great story so often fizzles in the end. Yet the overwhelming view of the public is that environmental contaminants are a primary cause of what seems like an epidemic of cancer.

So why are our instincts so wrong?

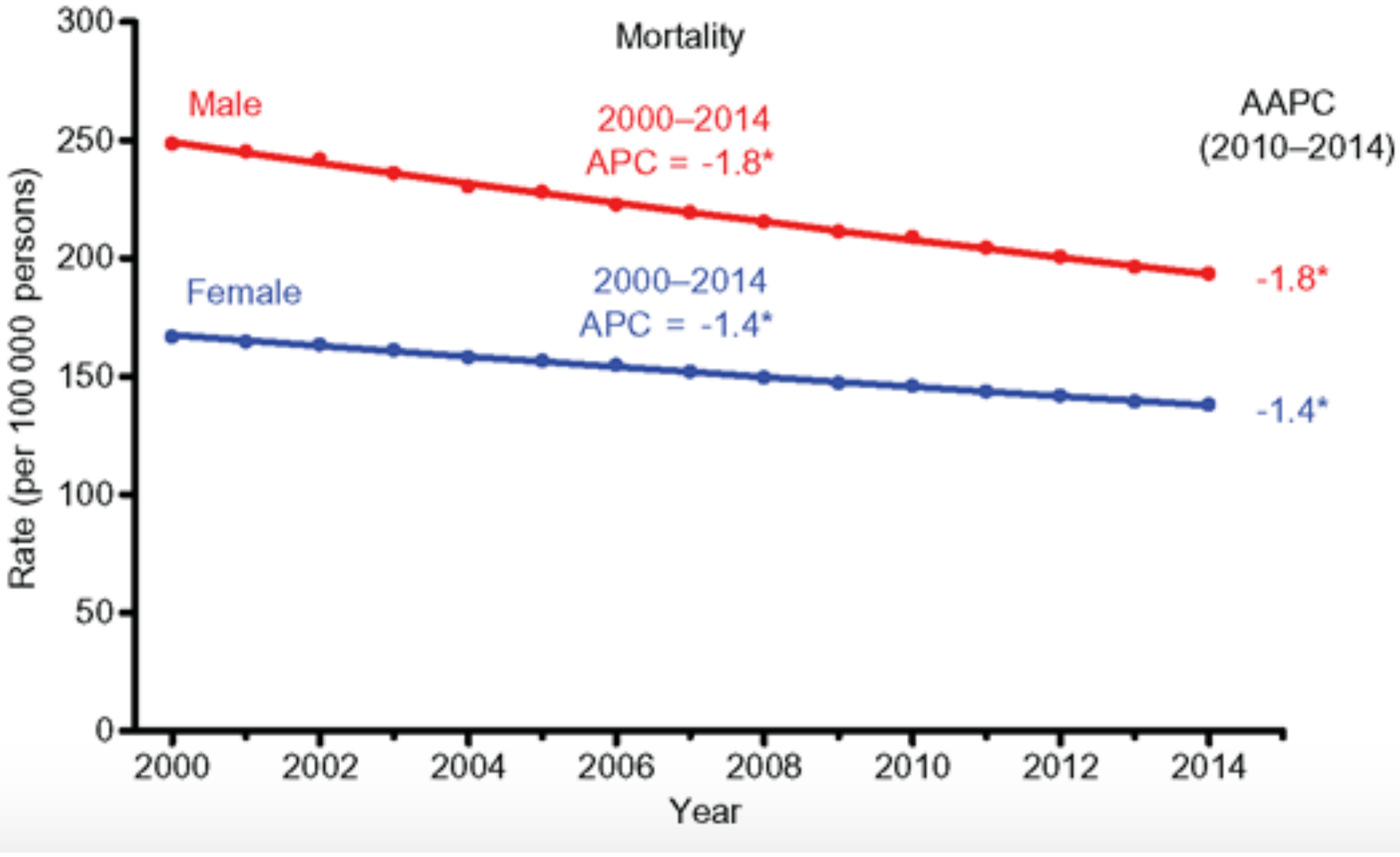
Cancer Incidence Rates for the Most Common Cancers

