



CUGH: Vaccines and Vaccine Hesitancy

Peter Hotez, M.D., Ph.D.

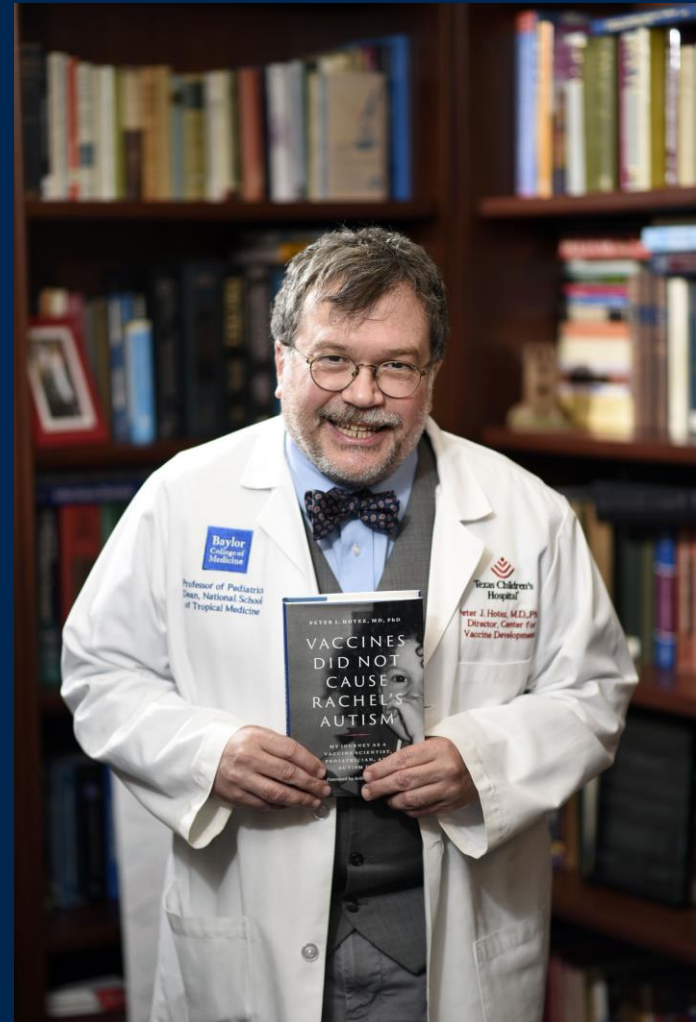
Texas Children's Hospital Endowed
Chair in Tropical Pediatrics

@PeterHotez

Dean, National School of Tropical Medicine
at Baylor College of Medicine

Former US Science Envoy

Vaccine Scientist, Pediatrician, Autism Dad







UN Millennium Summit and MDGs

UNDER 5 CHILDHOOD DEATHS

- Measles 478,727
- Pertussis 138,048
- Tetanus 105,333
- H. flu 86,104
- Diphtheria 10,413



