

“Lies, Damned Lies, and Statistics”

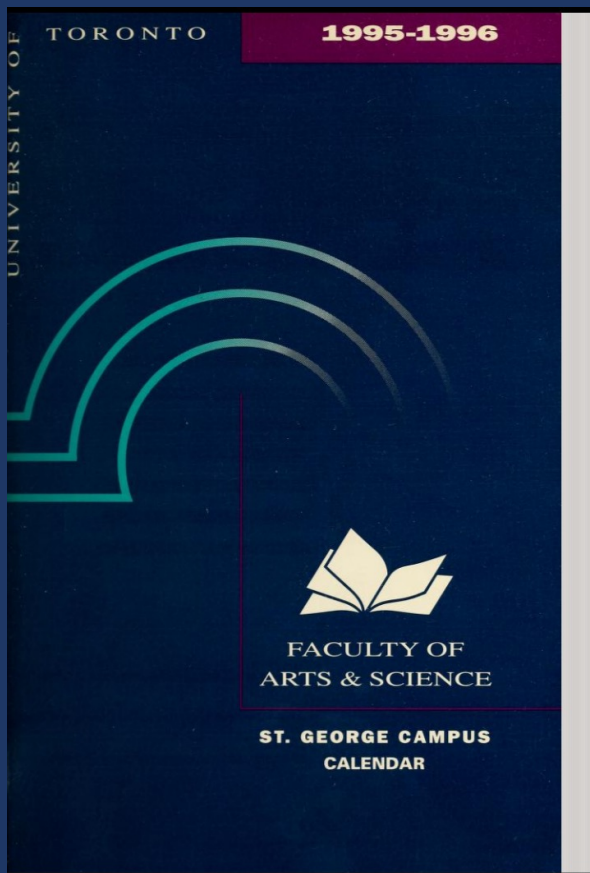
Nancy Reid
University of Toronto

September 29, 2025



Fall 1995

SCI 199Y "First year seminar"

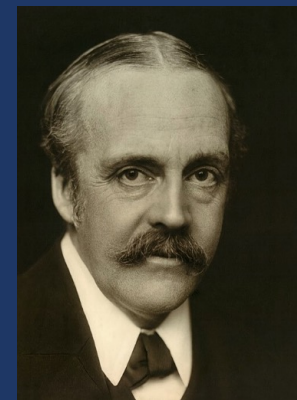
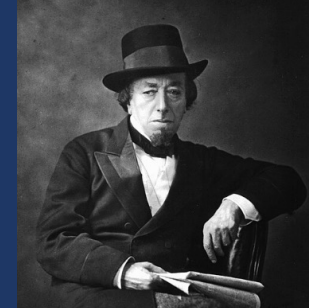
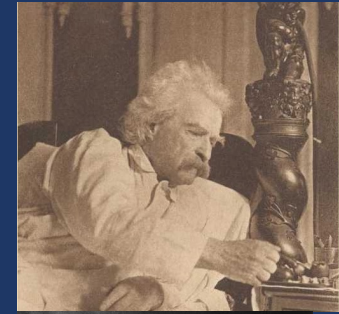


438 STA	STATISTICS
<p>Minor program: R22891 (4 full courses or their equivalent)</p> <ol style="list-style-type: none"> MAT 133Y/135Y/139Y MAT 223H/240H; STA 250H, (255H/257H) STA (302H, 352Y)/three STA half-courses at the 300/400-level 	
<p>STATISTICS AND COMPUTER SCIENCE — See COMPUTER SCIENCE AND STATISTICS</p>	
<p>STATISTICS AND ECONOMICS — See ECONOMICS</p>	
<p>STATISTICS COURSES (see Key to Course Descriptions on Page 44)</p>	
<p>NOTE: For Breadth Requirement purposes (see Pages 36ff), all STA courses (except STA 220H, 221H, 250H, 255H, 257H and JBS 229H, which have NO breadth requirement status) are classified as Mathematical Science courses. STA 429H is a Life or Social course.</p>	
SCI199Y	<p>First Year Seminar 52T</p> <p>Undergraduate seminar that focuses on specific ideas, questions, phenomena or controversies, taught by a regular Faculty member deeply engaged in the discipline. Open only to newly admitted first year students. It may serve as a breadth requirement course; see page 48.</p>
STA107H	<p>An Introduction to Probability and Modelling 39L, 13T</p> <p>An introduction to the theory of probability, with emphasis on the construction of discrete probability models for applications. After taking this course, students are expected to</p>

Undergraduate seminar that focuses on specific ideas, questions, phenomena or controversies, taught by a regular Faculty member deeply engaged in the discipline

“Lies, Damned Lies, and Statistics”

- Appears in Mark Twain’s autobiography 1924
- Attributed to Benjamin Disraeli 1895
- Also attributed to Arthur James Balfour 1892



Quote Origin: There Are Three Kinds of Lies: Lies, Damned Lies, and Statistics

quotersearch June 22, 2022

Mark Twain? Benjamin Disraeli? St. Swithin? Eliza Gutch? Charles Dilke? Charles Stewart Parnell? Robert Giffen?

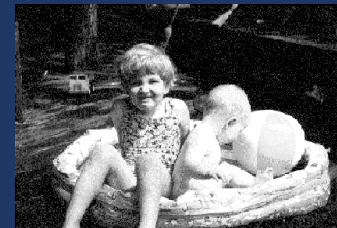
Arthur James Balfour? Francis Bacon? Anonymous?

<https://quoteinvestigator.com/2022/06/22/lies-statistics/>

Fall 1995

SCI 199Y First year seminar

The title of the course is a quotation attributed to Disraeli, a British statesman of the nineteenth century. Does it still apply today? This course will consider how statistics and statistical thinking get used (and abused) in a variety of activities, including polling, public health, marketing, advertising, lotteries.



Some questions that will be addressed are:
Why do newspapers report a "margin of error" for poll results, and what does it mean? How can graphs and charts provide information (or misinformation)? What makes a good graph? How do new cancer drugs get tested, and why doesn't the same protocol work for AIDS? How do studies on mice get extrapolated to humans, and do the results make any sense? What is quality control, and why is it currently so fashionable in North American industry?



Fall 2014

PMU 199H First year seminar

Both Mark Twain and Benjamin Disraeli are rumoured to have said "There are three types of lies. Lies, damned lies, and statistics". Can you really prove anything with statistics? This course will consider how statistical thinking gets used in a many fields of science, social science, business and public policy.

Some questions that will be addressed include:
Why do newspapers report a "margin of error" for poll results? What does "statistically significant" mean? How do Netflix recommendations work? What is "5-sigma", and why was this important for the 2013 Nobel Prize in physics?



95-6, 96-7, 06-07, 07-08, 08-09

Everything has changed

1990s -- Topics

THE GLOBE AND MAIL
CANADA'S NATIONAL NEWSPAPER • THURSDAY, FEBRUARY 26, 2015

TORONTO STAR

The New York Times

THE WALL STREET JOURNAL.

The Economist

Science

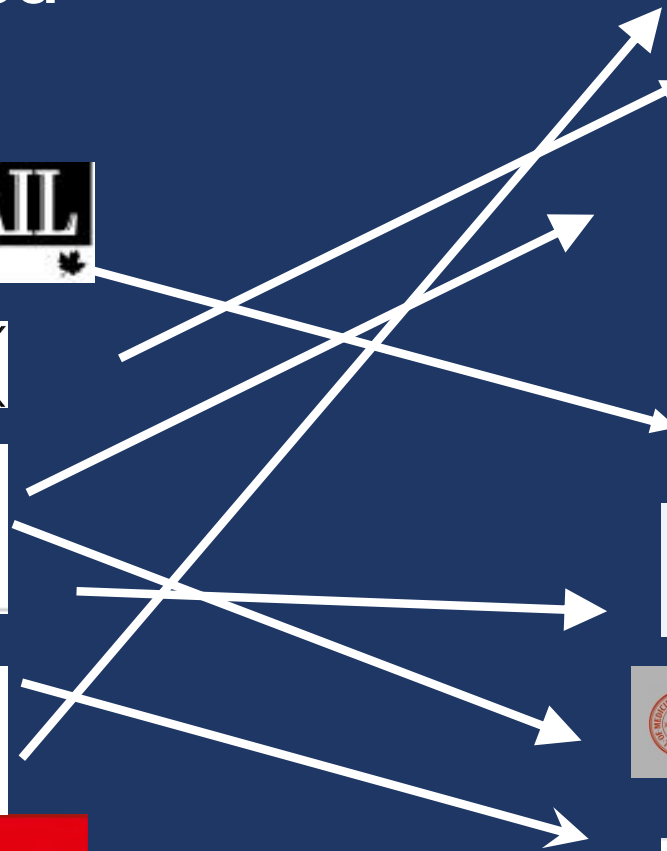
nature

JAMA

Psychology Today

 **The NEW ENGLAND JOURNAL of MEDICINE**

WIRED



That was then

1990s – To the source



That was then

October 1996

Research study suggests:

The survey of 2,100 recipients by the Levy-Coughlin Partnership adds to the heated debate about why the rolls have dropped by 180,000 since June of 1995.

The report is to be released today.

"This survey is the first effort by an Ontario government to research why people are leaving the welfare system," a government source said. "We have started to create a climate in Ontario that enables people to move from the welfare system to the work force."

The research company's telephone survey looked at randomly chosen people who left the system in May. It is considered accurate 19 times out of 20 plus or minus 1.6 percentage points.

Many critics have suggested the social assistance caseload has shrunk because policy changes by the Progressive Conservative government simply disqualified many people. Others who

The Globe and Mail, Thursday, October 24, 1996

National News

A7

Welfare recipients found jobs, study says

BY TOM BLACKWELL
Canadian Press

TORONTO — More than half the people who left Ontario's welfare rolls over the past year did so because they found a job, a government-commissioned study suggests.

The survey of 2,100 recipients by the Levy-Coughlin Partnership adds to the heated debate about why the rolls have dropped by 180,000 since June of 1995.