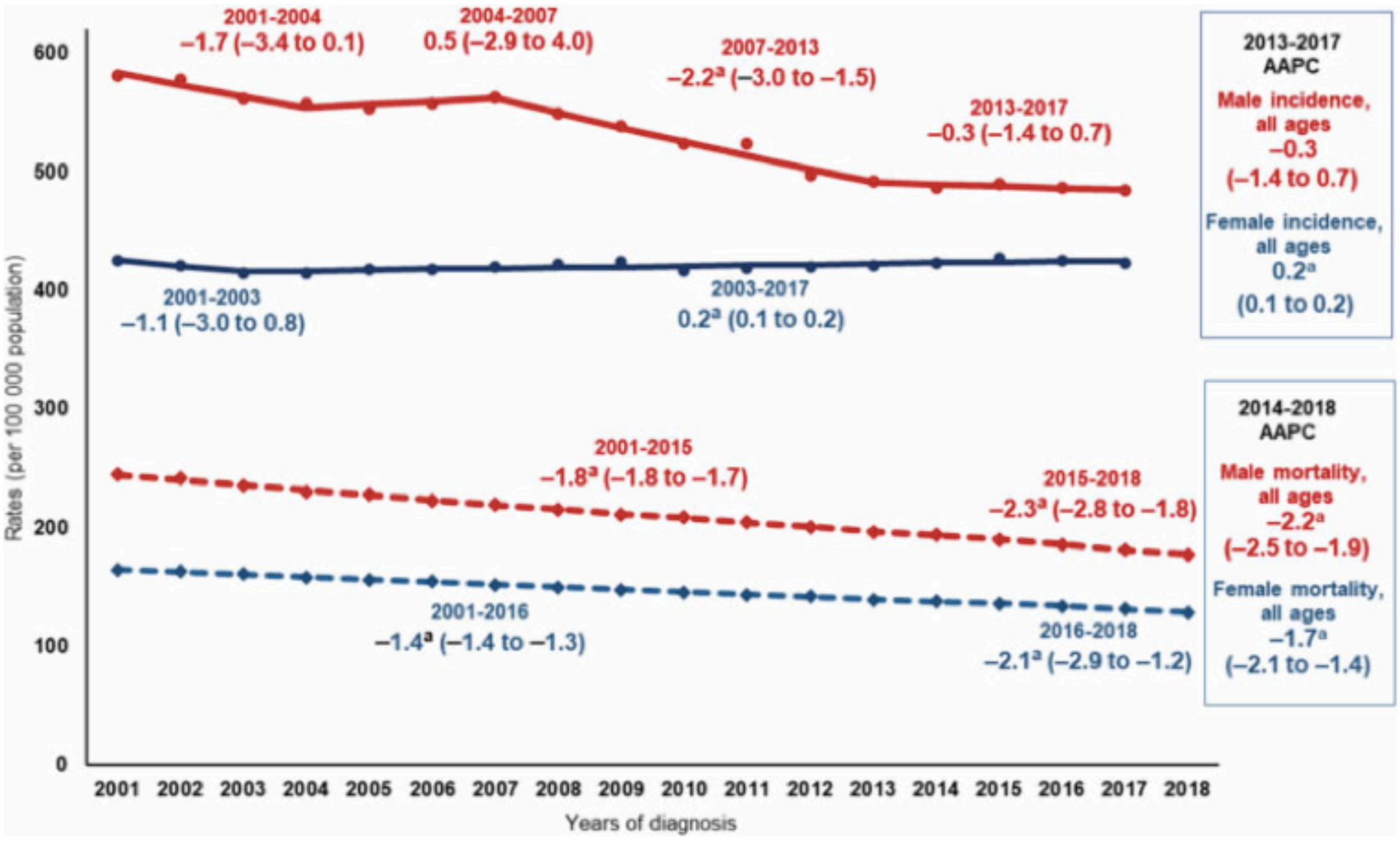
All cancers



Annual Report to the Nation on the Status of Cancer, 1975–2014

***Journal of the National Cancer Institute*, Volume 109, Issue 9, 1 September 2017**


Mortality
Male
2000–2014
APC = -1.8*
AAPC
(2010–2014)
-1.8*
Female
2000–2014
APC = -1.4*
-1.4*
Rate (per 100 000 persons)
300
250
200
150
100
50
0
2000
2002
2004
2006
2008
2010
2012
2014
Year


2001-2004
–1.7 (–3.4 to 0.1)
2004-2007
0.5 (–2.9 to 4.0)
2007-2013
–2.2[a] (–3.0 to –1.5)
2013-2017
–0.3 (–1.4 to 0.7)
2001-2003
–1.1 (–3.0 to 0.8)
2003-2017
0.2[a] (0.1 to 0.2)
2001-2015
–1.8[a] (–1.8 to –1.7)
2015-2018
–2.3[a] (–2.8 to –1.8)
2001-2016
–1.4[a] (–1.4 to –1.3)
2016-2018
–2.1[a] (–2.9 to –1.2)
2013-2017 AAPC
Male incidence, all ages
–0.3
(–1.4 to 0.7)
Female incidence, all ages
0.2[a]
(0.1 to 0.2)
2014-2018 AAPC
Male mortality, all ages
–2.2[a]
(–2.5 to –1.9)
Female mortality, all ages
–1.7[a]
(–2.1 to –1.4)
Rates (per 100 000 population)
600
500
400
300
200
100
0
2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018
Years of diagnosis

PREVENTABLE CAUSES OF CANCER

Among the factors with the biggest impact on cancer incidence in the United States are the following:

~33% of cancer diagnoses are caused by **tobacco use**.

~20% of cancer diagnoses are related to individuals being **obese or overweight**.