IMAGE(S) REMOVED FOR COPYRIGHT PURPOSES

OLD	NEW
	
	
GAVI	Gavi
GAVI Alliance	Gavi, the Vaccine Alliance

Under 5 Child Deaths 2000-2017

GBD 2017

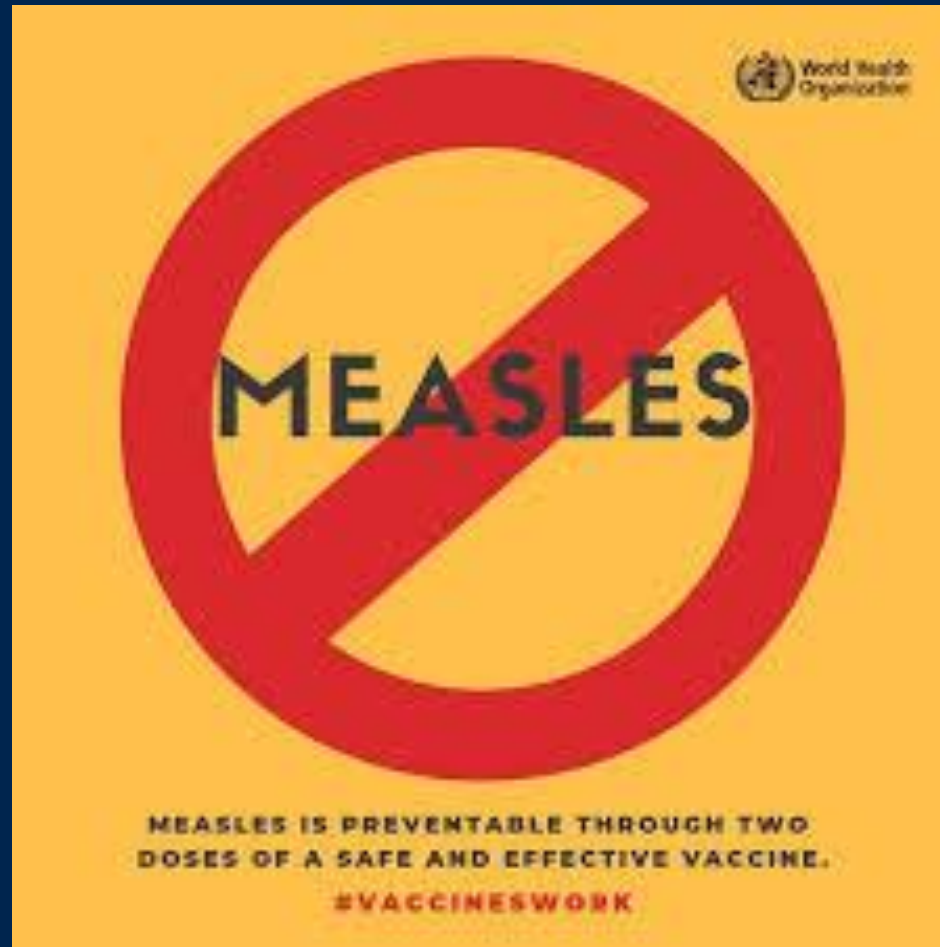
2000

- Measles 478,727
- Pertussis 138,048
- Tetanus 105,333
- H. flu 86,104
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2017

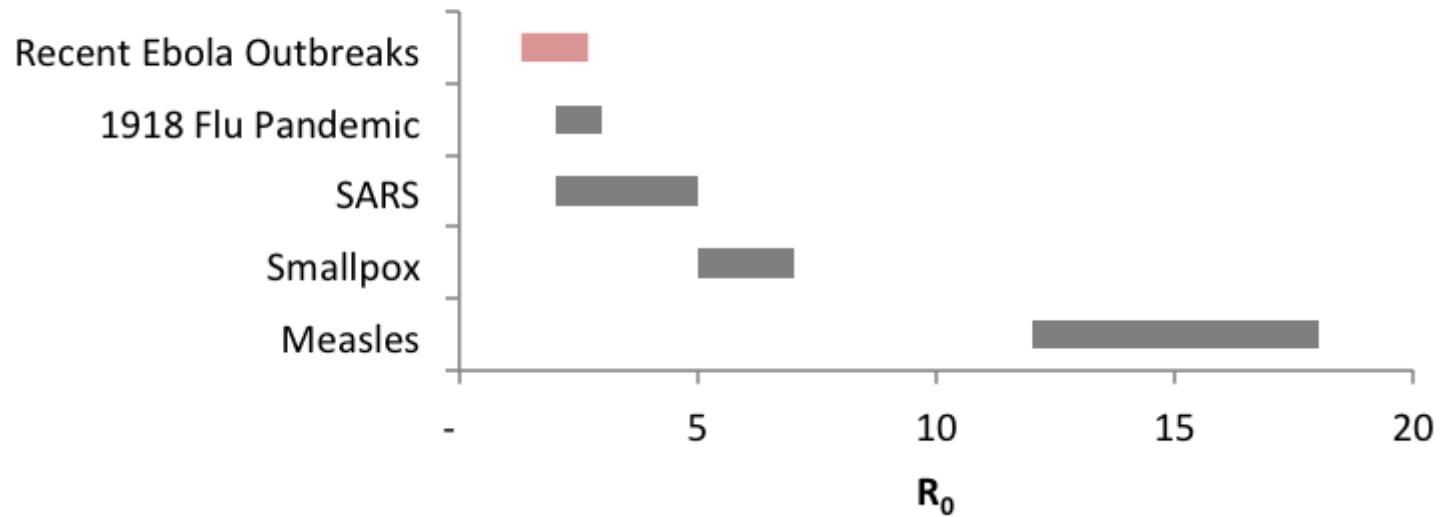
- Measles 83,438 (-83%)
- Pertussis 86,091 (-38%)
- Tetanus 18,623 (-82%)
- H.flu 36,185 (-58%)
- Diphtheria 2,914 (-72%)

Can we eliminate measles globally?