The report is to be released today. "This survey is the first effort by an Ontario government to research why people are leaving the welfare system," a government source said. "We have started to create a climate in Ontario that enables people to move from the welfare system to the work force."

The research company's telephone survey looked at randomly chosen people who left the system in May. It is considered accurate 19 times out of 20, plus or minus 1.6 percentage points.

Many critics have suggested the social assistance caseload has shrunk because policy changes by the Progressive Conservative government simply disqualified many people. Others who could no longer afford accommodation are living on the street, anti-poverty activists suggest.

But 46 per cent of former recipients polled by Levy-Coughlin said they went off assistance because they found a full-time job and 33 per cent said they found a part-time job.

An additional 26 per cent said their spouses had found work, 1.9 per cent said they had increased their pay or work hours and 1.7 per cent had found a better job, according to the survey.

More than 38 per cent said they had dropped off the rolls for other reasons, such as a reconciliation with a spouse.

One of the Conservatives' first moves after taking office last year was to cut welfare rates, which the government said would save \$1-billion a year.

Workfare puts volunteering at risk, report warns

People likely to balk at being mistaken for forced workers under confusing Ontario plan, groups say

BY JANE GADD
The Globe and Mail

TORONTO — Community agencies that provide a range of services from meals on wheels to youth clubs risk losing both their volunteers and their public donations if they use so-called workfare participants as planned by the Ontario government, says a report by the Ontario Social Safety Network and the Social Planning Council of Metropolitan Toronto.

The government's plan "threatens the entire ethic of volunteerism, relations among paid staff, volunteers and workfare placements, and even public support for volunteer agencies," says the report released yesterday.

Under the Ontario Works program introduced by the government this

summer, people on welfare for more than four months who are considered employable are to be required to perform community-service work for 70 hours a month. Those who don't work would lose their welfare benefits.

Municipalities have been left to work out with agencies that provide services the placement and supervision of workfare participants.

The 417 community-based agencies in Metro Toronto have a total "work force" of 67,000, of whom 78 per cent are volunteers. Many have only one or two paid staff members, and most have suffered cuts in the portion of their budgets that come from government. As a result, many are agonizing over whether to bolster their budgets and number of workers by participat-

ing in the provincial program. But the report warns that people who currently volunteer in community agencies fear being confused with people who have been forced into service. And it says staff at the agencies should not have the responsibility for reporting on workfare participants' attendance and performance and possibly causing them to lose their welfare payments.

The report says the government has deliberately fostered confusion in the public's mind between volunteer work and workfare by labelling the latter "community service."

"Confusing workfare and volunteerism could devalue volunteer activity and create a negative image of volunteerism, in the public's mind and

among other volunteers," it says. "Many people on social assistance already volunteer — to contribute to their community and to develop new skills and job contacts. . . . But when contributing to the community through work is required, participants may become cynical about genuine volunteer work."

Workfare will also conflict with the mission of agencies that provide assistance to people in need, the report says.

How will present or potential future clients view the agency which at one moment exists to serve their needs, and in the next is helping police their welfare eligibility?"

Only a handful of Northern Ontario communities have even begun to

make workfare placements, which were supposed to be in full swing in 20 pilot communities by Oct. 1.

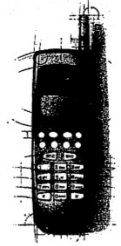
In Metro Toronto, which is not among the pilot communities, workfare is to begin next fall. Next week, Metro Council's social services committee is to debate how it should be implemented in Metro.

Peter Clutterback of the Social Planning Council released yesterday a resolution backed by 80 community-based agencies that will be presented to the committee.

It calls for a welfare-to-work program rather than workfare, with the main difference being that such a program would be voluntary, would include training in marketable skills and would pay "a fair wage."



Cordless



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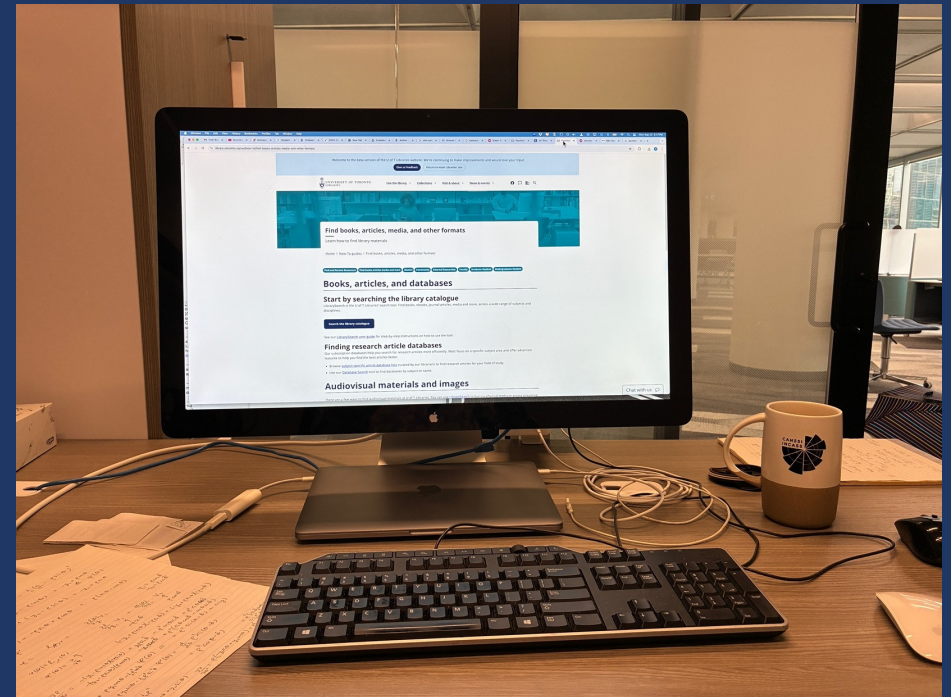
Changes over time

2014 – Topics



TheUpshot
SEEING IS BELIEVING

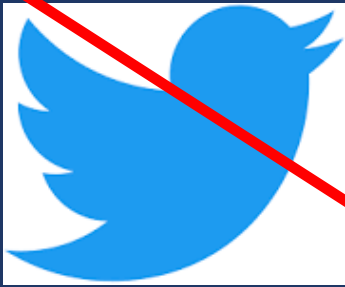
FiveThirtyEight



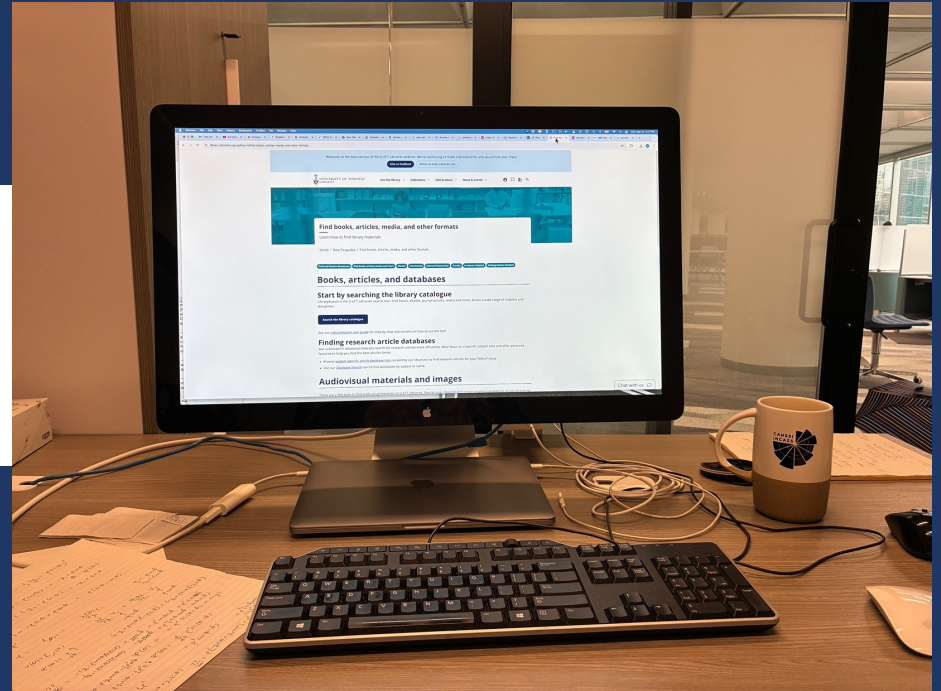
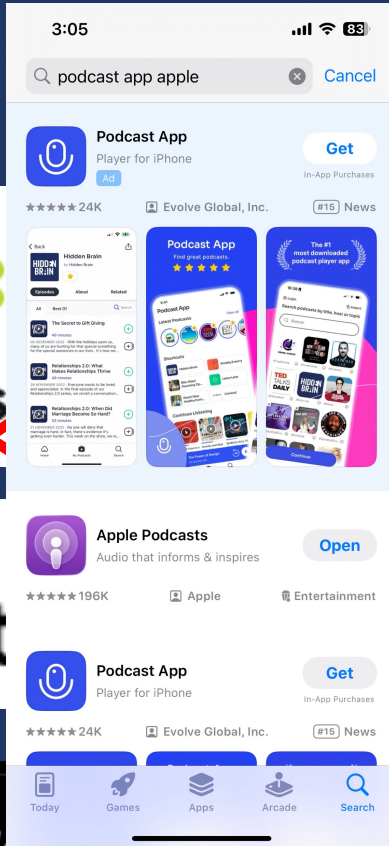
RADIO **4**