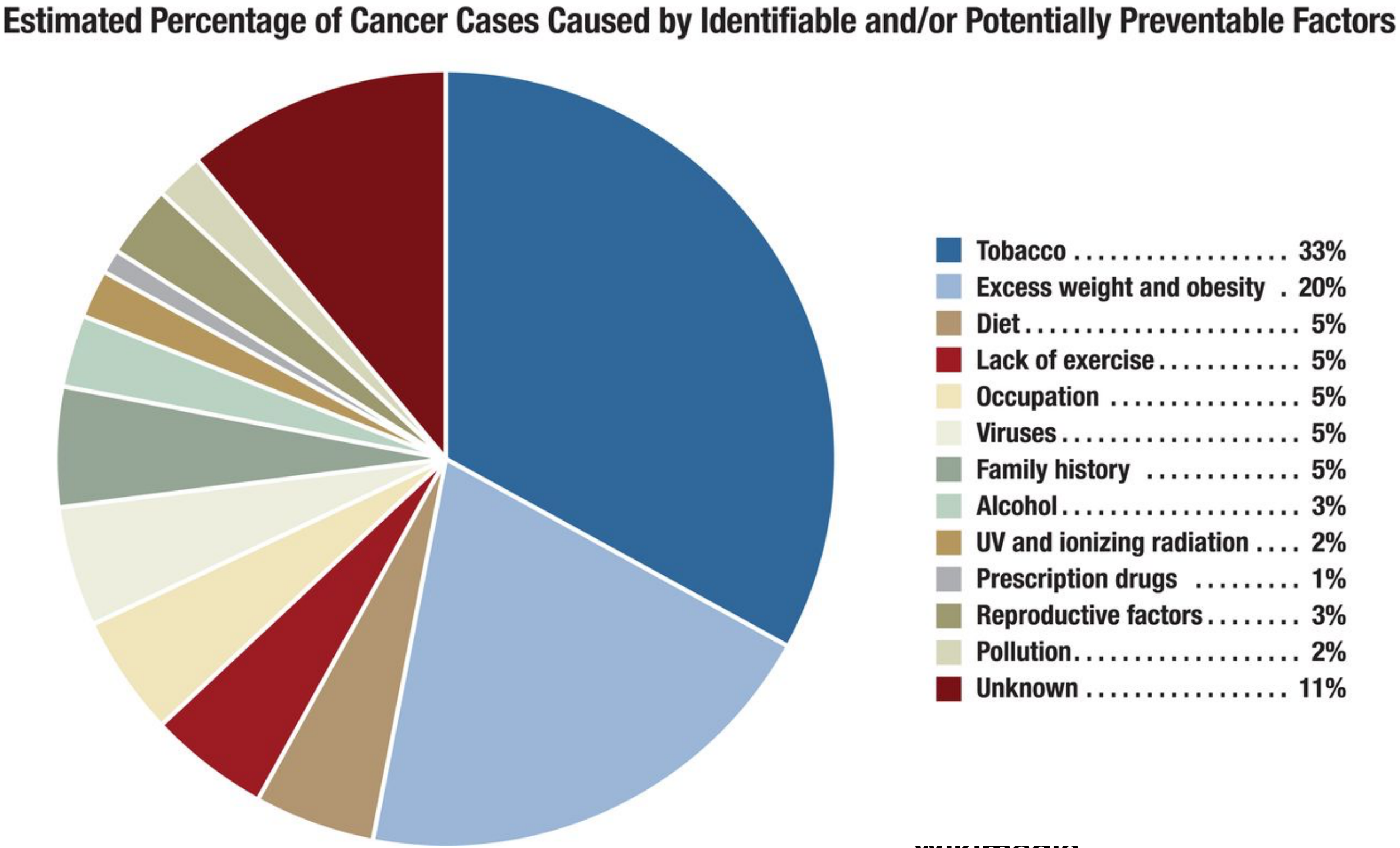
~16% of cancer diagnoses are related to infection with one of several **cancer-causing pathogens**.

~5% of cancer diagnoses are related to individuals getting **insufficient physical activity**.

~5% of cancer diagnoses are related to individuals having **poor dietary habits.**

~2% of cancer diagnoses are a result of **exposure to ultraviolet light from the sun or tanning devices.**

So what does cause the most cancer?



Wikimedia

Smoking increases the risk of lung cancer 23 times (2,300 percent!) for men and 13 times (1,300 percent!) for women.

-- The Health Consequences of Smoking: A Report of the U.S. Surgeon General, 2004

Alcohol and breast cancer risk

Study	Study Population (number of participants)	Follow-up (years)	Relative Risk of Breast Cancer in Women who Drank Alcohol Compared to Women who Did Not RR (95% CI)		
			1-2 drinks/day*	2-4 drinks/day†	
Prospective cohort studies					
Million Women Study [2]	1,280,296 (28,380 cases)	7	1.13 (1.10-1.16)	1.29 (1.23-1.35)‡	29 percent
Nurses' Health Study [3]	105,986 (7,690 cases)	28	1.22 (1.13-1.32)§	1.20 (1.07-1.35)§	20 percent
NIH-AARP Diet and Health Study [4]	184,418 (5,461 cases)	7	1.13 (1.02-1.25)||	1.23 (1.08-1.41)||	23 percent
EPIC [5]	274,688 (4,285 cases)	6	1.07 (0.96-1.19)	1.13 (1.01-1.25)	13 percent