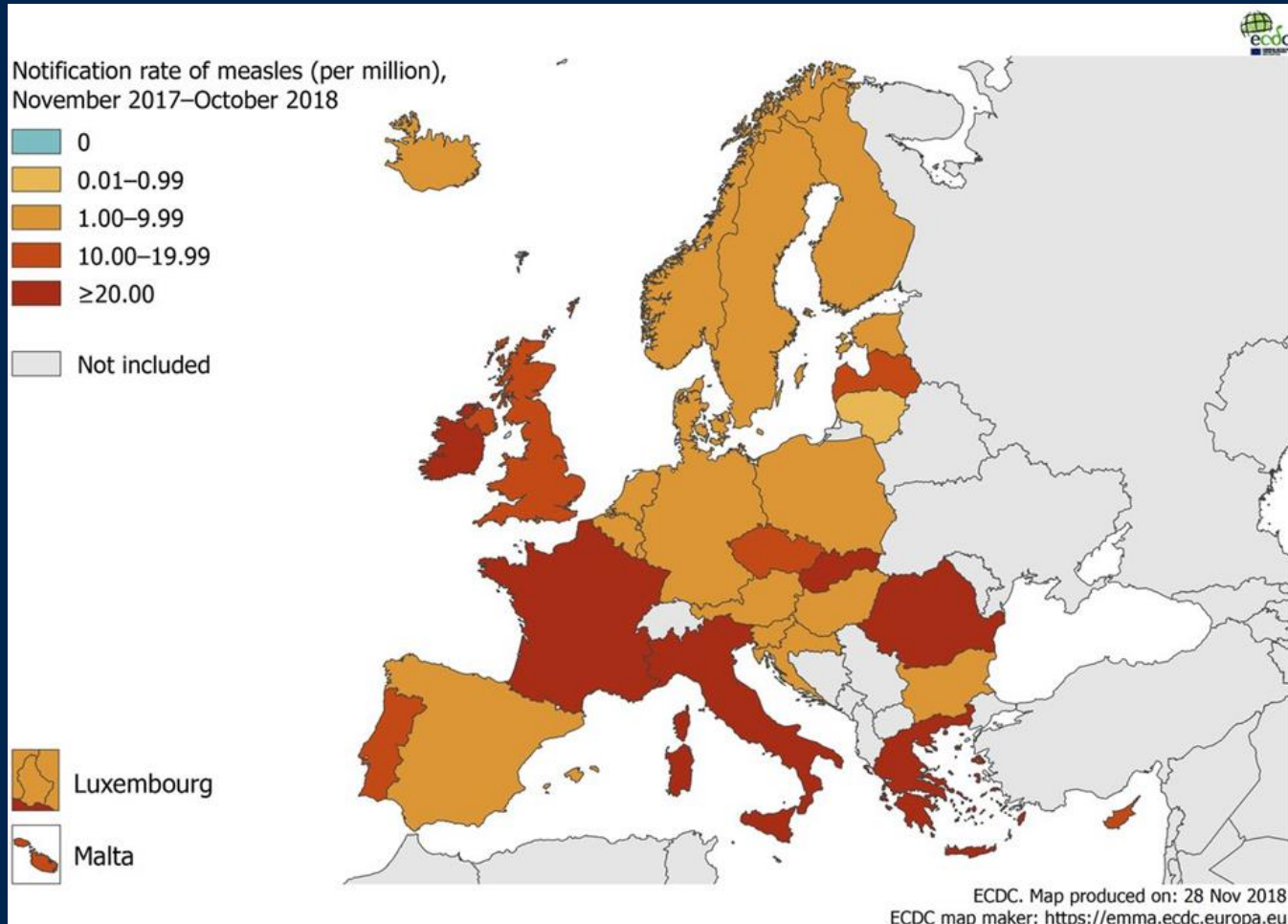


Measles Transmissibility

Average Number Infected Per Case



Europe in 2018: 60,000+ Measles



20 Years of 'Vaccine Hesitancy' 1998-2018


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THE LANCET

The Lancet, [Volume 351](#), [Issue 9103](#), Pages 637 - 641, 28 February 1998
doi:10.1016/S0140-6736(97)11096-0

This article was retracted

RETRACTED: Ileal-lymphoid-nodular hyperplasia, non-specific colitis, and pervasive developmental disorder in children

Dr [AJ Wakefield](#) FRCS [a](#) , [SH Murch](#) MB [b](#), [A Anthony](#) MB [a](#), [J Linnell](#) PhD [a](#), [DM Casson](#) MRCP [b](#), [M Malik](#) MRCP [b](#), [M Berelowitz](#) FRCPsych [c](#), [AP Dhillon](#) MRCPsych [a](#), [MA Thomson](#) FRCP [b](#), [P Harvey](#) FRCP [d](#), [A Valentine](#) FRCR [e](#), [SE Davies](#) MRCPsych [a](#), [JA Walker-Smith](#) FRCP [a](#)

Summary

Background

We investigated a consecutive series of children with chronic enterocolitis and regressive developmental disorder.