More or Less: Behind the Stats

This is now 2025 – Topics



FiveThirt

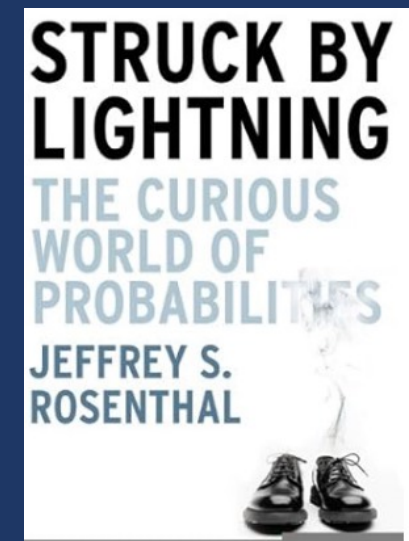
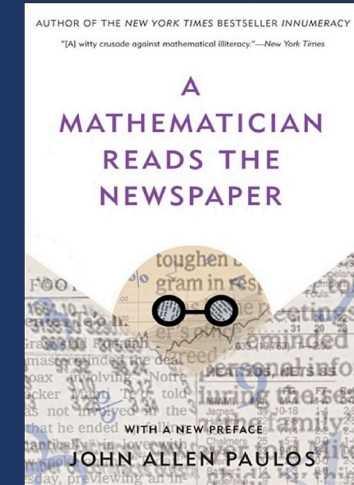
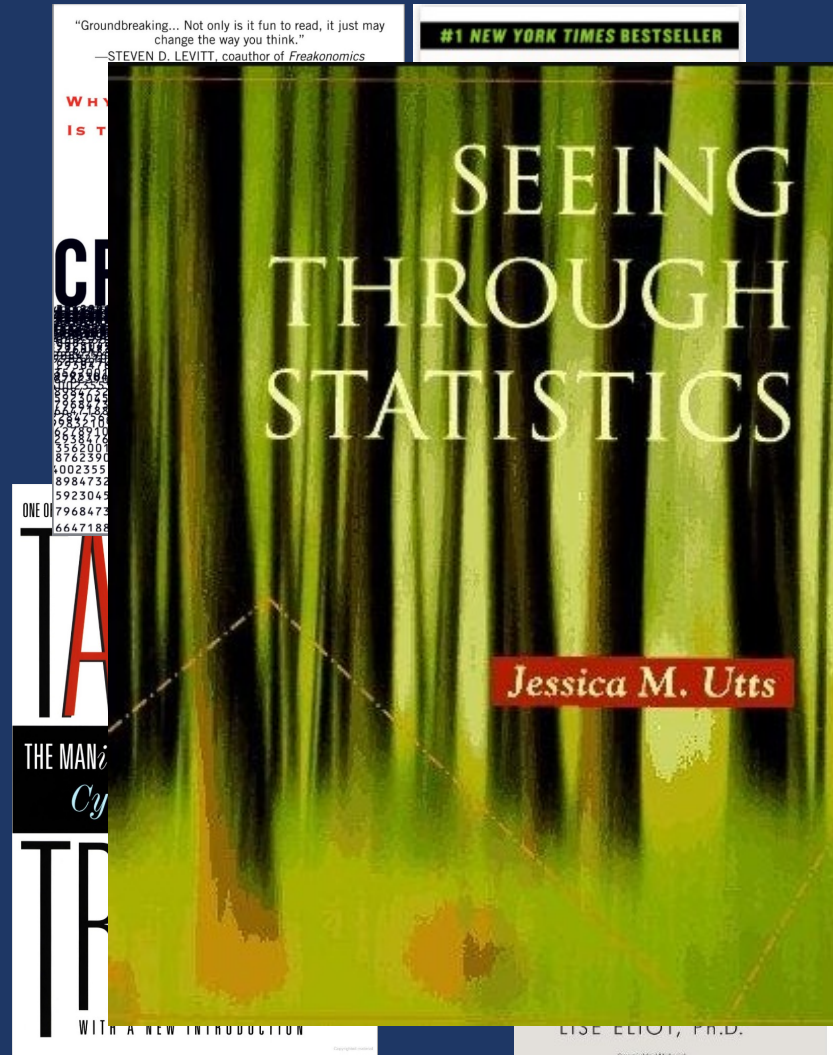
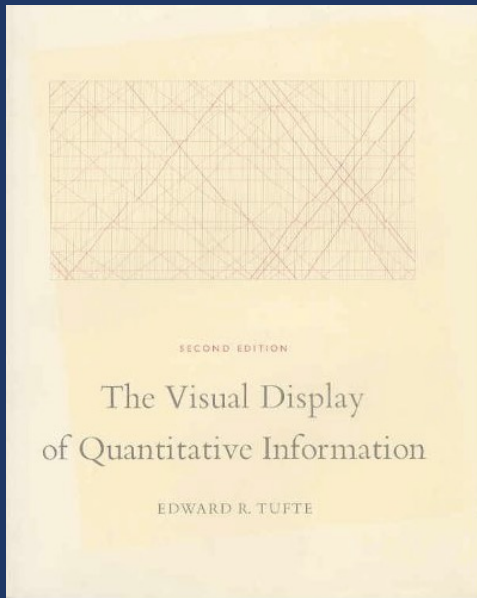


RADIO 4

More or Less: Behind the Stats

Some books

1995 – 2014



"A course called Ch



BIOL 270 Data Reasoning In A Digital World (4)

[Sign in to add this course to your plan or bookmark it.](#)

Course Overview

Course Description

Our world is rife with misinformation. This is a course about "calling b***s*** on" - spotting, dissecting, and publicly refuting - false claims and inferences based on quantitative, statistical, and computational analysis of data. Spotting misinformation; causal fallacies; statistical traps; data visualization; big data; interpreting scientific claims; fake news and social media; refutation techniques. Prior math/stat background unnecessary.

CHAN

A publication of the American Statistical Association
Volume 22, Number 1, 2009



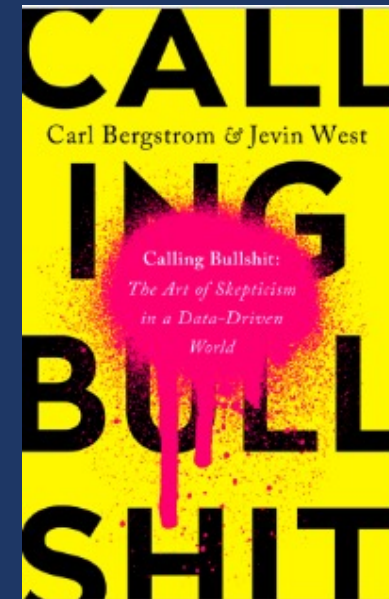
article discussion edit history

Main Page

navigation

- Main Page
- Community portal
- Current events

▪ [Chance News 46: 3/23/09 to ? Under Construction](#)



UNIVERSITY OF TORONTO
FACULTY OF ARTS & SCIENCE

Department of Statistical Sciences

STA 198, 199; AST 199; STA 130; ...

A typical week

Jan 7 2007

SCI199Y: January 11, 2007

Required for next week

- Read Chapter 6 of *Freakonomics* and come to class prepared to discuss it.
- Read the article from *Significance* on carbon trading, and come to class prepared to discuss it.
- Your essay proposal is due in two weeks. Some samples are attached.

This week in the news

- “Apple’s iPhone shakes rivals to the core” (Globe and Mail, Jan 10). This concerned the drop in share price of Nokia, Motorola, RIM and Palm following the unveiling of Apple’s entry into the cellphone market. The graphic from the article is reproduced below. Following that is a graphic over a longer time frame that I got from Bloomberg.
- “The man who shook up Vegas” (Wall Street Journal online, Jan 5; <http://online.wsj.com/article/SB116796079037267731.html>). I got to this article from *Chance News*, a wiki site at <http://www.dartmouth.edu/~chance> that collects statistics items in the news. The article describes an “obscure 41-year old statistician from San Francisco named Dr. Bob”, who sells recommendations on sports betting. It has an excellent explanation of how sports betting works.
- “Review raises questions about drug studies on rats” (Globe and Mail, Dec 29). This discusses an article in the *British Medical Journal* comparing the results from animal experiments to the later human trials, for six drugs used to treat a variety of conditions. The results from animal studies were often not borne out by human trials. The most serious problem identified was *publication bias*: animal studies that don’t show any effects of a certain drug don’t get published.

- Course work
- Stock market graphics
- Sports betting probability
- Animal studies publication bias

Apple’s iPhone shakes rivals to the core

Skinny cellphone expected to prompt other makers to revise designs

BY CATHERINE McLEAN
TELECOM REPORTER

Apple Computer Inc. shook up the technology world and stock markets yesterday when it unveiled a skinny cellphone that it says will revolutionize the world’s most popular consumer electronics device.

Observers are already predicting the iPhone will be a force to be reckoned with in the cellphone industry that will prompt existing manufacturers such as Motorola Inc., Nokia Corp., Palm Inc. and Research In Motion Ltd. to revise their own designs.

Those companies’ stocks took a beating yesterday as investors fretted about a new rival entering a market where competition is already intense. Shares of RIM, maker of the BlackBerry, slid \$2.82 to \$154.01 on the Toronto Stock Exchange. On the Nasdaq Stock Market, it fell \$11.16 (U.S.) to \$131. RIM was also hurt because a rumoured partnership with Apple didn’t transpire.

Elsewhere in the sector, shares of Motorola dropped 34 cents to \$18.26 on the New York Stock Exchange, Nokia slipped 26 cents to \$19.38 on the NYSE, and Palm declined 84 cents to \$13.92 on the Nasdaq. Shares of Apple, in contrast, climbed \$7.10 yesterday to \$32.57, adding \$6.1-billion to its market capitalization.

The creator of the Macintosh computer has already turned one consumer market on its head. Apple’s iPod persuaded consumers to download digital songs, television shows and films, rather than running out and purchasing CDs and DVDs.

“It’s certainly going to put pressure on people like Nokia and RIM to innovate and try to create a similar product,” said Brian Sharwood, a Toronto-based analyst at telecommunications consulting firm SeaBoard Group.

see APPL.E on page B6



The Apple effect

Apple CEO Steve Jobs’, left, introduction of the iPhone yesterday lifted its shares and sent those of its rivals plunging.

Apple Inc.



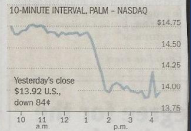
Motorola Inc.



Research In Motion Ltd.



Palm Inc.



SOURCE: THOMSON DATASTREAM

Memorable

One among many

Long-used drug shows new promise for cancer

Therapy prescribed for metabolic disorder now found to shrink tumours in lab rats

BY ANDRÉ PICARD
PUBLIC HEALTH REPORTER

Imagine, if you will, a drug that shrinks cancer cells and can even make tumours disappear. A couple of spoonfuls a day of powder in a glass of water is all you need.