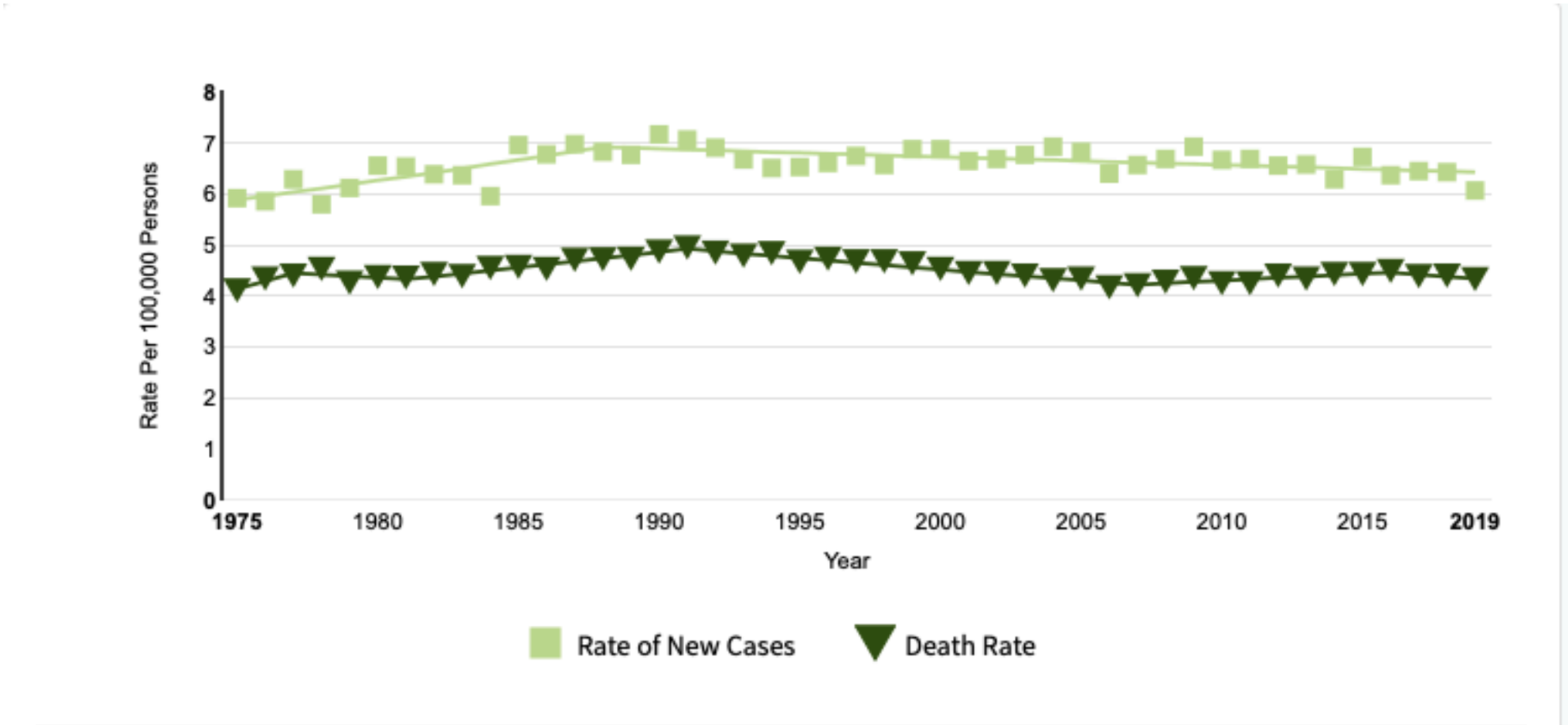
https://ww5.komen.org/BreastCancer/Table3Alcoholconsumptionandbreastcancerrisk.html

Warning: Your Cell Phone May Be Hazardous to Your Health

Ever worry that that gadget you spend hours holding next to your head might be damaging your brain? Well, the evidence is starting to pour in, and it's not pretty. So why isn't anyone in America doing anything about it?

By Christopher Ketcham • January 25, 2010

Brain and neurological cancers



Multicenter Study > Int J Epidemiol. 2010 Jun;39(3):675-94. doi: 10.1093/ije/dyq079.
Epub 2010 May 17.

Brain tumour risk in relation to mobile telephone use: results of the INTERPHONE international case-control study

INTERPHONE Study Group

— No relationship between the amount of time talking on a cell phone and the incidence of gliomas and other brain tumors.

— A strangely negative correlation: Regular users appeared to have a *slightly lower risk* of getting brain tumors than people who didn't use cell phones at all.

— Stranger still, for the 10 percent of people who reported the very highest use —as much as twelve hours a day(!)—the increased risk of glioma appeared to jump abruptly from 0 to 40 percent.

Not gradually as one would expect. No dose-response relationship
But all at once.

A person's odds of being diagnosed with glioma, the most common of all brain tumors, is about 0.0057 percent.