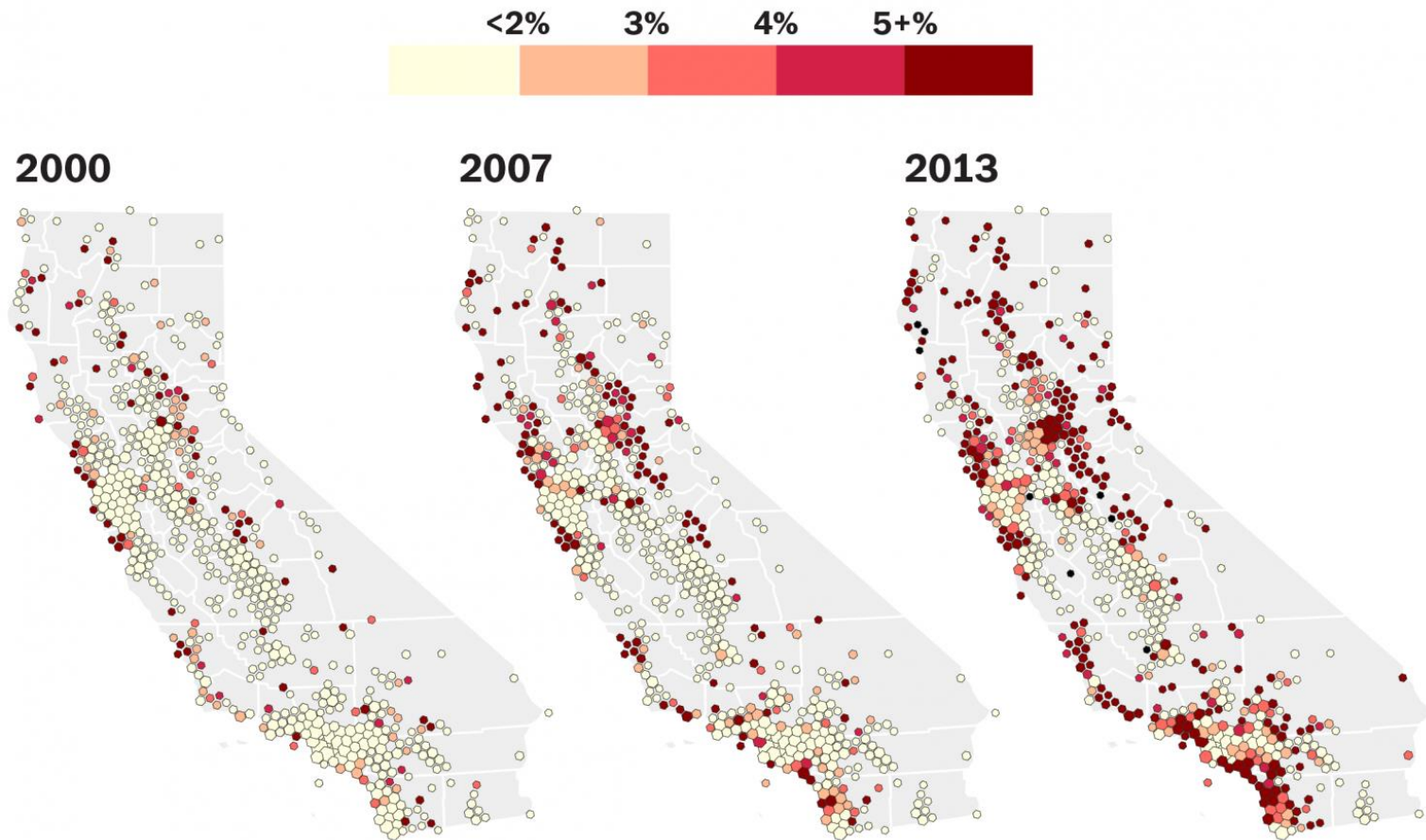
Methods

12 children (mean age 6 years [range 3–10], 11 boys) were referred to a paediatric gastroenterology unit with a history of normal development followed by loss of acquired skills, including language, together with diarrhoea and abdominal pain. Children underwent gastroenterological, neurological, and developmental assessment and review of developmental records. Ileocolonoscopy and biopsy sampling, magnetic-resonance imaging (MRI), electroencephalography (EEG), and lumbar puncture were done under sedation. Barium follow-through radiography was done where possible. Biochemical, haematological, and immunological profiles were examined.