There are no nasty side effects like nausea and hair loss, and no damage to internal organs such as with traditional chemotherapy. And it costs only about \$2 a dose.

Too good to be true? Not according to a Canadian researcher who stumbled upon the

“

This is the holy grail of cancer therapeutics — how to kill the cancer cells and spare normal cells.

EVANGELOS MICHELAKIS


vived with DCA, which makes the cancer cells susceptible to dying. (Most cancers become resistant to standard chemotherapy by suppressing mitochondrial function.)

In other words, the drug works by


Imagine, if you will, a drug that shrinks cancer cells and **can even make tumours disappear**. A couple of spoonfuls a day of powder in a glass of water is all you need. There are **no nasty side effects** like nausea and hair loss, and no damage to internal organs such as with traditional chemotherapy. And it costs only about \$2 a dose. Too good to be true?

Not according to a Canadian researcher who stumbled upon the potentially new anti-cancer agent called dichloroacetate, or DCA, a drug long used to treat rare metabolic disorders. ‘This is **one of the most exciting results I've ever had**,’ said Evangelos Michelakis, an associate professor of medicine at the University of Alberta in Edmonton. ‘**But I can't be overenthusiastic until it works in a human being.**’


This is now



European Society of Medicine



European Society of Medicine

 OPEN ACCESS

Published: August 31, 2023

Citation: Khan A and Ghen M, 2023. A 15 Year Evolution of Dichloroacetate-Based Metabolic Cancer Therapy: A Review with Case Reports

REVIEW ARTICLE

A 15 Year Evolution of Dichloroacetate-Based Metabolic Cancer Therapy: A Review with Case Reports

***Akbar Khan MD, IMD, DHS, FAAO**
4576 Yonge St., Suite 301, Toronto, ON, Canada, M2N 6N4
Email: akhan@medicorcancer.com (Corresponding author)

Mitchell Ghen, DO, PhD
1515 South Federal Hwy, Suite 215, Boca Raton, Florida, USA, 33432
Email: drmitchghe@gmail.com

OBJECTIVES

- Introduce and review the metabolic theory of cancer (history and background)
- Explain the application of metabolic theory to cancer therapeutics
- Introduce the concept of a metabolic multi-targeted approach to cancer therapeutics
- Use case reports to illustrate the clinical viability of the multi-targeted approach to cancer therapeutics

2023

Best Medicine Journals

The ranking of best journals for Medicine was published by Research.com, one of the leading sources of scientific contributions since 2014.


The position in the ranking is based on a unique bibliometric score created by Research.com, based on the endorsement of leading scientists who have endorsed the journal during the last three previous years.

All research areas ▼

Medical Research Archives

Rank		Journal Details
3092		Medical Research Archives 2375-1916

2024




Submit to this Journal

Review for this Journal

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Article Menu

Academic Editor ^

 Cheng-Wei Tom Chang

Order Article Reprints 

Open Access
Review

Dichloroacetate for Cancer Treatment: Some Facts and Many Doubts


by Tomas Koltai ^{1,*} and Larry Filegel ² 

¹ Hospital del Centro Gallego de Buenos Aires, Buenos Aires 2199, Argentina
² Department of Biochemistry, University Alberta, Edmonton, AB T6G 2H7, Canada
* Author to whom correspondence should be addressed.

Pharmaceuticals 2024, 17(6), 744; <https://doi.org/10.3390/ph17060744>

Submission received: 28 March 2024 / Revised: 23 May 2024 / Accepted: 4 June 2024 / Published: 6 June 2024

1048



Pharmaceuticals

1424-8247

This is now



The screenshot shows the journal's interface. On the left, there are buttons for 'Submit to this Journal', 'Review for this Journal', and 'Propose a Special Issue'. Below these is an 'Article Menu' section with an 'Academic Editor' dropdown menu showing 'Cheng-Wei Tom Chang'. On the right, the article title 'Dichloroacetate for Cancer Treatment: Some Facts and Many Doubts' is displayed, along with authors 'Tomas Koltaj' and 'Larry Filegel'. The article is marked as 'Open Access' and 'Review'. The journal name 'pharmaceuticals' is at the top left of the page. A 'Order Article Reprints' button is in the top right corner.



DCA, either alone or in association with other compounds, has never been tested in phase II clinical trials and we strongly discourage the use of DCA as a compassionate treatment until well planned and supervised studies are conducted.

On the other hand, we believe that DCA deserves more efforts to elucidate its precise role in the treatment of cancer.

Scanning the headlines can be addictive

Survey Sampling

Statistical Computing

Data Mining and M/L

Applied Statistics

Design of Experiments



Data Revised on Soot in Air and Deaths

Lower Their Estimate of Risk From Bad-Air Days

NEWS | BIOLOGY

Oscar Winners Live Long Lives

Nominees and other actors don't last as long

18 MAY 2001 • BY CONSTANCE HOLDEN

Effect of Ethics Consultations on Nonbeneficial Life-Sustaining Treatments in the Intensive Care Setting

A Randomized Controlled Trial

Lawrence J. Schneiderman, MD
Todd Gilmer, PhD
Holly D. Teetzel, MA
Daniel O. Dugan, PhD
Jeffrey Blustein, PhD
Ronald Cranford, MD
Kathleen B. Briggs, MA, LICSW
Glen I. Komatsu, MD
Paula Goodman-Crews, MSW, LCSW

Context Ethics consultations increasingly are being used to resolve conflicts about life-sustaining interventions, but few studies have reported their outcomes.

Objective To investigate whether ethics consultations in the intensive care setting reduce the use of life-sustaining treatments delivered to patients who ultimately did not survive to hospital discharge, as well as the reactions to the consultations of physicians, nurses, and patients/surrogates.

Design Prospective, multicenter, randomized controlled trial from November 2000 to December 2002.

Setting Adult intensive care units (ICUs) of 7 US hospitals representing a spectrum of institutional characteristics.

Science

JAMA®

Even statistical theory?

Topics in likelihood inference (Post-PhD)

Theoretical Statistics (PhD)

Mathematical Statistics 2 (MSc)

HAVING A MID-LIFE CRISIS? YOU'RE NOT ALONE

A study involving two million people in 72 countries found men and women were less happy in their 40s but that improved in later life.

PROBABILITY OF DEPRESSION BY AGE

PERCENTAGE LIKELIHOOD



NATURE | NEWS

Weak statistical standards implicate irreproducibility

One-quarter of studies that meet commonly used statistical criteria

Erika Check Hayden

11 November 2013

The plague of non-reproducibility in science may be mostly due to a problem shown by an innovative method developed by statistician Valen Jofre-Bonet.

nature

School phone bans alone do not improve grades or wellbeing, says UK study

Researchers say bans need to be part of wider strategy to tackle negative impact of mobile use on children



The negative effects of phone overuse did not differ between schools that banned phones and those that did not, the study found. Photograph: True Images/Alamy

D JOHNSON / NATIONAL POST

Some recent examples

- Can Pilates really make my muscles long and lean? Sep 16

The New York Times

- Happy Birthday LIGO, now drop dead. Sep 10



- 1,500 deaths in recent European heat wave were due to climate change, study estimates Jul 9

RADIO 4 More or Less

- Are self-driving cars safer than cars with drivers? Aug 30



- Coral reefs set to stop growing as climate warms Sep 17



- Utah researchers find decreased risk of skin cancer in those with tattoos Sep 17

Tattoos

1. Sep 17 press release
2. Picked up by other news orgs
3. Sep 22 in my inbox



Tattoos may help reduce the risk of melanoma




(Rachel Meyer / 500px/Getty Images)


A study in the [Journal of the National Cancer Institute](#) found that people with four or more tattoo sessions had a 56% lower risk of melanoma, compared with those without tattoos. People with three or more large tattoos had a 74% lower melanoma risk, compared with 53% for those with just one tattoo, and getting a first tattoo before age 20 was linked to a 26% reduced risk of melanoma and 52% lower likelihood of invasive melanoma.

Full Story: [HealthDay News](#) (9/22)




 University of Utah Health
<https://healthcare.utah.edu/press-releases/2025/09/st...>


[Study Finds Melanoma Less Common in Individuals ...](#)
6 days ago — People with more than one tattoo session may have a decreased risk of the skin cancer melanoma—with one key caveat, according to research from ...

 Piedmont Orthopedics | OrthoAtlanta
<https://www.orthoatlanta.com/health-news/tattoos-m...>

[Tattoos Might Protect Against Melanoma -- And The More, ...](#)
12 hours ago — 22, 2025 (HealthDay News) — Getting that tattooed arm sleeve or back design of your dreams might protect you against deadly skin cancer, a new ...

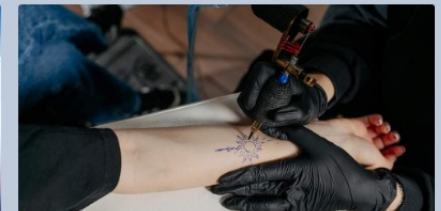
 Yahoo News Canada
<https://ca.news.yahoo.com/cancer-researchers-tattoos...>

[Cancer researchers find tattoos protect against melanoma](#)
1 day ago — Getting that tattooed arm sleeve or back design of your dreams might protect you against deadly skin cancer, a new study says.

 FOX 13 News Utah
<https://www.fox13now.com/news/health/utah-rese...>

[Utah researchers find decreased risk of skin cancer in ...](#)
6 days ago — The researchers say that people with more than one tattoo session may have a decreased risk of the skin cancer melanoma, with one key cut out.

RECENT PRESS RELEASES



PRESS RELEASE

Sep 17, 2025

Study Finds Melanoma Less Common in Individuals with Several Tattoos

Researchers found people with multiple tattoo sessions have a lower risk of melanoma. Experts stress more research is needed to confirm these unexpected findings, and to investigate potential mechanisms.