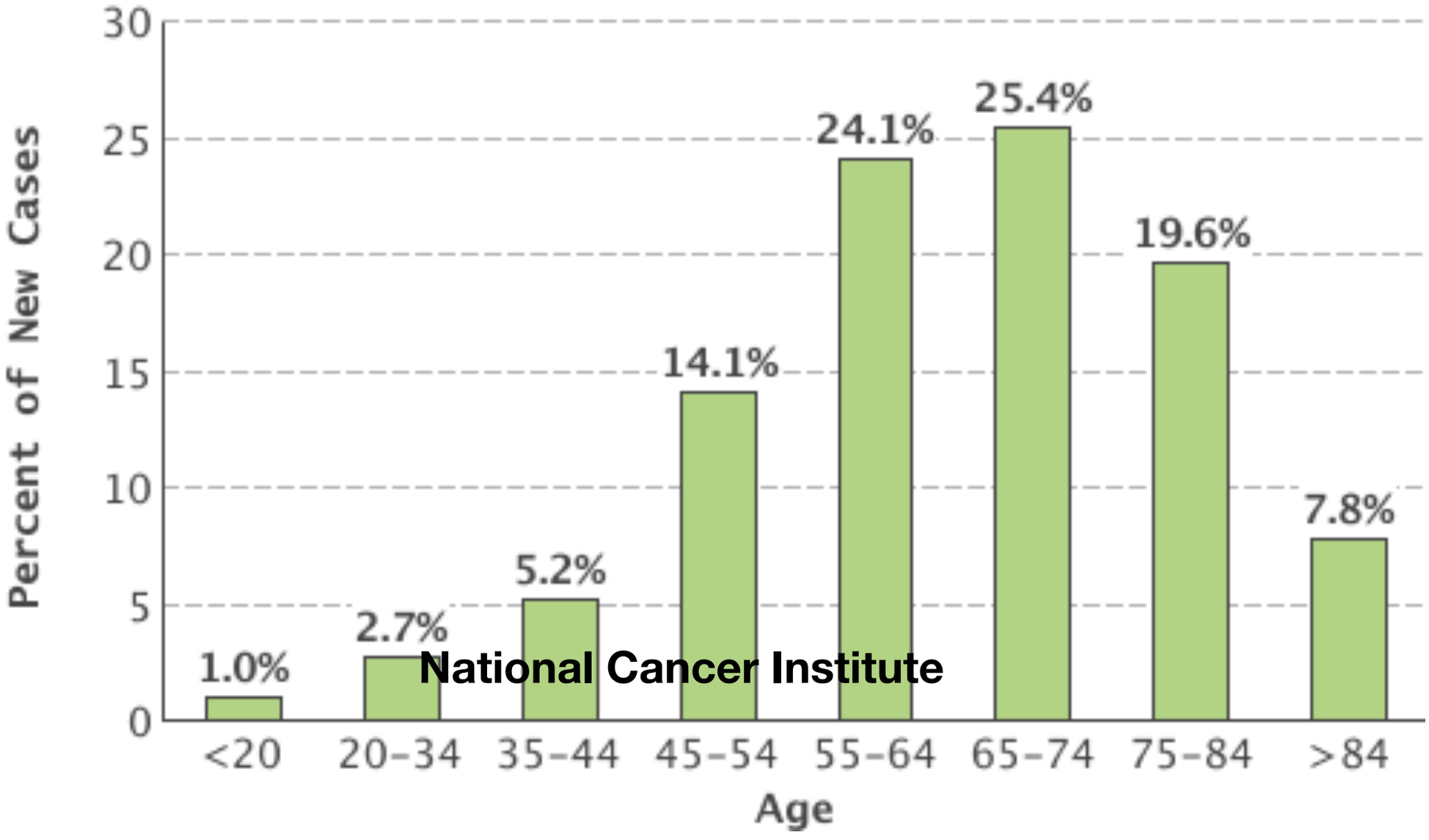
A 40 percent increase would make that 0.008 percent.

185 **odds of being diagnosed with the cancer:** This was a hard number to come up with. The statistics available online from SEER don't break down brain tumors by type, but the agency made the calculation at my request. (E-mail to author from Rick Borchelt, NCI Media Relations, July 12, 2012.) For a somewhat lower estimate, see table 1 of Judith A. Schwartzbaum et al., "Epidemiology and Molecular Pathology of Glioma," *Nature Clinical Practice Neurology* 2, no. 9 (2006): 494–503. Adding the incidence rates of the different kinds of glioma comes to .0049. The article also estimates that 77 percent of primary malignant brain tumors are gliomas. Multiplying SEER's incidence rate for all gliomas, 0.0061, by 0.77 yields a slightly different value, 0.0047.

The problem is that we can’t shake this idea that cancer is something inflicted on us from outside. By poisonous chemicals, invisible waves. When tragedy strikes out of the blue it’s human nature to seek a cause. To find a culprit — someone to blame. Maybe ourself ourselves. If only we hadn’t . . .

But much, maybe most cancer arises spontaneously from within.

60 percent of cancer cases are diagnosed in people 65 or older.



“Cancer is an inevitability the moment you create complex multicellular organisms and give the individual cells the license to proliferate.