RETRACTED

The spread of anti-vax sentiment in California

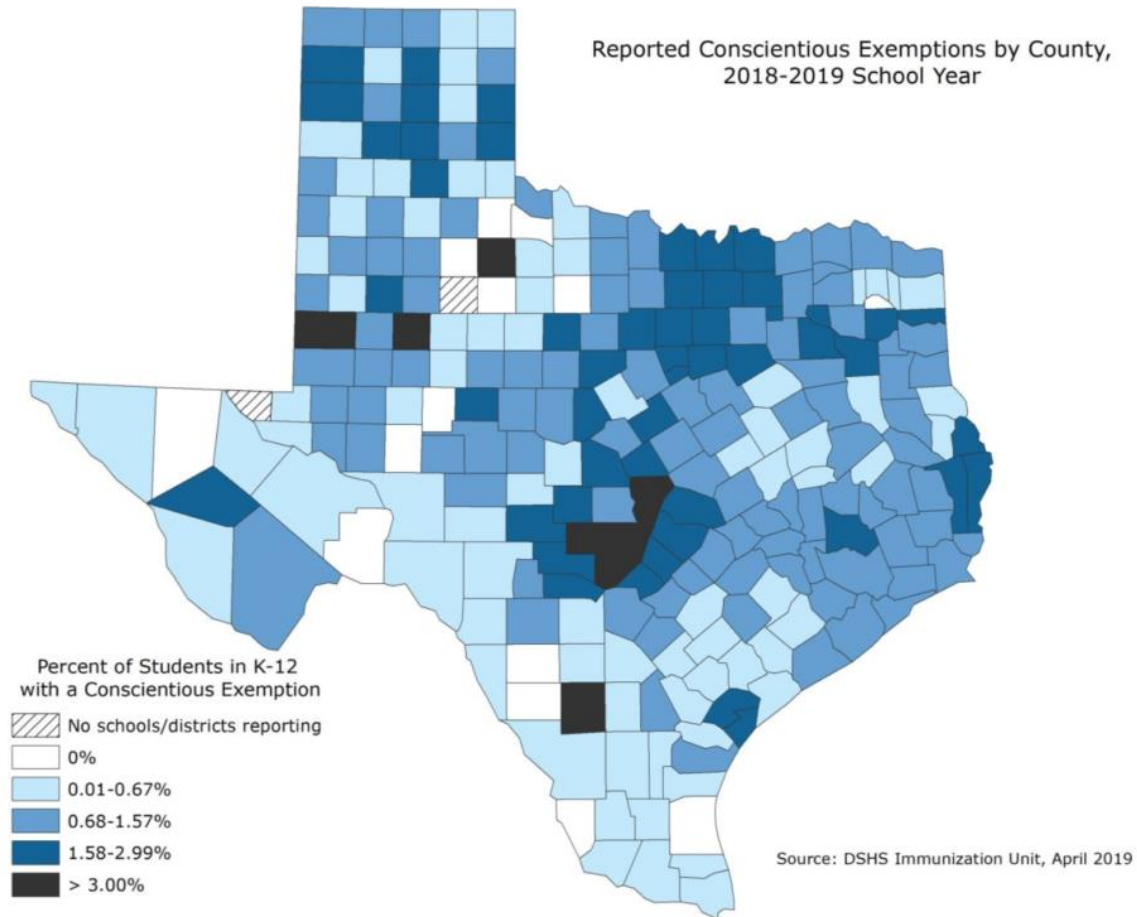
Share of public school kindergartners with personal belief exemptions to vaccination requirements