[Read More](#)

4. Aug 21 pub.



JOURNAL of the
NATIONAL CANCER INSTITUTE

Tattoos

4. Aug 21 publication



JOURNAL ARTICLE ACCEPTED MANUSCRIPT

Tattooing and risk of melanoma: a population-based case-control study in Utah

Rachel D McCarty, PhD , Britton Trabert, PhD, Lindsay J Collin, PhD, Morgan M Millar, PhD, David Kriebel, ScD, Laurie Grieshober, PhD, Mollie E Barnard, ScD, Jenna Sawatzki, BS, Marjorie Carter, MSPH, Valerie Yoder, BS ... [Show more](#)

JNCI: Journal of the National Cancer Institute, djaf235,
<https://doi.org/10.1093/jnci/djaf235>

Published: 21 August 2025 **Article history** ▼

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Tattoos

Methods

We conducted a population-based case-control study. A flow chart of the inclusion/exclusion process is shown in Figure 1. All incident cases of in situ and invasive melanoma diagnosed in Utah between January 1, 2020 and June 30, 2021, ages 19–79 years old were identified by the Utah Cancer Registry using rapid case ascertainment and mailed a letter inviting them to participate in the study. The University of Utah Institutional Review Board (IRB) determined this research exempt (IRB #00123466) and waived the need for documentation of informed consent. A trained interviewer attempted to contact each case via telephone using a standard protocol

4

and informed individuals that by completing the interview they were consenting to participate in the study. Of the 3,032 incident cases, 133 were determined to be outside of the interviewing time frame ending in January 2024 for a total of 2,899 cases included in recruitment. Of these, 105 (4%) were deceased before first contact, 1,111 (38%) were unable to be reached, and 505 (17%) refused. Telephone surveys were completed by 1,178 individuals for a response proportion of 41%. Individuals were excluded after interview if they were not a Utah resident one year prior to diagnosis (n=5), or were missing tattoo data (n=6). The final analytic dataset included 1,167 melanoma cases (566 in situ and 601 invasive). Interviewers captured

Retrospective observational study

Identified all melanoma cases
unable to reach 60% of these

Five matched controls per case
survey data; 45% non-response

Matched on sex, age, ethnicity

“We computed odds ratios and 95% CIs
from logistic regression models”

“We created a DAG to identify potential confounders”

“Data on melanoma risk factors not available
for controls”

“We used propensity score models
to explore potential confounders”

Results

Table 2. Tattooing exposures and risk of overall and invasive melanoma in individuals ages 19-79 years

	Controls (n=5,835)		Overall (n=1,167)		Invasive (n=601)			
	n	(%)	n	(%)	OR (95% CI)	n	(%)	OR (95% CI)
Ever tattooed								
No	4980	(85%)	1027	(88%)	Ref	536	(89%)	Ref
Yes	855	(15%)	140	(12%)	0.92 (0.74–1.13)	65	(11%)	0.81 (0.60–1.09)
Time since first tattoo								
No tattoo sessions	4980	(85%)	1027	(88%)	Ref	536	(89%)	Ref
<10 years	198	(3%)	41	(4%)	1.11 (0.76–1.58)	17	(3%)	0.87 (0.52–1.47)
10+ years	649	(11%)	96	(8%)	0.83 (0.64–1.06)	45	(7%)	0.74 (0.52–1.04)
Age at first tattoo								
No tattoo sessions	4980	(85%)	1027	(88%)	Ref	536	(89%)	Ref
<20	317	(5%)	42	(4%)	0.74 (0.51–1.05)	17	(3%)	0.48 (0.29–0.82)
20+	530	(9%)	95	(8%)	0.98 (0.76–1.25)	45	(7%)	0.83 (0.60–1.14)
Number of tattoo sessions								
No tattoo sessions	4980	(85%)	1027	(88%)	Ref	536	(89%)	Ref
1	280	(5%)	79	(7%)	1.53 (1.16–2.00)	34	(6%)	1.25 (0.85–1.83)
2-3	277	(5%)	37	(3%)	0.73 (0.50–1.04)	19	(3%)	0.72 (0.44–1.17)
4 or more	298	(5%)	24	(2%)	0.44 (0.27–0.67)	12	(2%)	0.43 (0.24–0.80)
Number of large tattoos								
No tattoo sessions	4980	(85%)	1027	(88%)	Ref	536	(89%)	Ref
0	407	(7%)	80	(7%)	1.06 (0.81–1.38)	37	(6%)	0.93 (0.64–1.34)
1-2	308	(5%)	* (<5%)		0.93 (0.66–1.28)	* (<5%)		0.85 (0.54–1.33)
3 or more	140	(2%)	* (<5%)		0.26 (0.10–0.54)	* (<1%)		0.23 (0.07–0.75)

*Censored to hide cell values <11

Note: Percentages indicated as "<" are not precise to prevent identification of study participants and may cause columns to not sum to 100%.

Adjusted for age (five-year groups), sex, race and ethnicity (Non-Hispanic White, Hispanic, all other racial and ethnic groups), education (<high school diploma, high school diploma, some college, four-year college degree or more), ever smoking (yes/no), physical activity in the past 30 days (yes/no), and body mass index (BMI; <25/25+ kg/m2)

Results

Number of tattoo sessions					
No tattoo sessions	4980	(85%)	1027	(88%)	Ref
1	280	(5%)	79	(7%)	1.53 (1.16–2.00)
2-3	277	(5%)	37	(3%)	0.73 (0.50–1.04)
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*Censored to hide cell values <11

Note: Percentages indicated as "<" are not precise to prevent identification of study participants and may cause confusion. Adjusted for age (five-year groups), sex, race and ethnicity (Non-Hispanic White, Hispanic, all other racial and ethnic groups), four-year college degree or more, ever smoking (yes/no), physical activity in the past 30 days (yes/no), and body mass index (BMI).

From the authors

Bradford-Hill criteria

The findings should be considered as generating hypotheses for further study

The biological mechanisms underlying the observed associations are unknown

There is a high likelihood of unmeasured confounding

It is also possible that people with tattoos have fewer melanoma risk factors than those without

We were further limited by the 41% response proportion among cases

Future larger studies with detailed data on potential confounders are needed

From the press



University of Utah Health

<https://healthcare.utah.edu> › press-releases › 2025/09 › st... ⋮

[Study Finds Melanoma Less Common in Individuals ...](#)

6 days ago — People with more than one tattoo session may have a decreased risk of the skin cancer melanoma—with one key caveat, according to research from ...

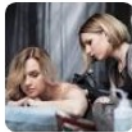


Piedmont Orthopedics | OrthoAtlanta

<https://www.orthoatlanta.com> › health-news › tattoos-m... ⋮

[Tattoos Might Protect Against Melanoma -- And The More, ...](#)

12 hours ago — 22, 2025 (HealthDay News) — Getting that tattooed arm sleeve or back design of your dreams might protect you against deadly skin cancer, a new ...



Yahoo News Canada

<https://ca.news.yahoo.com> › cancer-researchers-tattoos-... ⋮

[Cancer researchers find tattoos protect against melanoma](#)

1 day ago — Getting that tattooed arm sleeve or back design of your dreams might protect you against deadly skin cancer, a new study says.



FOX 13 News Utah

<https://www.fox13now.com> › news › health › utah-rese... ⋮

[Utah researchers find decreased risk of skin cancer in ...](#)

6 days ago — The researchers say that people with more than one tattoo session may have a decreased risk of the skin cancer melanoma, with one key cut out.



“Getting that tattooed arm sleeve or back design of your dreams might protect you against **deadly** skin cancer, a new study says”

Other studies



Dermatology Advisor

<https://www.dermatologyadvisor.com> › News

Risk for Lymphoma, Skin Cancer Increased in Individuals ...

Mar 10, 2025 — The risk for **skin cancer** (any type except basal cell carcinoma) was 1.62 times higher among **tattooed** individuals in the case-control study.

Jan 2025



CTV News

<https://www.ctvnews.ca> › montreal › article › tattoos-in...

Tattoos increase the risk of certain cancers: study

Mar 15, 2025 — **Tattoos may increase the risk of developing certain cancers**, concludes a study recently published by Danish and Finnish researchers.

Mar 2025



WebMD

<https://www.webmd.com> › ... › News

Cancer Link to Body Ink: What to Know About New Tattoo ...

Aug 27, 2025 — Some studies suggest that **getting inked could also raise the risk of skin cancers**, such as melanoma. In Clemmensen's study, people with tattoos ...

Some recent examples

- Can Pilates really make my muscles long and lean? Sep 16

The New York Times

- Happy Birthday LIGO, now drop dead. Sep 10



- 1,500 deaths in recent European heat wave were due to climate change, study estimates Jul 9

RADIO 4 More or Less

- Are self-driving cars safer than cars with drivers? Aug 30



- Coral reefs set to stop growing as climate warms Sep 17



- Utah researchers find decreased risk of skin cancer in those with tattoos Sep 17

Heat-related deaths in Europe

The Headline:

1,500 deaths in recent European heat wave were due to climate change, study estimates



The Source:

IMPERIAL

Grantham Institute – Climate Change and the Environment

Imperial Home / Grantham Institute – Climate Change and the Environment / Resources / Publications

Climate change tripled heat-related deaths in early summer European heatwave

Topics: Impacts and adaptation

Type: Institute reports and analytical notes

Publication date: July 2025

Download

[Climate change tripled heat-related deaths in early summer European heatwave.](#) [PDF]

In total, we estimate climate change driven changes to the temperatures to have caused 1504 additional excess deaths across the 12 cities.