“It is simply a consequence of increasing entropy, increasing disorder.” -- *Robert Weinberg, the Whitehead Institute. MIT*

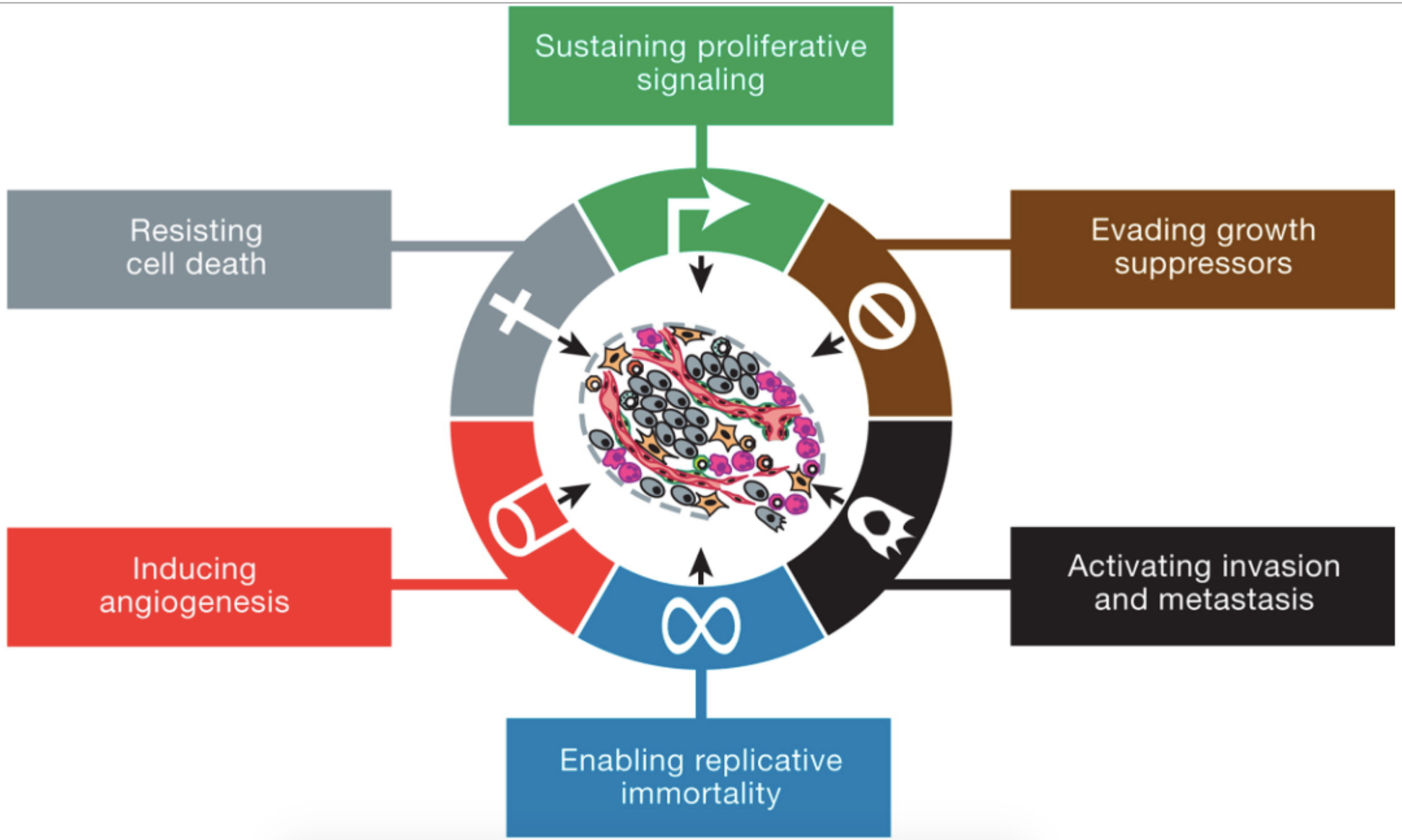
“If we lived long enough, sooner or later we all would get cancer.”

Every second 4 million cells in your body are dividing,
copying your entire genome.
Inevitably there will be mistakes -- mutations.