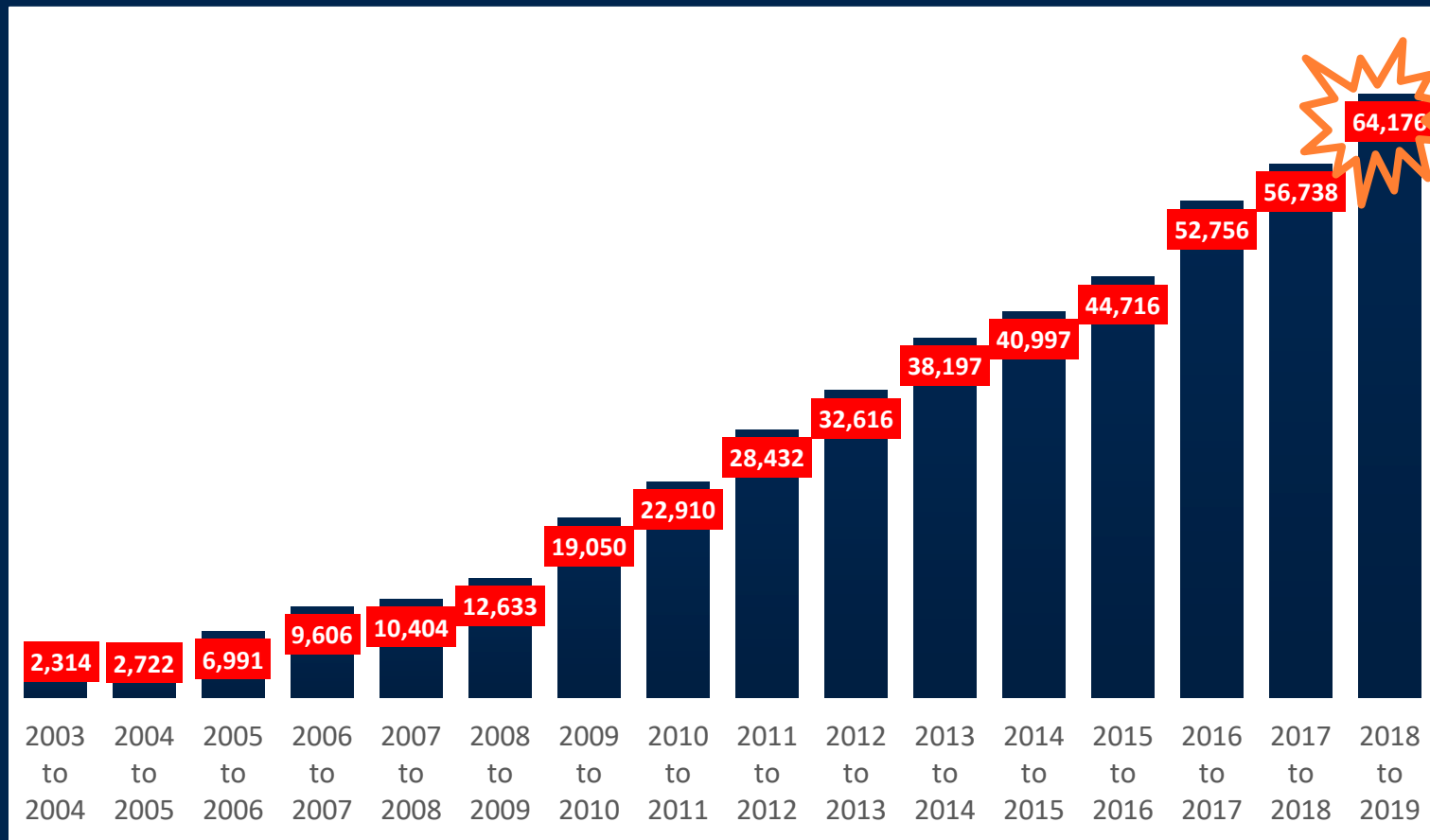
WASHINGTONPOST.COM/**WONKBLOG**

Source: California Department of Public Health

Figure 1. Percent of Students in Kindergarten through 12th Grade with a Conscientious Exemption on file for at least one vaccine



TEXAS NON-MEDICAL VACCINE EXEMPTIONS (2003-2019)



Texas Tribune

IMAGE(S) REMOVED FOR COPYRIGHT PURPOSES

Schools with Highest Rates of Vaccination Exemptions

<u>School</u>	<u>Percent exempted</u>
Austin Waldorf School (Travis)	40.51%
Regents Academy (Nacogdoches)	37.75%
Austin Discovery School (Travis)	30.06%
Joshua Adv Multi-Gr Sch (Johnson)	26.67%
Trinity Christian Academy Paris (Lamar)	23.86%
The Khabele School (Travis)	22.08%
Aesa Prep Academy (Travis)	20.65%