(95% **empirical** Confidence Intervals: 1262 to 1709)

Heat-related deaths in Europe

Methods:

Examine trends in heat extremes using data + climate models

Create a series of factual and counter-factual temperatures

Use a regression model to relate temperature to mortality

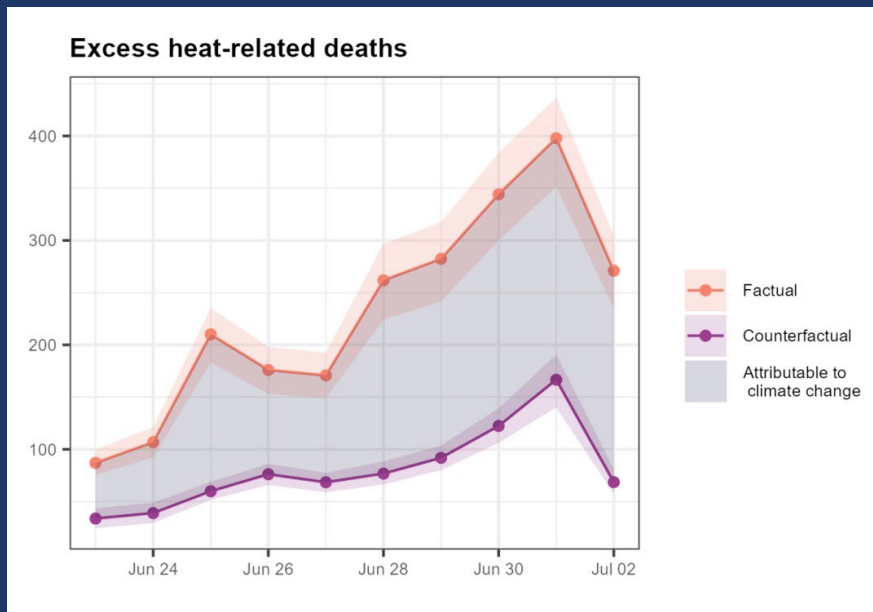
Create an estimate of expected mortality

Compare expected mortality under factual and counter-factual temperatures

Mortality risk converted to heat-related mortality risk

Heat-related deaths in Europe

Results:



We use established epidemiological models and the WWA climate-attribution framework to estimate the additional number of heat-related excess deaths that occurred due to anthropogenic climate change.

More information about the methodology can be found in the Supplementary Information section.



Extreme fire weather conditions in Spain and Portugal now common due to climate change

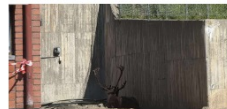
Latest analyses



Wildfire

Weather conditions leading to deadly wildfires in Türkiye, Cyprus and Greece made 10 times more likely due to climate change

In July 2025, Greece, Türkiye and Cyprus experienced one of the most devastating months of wildfires in recent years, fueled in Greece by a record heatwave above 45C, drought,



Heatwave

Intense two-week heatwave in Fennoscandia hotter and more likely due to climate change

After a relatively cool June, the Fennoscandian countries Norway, Sweden and Finland were hit by an intense heatwave that lasted for about two weeks from mid-July, with maximum temperatures repeatedly exceeding 30°C.



Extreme rainfall

Climate change intensified heavy monsoon rain in Pakistan, exacerbating urban floods that impacted highly exposed communities

From late June 2025, intense monsoon rainfall led to severe flooding in northern Pakistan, particularly in the provinces of Punjab and Khyber Pakhtunkhwa.



Heatwave

Heatwaves can be particularly dangerous to humans, and occur all over the world with increasing intensity.



Extreme rainfall

Rainfall events from a major storm or hurricane, or intense localised downpours can lead to flooding in any type of location.



Drought

Drought affects people in many ways, from reduced water & food supplies to increasing the risk of wildfires.



Wildfire

Warmer temperatures are increasing the likelihood of wildfires both starting and spreading in many regions of the world.



Article

Articles / Volume 6, issue 2 / ASCMO, 6, 177–203, 2020



Search 

<https://doi.org/10.5194/ascmo-6-177-2020>

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A protocol for probabilistic extreme event attribution analyses

Sjoukje Philip , Sarah Kew, Geert Jan van Oldenborgh , Friederike Otto, Robert Vautard, Karin van der Wiel, Andrew King, Fraser Lott, Julie Arrighi, Roop Singh, and Maarten van Aalst

Abstract

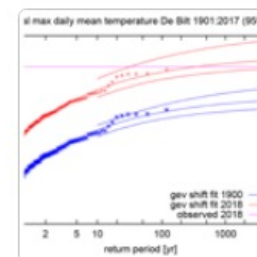
Over the last few years, methods have been developed to answer questions on the effect of global warming on recent extreme

Article

Metrics

Related articles

10 Nov 2020



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Short summary

Event attribution studies can now be performed at short notice. We document a protocol developed...
▶ Read more

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Observations re courses

- No shortage of material
- Core set of topics recurs in different guises
- The same topic emerges repeatedly over time
- Students seem to appreciate the examples
- Good source of homework problems
- Helps to keep classical material fresh

Polls
Sampling
Design of Studies
Comparison of means
Regression
Probability
Confounding
Bayes theorem

Life tables
Survival data
Time series
Ethics
Stochastic Processes
Extreme values
Meta-analysis
Measures of risk

Some stories never die

- Chocolate
- Counting the dead
- Oscar winners
- Bad graphs



2005



Annals of Internal Medicine

2001

Survival in Academy Award-Winning Actors and Actresses

Donald A. Redelmeier, MD, and Sheldon M. Singh, BSc

New study estimating number of dead in Iraq hotly contested

BY ESTANISLAO OZIEWICZ

More than 650,000 Iraqis have died as a result of the 2003 invasion and ensuing violence, according to a new study directed by a U.S. public-health expert.

But the results of the study, published in the on-line edition of the leading British medical journal *The Lancet*, are as controversial as an earlier survey by researchers from the Johns Hopkins Bloomberg School of Public Health that attributed nearly 100,000 deaths to the first 18 months of the war.

"We estimate that almost 655,000 people — 2.5 per cent of the population — have died in Iraq," the authors of the study conclude. "Although such death rates might be common in times of war, the combination of long duration and tens of millions of people affected has made this the deadliest international conflict of the 21st century."

U.S. President George W. Bush dismissed the report. "The methodology is pretty well discredited," he said yesterday. Similarly, Iraqi government spokesman Ali al-Dabbagh told Reuters: "These numbers are exaggerated and not precise."

Mr. Bush has previously put the number of Iraqi deaths at 80,000. He reaffirmed that number yesterday.

"I stand by the figure," he said. "Six hundred thousand or whatever they guessed at... it's not credible. Even some less self-interested

and partisan bodies are skeptical of the numbers, partly because they are many times higher than other apparently independent estimates. For example, Iraq Body Count, an Internet-based organization, put the death count at 48,693 yesterday.

"If there is surprise about the size of the figure, it has more to do with our existing death tolls. The conventional wisdom is based on shoddy information."

Sarah Leah Whitson, New York-based Human Rights Watch

But Human Rights Watch defended the study, whose lead author is Gilbert Burnham, co-director of the Centre for Refugee and Disaster Response at Johns Hopkins.

"If there is surprise about the size of the figure, it has more to do with our existing death tolls," said Sarah Leah Whitson, of New York-based Human Rights Watch. "The conventional wisdom is based on shoddy information."

The study was funded by the Massachusetts Institute of Technology.

The number of Iraqis who have died above the normal rates since March of 2003 includes deaths from all causes, including those due to a rise in certain diseases and illnesses, the study said.

Nearly 60 per cent of the dead were boys and men aged between 15 and 44. "Over the 40-month period of the study, approximately 31 per cent of households attributed the death of their household member to coalition forces," Dr. Burnham told reporters yesterday.

"Of the deaths, we found an increasing proportion were due to car bombs, but the majority were due to gunfire," he said.

Most violent deaths — 56 per cent — were due to gunfire. Air strikes, car bombs and other explosions accounted for 13 per cent to 14 per cent of violent deaths.

The researchers did not ask interviewees whether those they reported dead were civilians or combatants. Dr. Burnham said his study was unable to conclude which deaths were due to sectarian or criminal violence.

The figures are based on a May-June survey conducted by researchers from Johns Hopkins and Al-Mustansiriyah University in Baghdad, of 1,918 households including 12,801 household members in 47 randomly selected sites across Iraq. They questioned inhabitants about births, deaths, and migrations. The death rate in Iraq rose to 13.3 per 1,000 people per year from 5.5 per year before the invasion, they said.

2006

USA TODAY Snapshot 2007

10/17/2007 - Updated 04:36 AM ET

There were more than 7.3 million high school athletes in the 2006-07 school year. Top state in athletes: Texas, with nearly 764,000.

States with most high school athletes

Texas	763,967
California	735,497
New York	350,349
Illinois	334,358

Some stories never die

- Chocolate
- Counting the dead
- Oscar winners
- Bad graphs



Chocolate intake and risk of type 2 diabetes: prospective cohort studies

Binkai Liu,¹ Geng Zong,^{2,3} Lu Zhu,¹ Yang Hu,¹ JoAnn E Manson,^{4,5,6} Molin Wang,^{4,5,7} Eric B Rimm,^{1,4,5} Frank B Hu,^{1,4,5} Qi Sun^{1,4,5}

Gaza war toll likely significantly undercounts deaths, says study in The Lancet journal

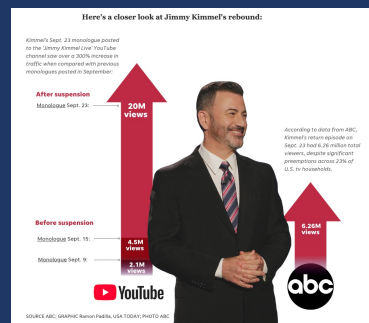
MAGGIE FICK
LONDON
REUTERS
PUBLISHED JANUARY 9, 2025



POP CULTURE AND MEDIA

Academy Award winners live longer than nominees, studies show—a psychologist explains the 'Oscar effect': 'We can all get a mini version of this'

Published Tue, Feb 18 2025 3:38 PM EST



Chocolate

- 2005



- 2009

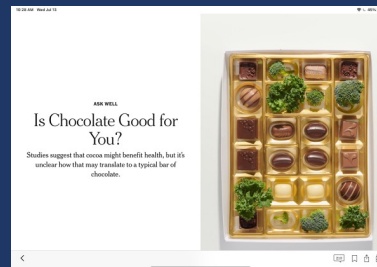
Effect of Cocoa Products on Blood Pressure: Systematic Review and Meta-Analysis