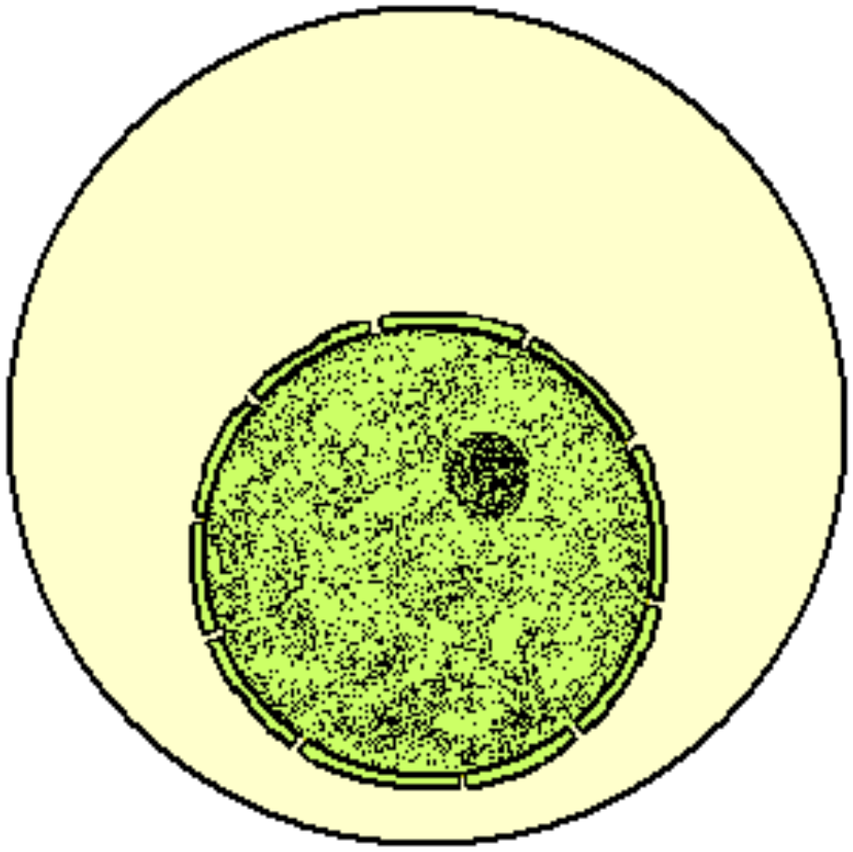
Some will caught and corrected by “proof-reading” enzymes. But this safeguard is imperfect.

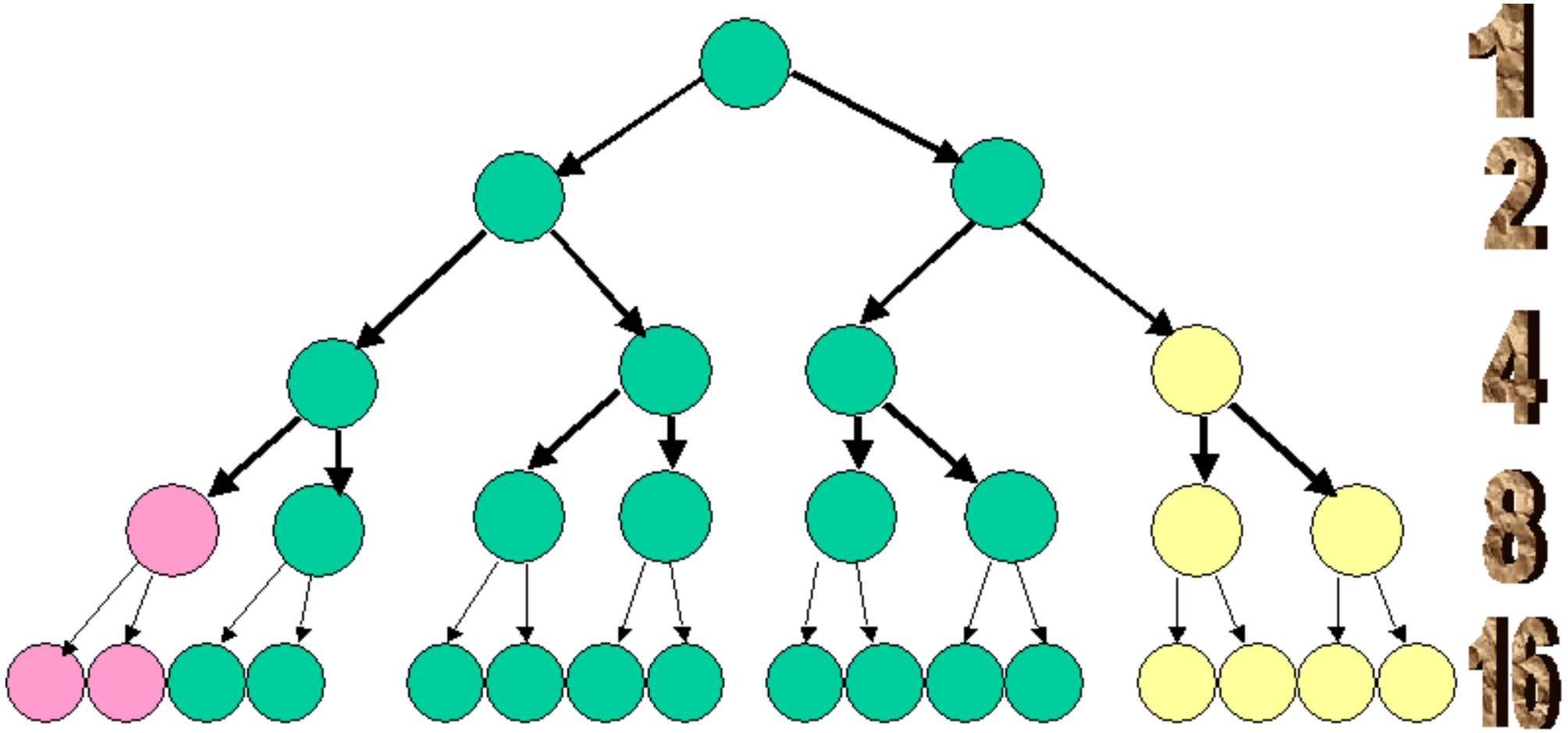
Inevitably there will be mistakes -- mutations.