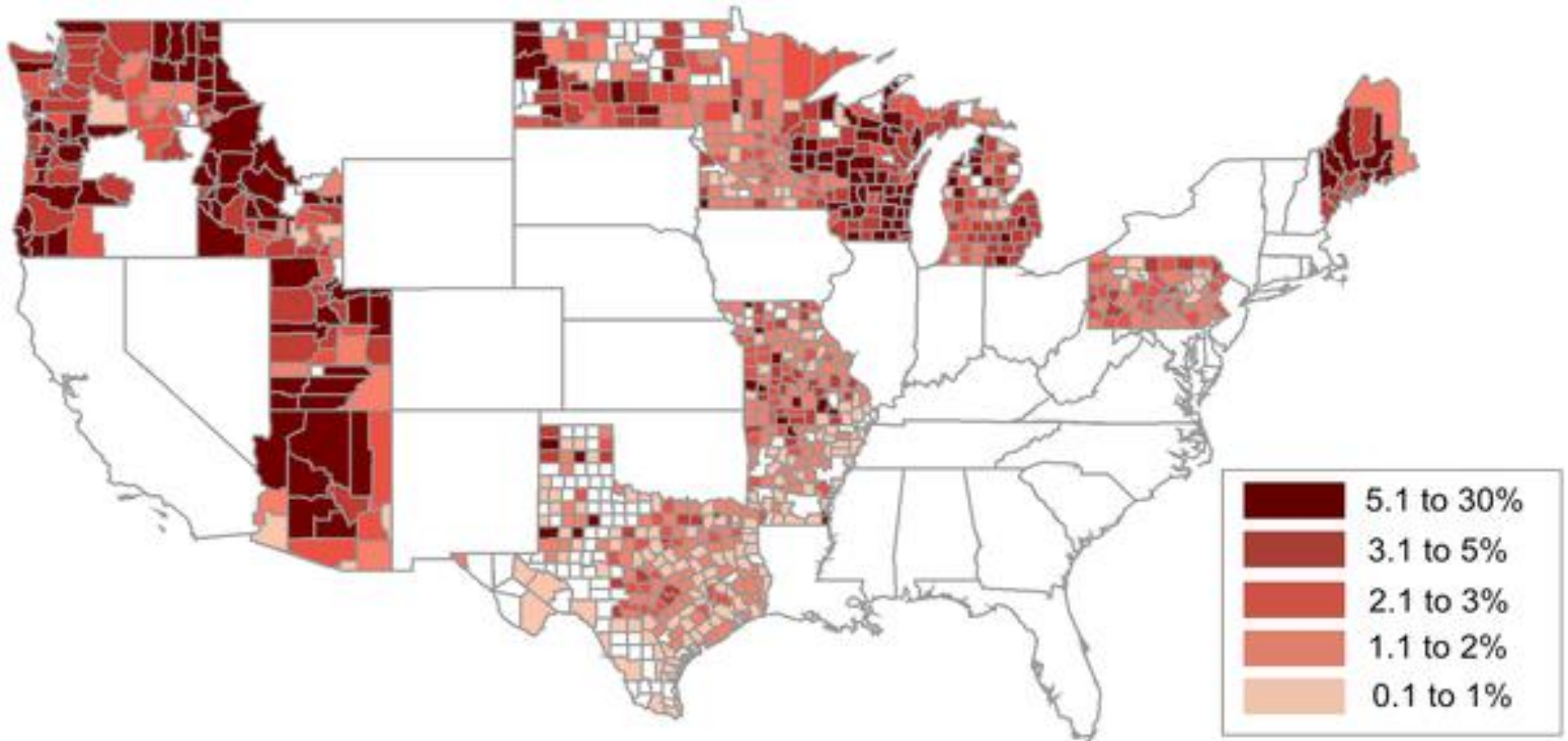


TEXANS for Vaccine Choice

Vaccine Hesitancy in USA

IMAGE(S) REMOVED FOR COPYRIGHT PURPOSES

Heat map of county-level NME rates in 2016 to 2017

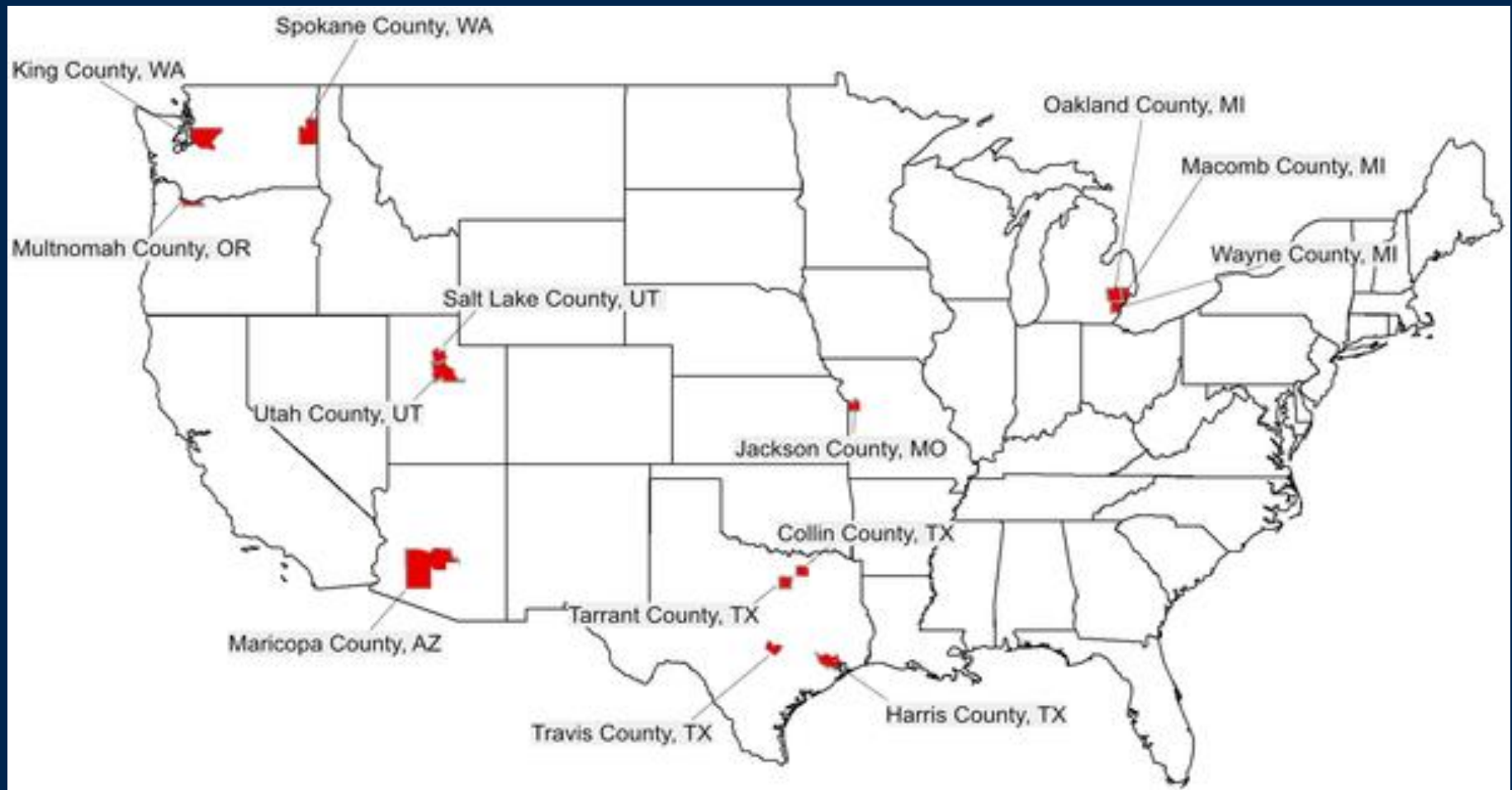


Olive JK, Hotez PJ, Damania A, Nolan MS (2018) Correction: The state of the antivaccine movement in the United States: A focused examination of nonmedical exemptions in states and counties. *PLOS Medicine* 15(7): e1002616.

<https://doi.org/10.1371/journal.pmed.1002616>

<http://journals.plos.org/plosmedicine/article?id=10.1371/journal.pmed.1002616>

Heat map of counties with >400 kindergarteners with NMEs in 2016 to 2017