- 2010



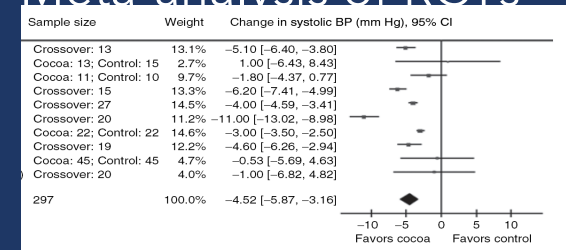
- 2022

The New York Times



- 10 Males, 10 Females, 4 weeks, cross-over study, SBP change -11.0 ± 6.3

- Meta-analysis of RCTs



- Large observational study, food diary (recall), SBP change -1.0 ± 0.4

JAMA Network | **Open**

Original Investigation | Nutrition, Obesity, and Exercise

Evaluation of the Quality of Evidence of the Association of Foods and Nutrients With Cardiovascular Disease and Diabetes
A Systematic Review

Victoria Miller, PhD; Renata Micha, PhD; Erin Choi; Dimitra Karageorgou, PhD; Patrick Webb, PhD; Dariush Mozaffarian, MD, DrPH

Chocolate 2025

Table 4 | Adjusted hazard ratios (95% CIs)* of T2D for chocolate intake by subtype in NHS (2006-18), NHSII (2007-21), and HPFS (2006-20)

	Chocolate subtypes consumption levels					P trend†	Per serving/week
	0 or <1 serving/month	1 serving/month to <1 serving/week	1-4 servings/week	≥5 servings/week			
Dark chocolate							
NHS:							
Case/person years	789/229 604	300/104 135	174/51 245	32/10 517			
Age adjusted	1	0.91 (0.79 to 1.04)	0.94 (0.80 to 1.11)	0.90 (0.63 to 1.29)	0.42	0.98 (0.94 to 1.02)	
Multivariable adjusted	1	0.92 (0.80 to 1.06)	0.99 (0.83 to 1.17)	0.99 (0.68 to 1.43)	0.92	0.99 (0.95 to 1.04)	
NHSII:							
Case/person years	1339/291 824	971/241 896	505/145 064	88/35 192			
Age adjusted	1	0.87 (0.80 to 0.94)	0.75 (0.67 to 0.83)	0.53 (0.43 to 0.66)	<0.001	0.91 (0.88 to 0.93)	
Multivariable adjusted	1	0.95 (0.87 to 1.03)	0.91 (0.82 to 1.02)	0.80 (0.64 to 1.01)	0.03	0.97 (0.94 to 1.00)	
HPFS:							
Case/person years	263/70 984	202/52 587	97/30 207	11/7093			
Age adjusted	1	1.09 (0.91 to 1.32)	0.90 (0.71 to 1.14)	0.44 (0.24 to 0.80)	0.006	0.90 (0.84 to 0.97)	
Multivariable adjusted	1	1.08 (0.89 to 1.31)	0.95 (0.74 to 1.22)	0.49 (0.26 to 0.92)	0.04	0.92 (0.85 to 0.99)	
Pooled‡:							
Case/person years	2404/594 879	1481/399 934	777/227 163	132/52 895			
Age adjusted	1	0.91 (0.85 to 0.97)	0.81 (0.74 to 0.88)	0.58 (0.49 to 0.70)	<0.001	0.92 (0.90 to 0.95)	
Multivariable adjusted	1	0.95 (0.89 to 1.02)	0.93 (0.85 to 1.01)	0.79 (0.66 to 0.95)	0.006	0.97 (0.95 to 0.99)	
Milk chocolate							
NHS:							
Case/person years	530/183 122	445/135 119	280/66 828	40/10 432			
Age adjusted	1	1.12 (0.99 to 1.28)	1.30 (1.12 to 1.51)	1.29 (0.93 to 1.78)	0.002	1.03 (0.99 to 1.06)	
Multivariable adjusted	1	0.95 (0.83 to 1.08)	1.05 (0.90 to 1.23)	1.02 (0.72 to 1.44)	0.52	1.00 (0.96 to 1.04)	
NHSII:							
Case/person years	815/236 945	1229/295 724	752/158 452	107/22 855			
Age adjusted	1	1.24 (1.13 to 1.36)	1.43 (1.29 to 1.58)	1.41 (1.15 to 1.72)	<0.001	1.05 (1.03 to 1.07)	
Multivariable adjusted	1	0.96 (0.88 to 1.05)	0.97 (0.87 to 1.08)	0.90 (0.72 to 1.12)	0.49	0.98 (0.96 to 1.01)	
HPFS:							
Case/person years	180/56 529	235/63 694	136/35 662	22/4988			
Age adjusted	1	1.24 (1.02 to 1.51)	1.21 (0.96 to 1.51)	1.32 (0.84 to 2.08)	0.17	1.03 (0.98 to 1.08)	
Multivariable adjusted	1	1.05 (0.86 to 1.29)	0.95 (0.74 to 1.22)	1.00 (0.61 to 1.63)	0.69	0.99 (0.93 to 1.05)	
Pooled‡:							
Case/person years	1533/478 373	1918/496 219	1177/261 872	169/38 409			
Age adjusted	1	1.21 (1.13 to 1.29)	1.36 (1.26 to 1.47)	1.36 (1.16 to 1.59)	<0.001	1.04 (1.02 to 1.06)	
Multivariable adjusted	1	0.97 (0.90 to 1.04)	0.99 (0.91 to 1.08)	0.94 (0.79 to 1.12)	0.75	0.99 (0.97 to 1.01)	

Multivariable models adjusted for age, calendar year, ethnicity (white, African American, Asian, and others), smoking status (never, former, current (1-14, 15-24, or ≥25 cigarettes/day), or missing), alcohol intake (g/day: 0, 0.1-4.9, 5.0-14.9, and ≥15.0 in women, 0, 0.1-4.9, 5.0-14.9, 15.0-29.9, and ≥30.0 in men, or missing), family history of diabetes (yes/no), menopausal status and postmenopausal hormone use (premenopausal, postmenopausal (never, former, or current hormone use), or missing, for women), use of oral contraceptives (yes, no, NHSII only), physical activity (3, 3.0-8.9, 9.0-17.9, 18.0-26.9, ≥27.0 MET-h/week, or missing), baseline BMI (≤21.0, 21.0-22.9, 23.0-24.9, 25.0-26.9, 27.0-29.9, 30.0-32.9, 33.0-34.9, ≥35.0, or missing), multivitamin use (yes/no), baseline hypertension, baseline hypercholesterolemia, total energy intake, AHEI (five groups), and total chocolate intake before baseline (as cumulative averages for 1980-2002 (NHS), 1991-2003 (NHSII), 1986-2002 (HPFS)).

AHEI=Alternate Healthy Eating Index; BMI=body mass index; CI=confidence interval; NHS=Nurses' Health Study; NHSII=Nurses' Health Study II; HPFS=Health Professionals Follow-up Study; MET-h=metabolic equivalent tasks per hour; T2D=type 2 diabetes.

*Calculated using Cox proportional hazards models.

†Calculated using median levels of chocolate consumption categories as continuous predictor in the model.

‡Data from three cohorts were combined to run the pooled results. Pooled models further adjusted for study origin (NHS, NHSII, HPFS).

OPEN ACCESS

Check for updates

Chocolate intake and risk of type 2 diabetes: prospective cohort studies

Binkai Liu,¹ Geng Zong,^{2,3} Lu Zhu,¹ Yang Hu,¹ JoAnn E Manson,^{4,5,6} Molin Wang,^{4,5,7} Eric B Rimm,^{1,4,5} Frank B Hu,^{1,4,5} Qi Sun^{1,4,5}

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Additional material is published online only. To view please visit the journal online.

Cite this as: [BMJ 2024;387:e078386](https://doi.org/10.1136/bmj-2023-078386) <http://dx.doi.org/10.1136/bmj-2023-078386>

Accepted: 05 October 2024

ABSTRACT

OBJECTIVE

To prospectively investigate the associations between dark, milk, and total chocolate consumption and risk of type 2 diabetes (T2D) in three US cohorts.

DESIGN

Prospective cohort studies.

SETTING

Nurses' Health Study (NHS; 1986-2018), Nurses' Health Study II (NHSII; 1991-2021), and Health Professionals Follow-Up Study (HPFS; 1986-2020).

PARTICIPANTS

At study baseline for total chocolate analyses (1986 for NHS and HPFS; 1991 for NHSII), 192 208 participants without T2D, cardiovascular disease, or cancer were included. 111 654 participants were included in the analysis for risk of T2D by intake of chocolate subtypes, assessed from 2006 in NHS and HPFS and from 2007 in NHSII.

MAIN RESULTS

Self-reported incident T2D, with patients identified by follow-up questionnaires and confirmed through a validated supplementary questionnaire. Cox proportional hazards regression was used to estimate hazard ratios and 95% confidence intervals (CIs) for T2D according to chocolate consumption.

RESULTS

In the primary analyses for total chocolate, 18 862 people with incident T2D were identified during 4 829 175 person years of follow-up. After adjusting for personal, lifestyle, and dietary risk factors, participants consuming ≥5 servings/week of any chocolate showed a significant 10% (95% CI 2% to 17%; P trend=0.07) lower rate of T2D compared with those

who never or rarely consumed chocolate. In analyses by chocolate subtypes, 4771 people with incident T2D were identified. Participants who consumed ≥5 servings/week of dark chocolate showed a significant 21% (5% to 34%; P trend=0.006) lower risk of T2D. No significant associations were found for milk chocolate intake. Spline regression showed a linear dose-response association between dark chocolate intake and risk of T2D (P for linearity=0.003), with a significant risk reduction of 3% (1% to 5%) observed for each serving/week of dark chocolate consumption. Intake of milk, but not dark, chocolate was positively associated with weight gain.

CONCLUSIONS

Increased consumption of dark, but not milk, chocolate was associated with lower risk of T2D. Increased consumption of milk, but not dark, chocolate was associated with long term weight gain. Further randomized controlled trials are needed to replicate these findings and further explore the mechanisms.