And certain combinations of mutations can tip a healthy cell into the wildfire growth we call cancer.



Hallmarks of Cancer: The Next Generation
Douglas Hanahan, Robert A. Weinberg





Cell Replication

Cell Replication

http://members.optusnet.com.au/exponentialist/Bacteria.htm

As a cluster of cancer cells develops, mutation by mutation, it is like a creature trying to evolve inside the ecosystem of your body.

Cancer is an unfortunate consequence of evolution -- of being multicellular creatures that evolved in a world ruled by the Second Law of Thermodynamics.

“Things fall apart.”

All systems move inevitably from a state of order to disorder.

The most powerful cause of cancer is entropy.

The end

- leftovers

Camp Lejeune, North Carolina

42 deaths from kidney cancer when 36 was considered average.

For multiple myeloma: 17 deaths, when 16 would have been expected.

Actually there were fewer cancer cases than in the general population

“The healthy soldier effect”

Love Canal

UPSTATE WASTE SITE MAY ENDANGER LIVES

Abandoned Dump in Niagara Falls Leaks Possible Carcinogens

By DONALD G. McNEIL Jr.

Special to The New York Times

NIAGARA FALLS, N.Y., Aug. 1 — Twenty-five years after the Hooker Chemical Company stopped using the Love Canal here as an industrial dump, 82 different compounds, 11 of them suspected carcinogens, have begun percolating upward through the soil, their drum containers rotting and leeching their contents into the backyards and basements of 100 homes and a public school built on the banks of the canal.

Children and dogs have received chemical burns playing on the canal site, and large numbers of miscarriages and birth defects have been found among residents of the homes along the site.

Tomorrow, the State Health Department is scheduled to recommend whether the Governor should declare a health emergency and evacuate the area's fami-

Published: August 2, 1978

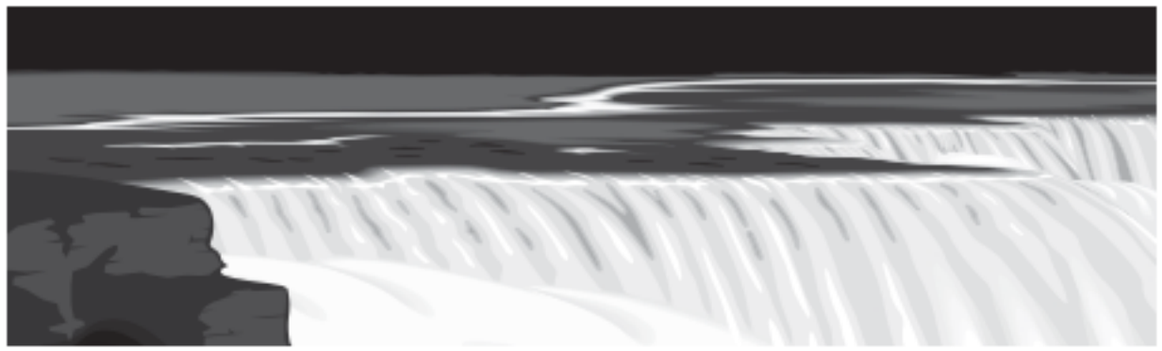
Time Bomb in Love Canal

The New York State health commissioner is right to call the Love Canal area of Niagara Falls a "great and imminent peril." He is just 25 years too late. A "long-standing peril" would be more like it.

The bizarre troubles now surfacing at Love Canal originated decades ago in careless, virtually unregulated waste-disposal practices. The never-completed canal, a deep ditch, was once owned by Hooker Chemical Company, which used it as a sump for toxic chemical wastes. Then it was sold to the city of Niagara Falls, which dumped in municipal wastes. Other chemical companies and possibly the Army added their poisons. Eventually the ditch was covered over and a school and houses were built.

burying these things like ticking time bombs," one E.P.A. official warns. ". . . We're mortgaging our future if we don't control them more carefully."

New laws and regulations should do much to ease problems in the future. Two years ago Congress passed a Resource Conservation and Recovery Act which required a "cradle-to-grave" management system for hazardous wastes. The E.P.A. is now trying to define which wastes are hazardous and preparing regulations for managing and disposing of them. The regulations are expected to require that most disposal sites be made impermeable to leakage; that draining be engineered to keep surface water away; that very long-lasting and toxic materials be incinerated or neutral-



Love Canal Follow-up Health Study

Prepared by the

Division of Environmental Health Assessment
Center for Environmental Health
New York State Department of Health
for the
U.S. Department of Health and Human Services
Agency for Toxic Substances and Disease Registry

30 year follow-up, 2008

"For cancer incidence, the results of the external comparisons indicated that the total number of cancers observed among Love Canal residents was within the range expected for New York State and Niagara County. The respiratory and digestive systems were the only major organ systems to show any elevation, and some individual sites such as gall bladder, kidney, bladder, testis, liver and rectum also showed elevations. Due to small numbers, these elevations remained within the range of rates that would be expected by chance."