Introduction

The global prevalence of type 2 diabetes (T2D) has increased noticeably over the past few decades, with an estimated 463 million people affected worldwide in 2019 and projected to increase to 700 million by 2045.¹ T2D is a multifactorial disease characterized by insulin resistance and impaired insulin secretion, which can lead to numerous severe complications such as cardiovascular disease, renal failure, and loss of vision.² A growing body of research has highlighted the importance of lifestyle factors, including healthy diets, in the prevention and management of T2D.³⁻⁶

Higher consumption of total dietary flavonoids, as well as specific flavonoid subclasses, has been associated with a decreased risk of T2D.⁷⁻⁹ In randomized controlled trials, these flavonoids exerted antioxidant, anti-inflammatory, and vasodilatory effects that might confer cardiometabolic benefits and reduce the risk of T2D,^{7,9} although data were not consistent.¹⁰ Chocolate, derived from the beans of the cacao tree (*Theobroma cacao*), is among foods with the highest flavanol content and is a popular snack globally.¹¹⁻¹³ However, the association between chocolate consumption and risk of T2D remains controversial owing to inconsistent findings in observational studies.¹⁴⁻¹⁵ Furthermore, most previous studies have primarily focused on total chocolate intake, without considering the potential differences in health effects between chocolate subtypes (ie, dark, milk, and white chocolate).^{16,17} These subtypes differ in cocoa content and proportions of other ingredients

WHAT IS ALREADY KNOWN ON THIS TOPIC

Chocolate contains high levels of flavanols, which promote cardiometabolic health and reduce the risk of type 2 diabetes (T2D), as shown in randomized controlled trials

The associations between chocolate consumption and risk of T2D remain controversial owing to inconsistent findings in observational studies
 Most previous studies did not differentiate between chocolate subtypes (dark, milk), which differ in their cocoa content and proportions of other ingredients such as sugar and milk, and may have differential associations with risk of T2D

WHAT THIS STUDY ADDS

Consumption of ≥5 servings/week of dark chocolate compared with rare consumption was statistically significantly associated with lower risk of T2D
 The association for milk chocolate was, however, null

Increased consumption of milk chocolate but not dark chocolate was associated with increased weight gain

Chocolate 2025

Table 4 | Adjusted hazard ratios (95% CIs)* of T2D for chocolate intake by subtype in NHS (2006-18), NHSII (2007-21), and HPFS (2006-20)

	Chocolate subtypes consumption levels				P trend†	Per serving/week
	0 or <1 serving/month	1 serving/month to <1 serving/week	1-4 servings/week	≥5 servings/week		
Dark chocolate						
NHS:						
Case/person years	789/229 604	300/104 135	174/51 245	32/10 517		
Age adjusted	1	0.91 (0.79 to 1.04)	0.94 (0.80 to 1.11)	0.90 (0.63 to 1.29)	0.42	0.98 (0.94 to 1.02)
Multivariable adjusted	1	0.92 (0.80 to 1.06)	0.99 (0.83 to 1.17)	0.99 (0.68 to 1.43)	0.92	0.99 (0.95 to 1.04)
NHSII:						
Case/person years	1339/291 824	971/241 896	505/145 064	88/35 192		
Age adjusted	1	0.87 (0.80 to 0.94)	0.75 (0.67 to 0.83)	0.53 (0.43 to 0.66)	<0.001	0.91 (0.88 to 0.93)
Multivariable adjusted	1	0.95 (0.87 to 1.03)	0.91 (0.82 to 1.02)	0.80 (0.64 to 1.01)	0.03	0.97 (0.94 to 1.00)
HPFS:						
Case/person years	263/70 984	202/52 587	97/30 207	11/7093		
Age adjusted	1	1.09 (0.91 to 1.32)	0.90 (0.71 to 1.14)	0.44 (0.24 to 0.80)	0.006	0.90 (0.84 to 0.97)
Multivariable adjusted	1	1.08 (0.89 to 1.31)	0.95 (0.74 to 1.22)	0.49 (0.26 to 0.92)	0.04	0.92 (0.85 to 0.99)
Pooled‡:						
Case/person years	2404/594 879	1481/399 934	777/227 163	132/52 895		
Age adjusted	1	0.91 (0.85 to 0.97)	0.81 (0.74 to 0.88)	0.58 (0.49 to 0.70)	<0.001	0.92 (0.90 to 0.95)
Multivariable adjusted	1	0.95 (0.89 to 1.02)	0.93 (0.85 to 1.01)	0.79 (0.66 to 0.95)	0.006	0.97 (0.95 to 0.99)

Things are improving

Then

- “We have to say this because it’s a poll”
 (“plus or minus 3 percentage points, 19 times out of 20”)
- “We had to do it this way to make it statistically valid” (capture-recapture)

Now

- “Acetaminophen causes autism” --- NOPE
Confounding factors, genetic links, correlation is not causation ...

Things are improving

- Tutorial articles

A protocol for probabilistic extreme event attribution analyses

Sjoukje Philip, Sarah Kew, Geert Jan van Oldenborgh, Friederike Otto, Robert Vautard, Karin van der Wiel, Andrew King, Fraser Lott, Julie Arrighi, Roop Singh, and Maarten van Aalst

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- Explainers

THE STATISTICIAN'S PAGE - Volume 89, Issue 5, P1337-1343, May 2009

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- P-values are everywhere
- Statistical issues of sampling, bias, reproducibility, much more prominent
- Communication gaps still exist!

Lost in translation

Science

PERSPECTIVE | HEALTH

July 21, 2023

Heart failure causes sleepless nights

Cardiac dysfunction triggers immune-mediated loss of pineal gland melatonin release

By Harvey Davis and David Attwell

RESEARCH ARTICLE | HEART DISEASE



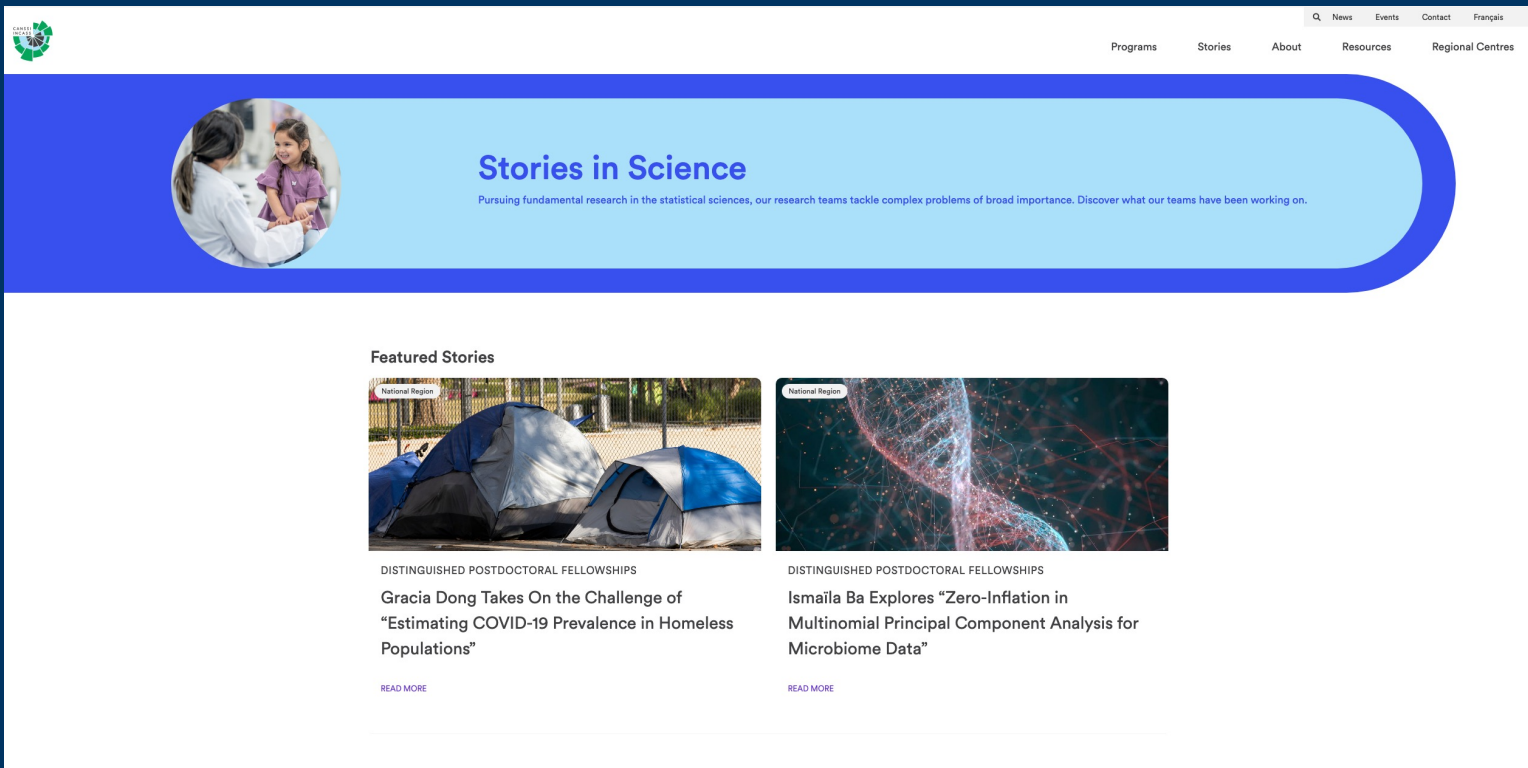
Immune-mediated denervation of the pineal gland underlies sleep disturbance in cardiac disease

KARIN A. ZIEGLER , ANDREA AHLES, ANNE DUECK , DENA ESFANDYARI , PAULINE PICHLER , KAROLIN WEBER , STEFAN KOTSCHI , ALEXANDER BARTELT 
, INGA SINICINA, [...] AND STEFAN ENGELHARDT  +12 authors [Authors Info & Affiliations](#)

SCIENCE · 20 Jul 2023 · Vol 381, Issue 6655 · pp. 285-290 · DOI: 10.1126/science.abn6366

In mice
and in cells

Thank You!



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