Olive JK, Hotez PJ, Damania A, Nolan MS (2018) Correction: The state of the antivaccine movement in the United States: A focused examination of nonmedical exemptions in states and counties. *PLOS Medicine* 15(7): e1002616. <https://doi.org/10.1371/journal.pmed.1002616>
<http://journals.plos.org/plosmedicine/article?id=10.1371/journal.pmed.1002616>

Public Health and Economic Consequences of Vaccine Hesitancy for Measles in the United States

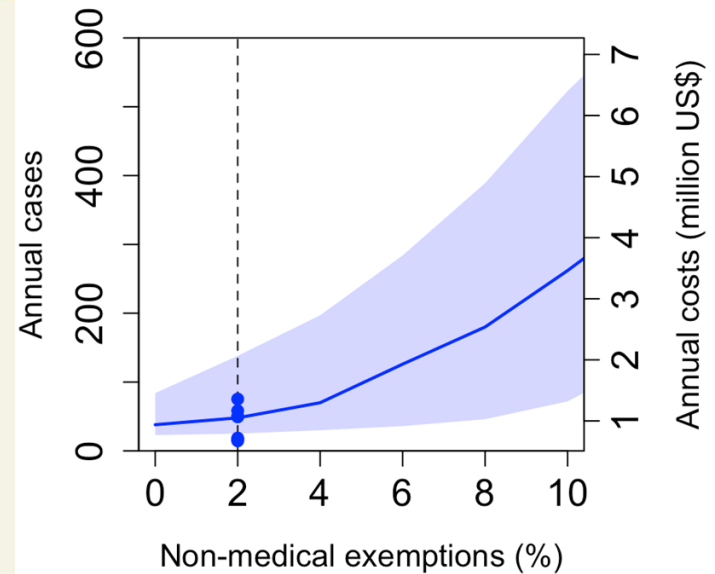
Nathan C. Lo, BS; Peter J. Hotez, MD, PhD

Key Points

Question How does vaccine hesitancy affect annual measles cases and economic costs in the United States?

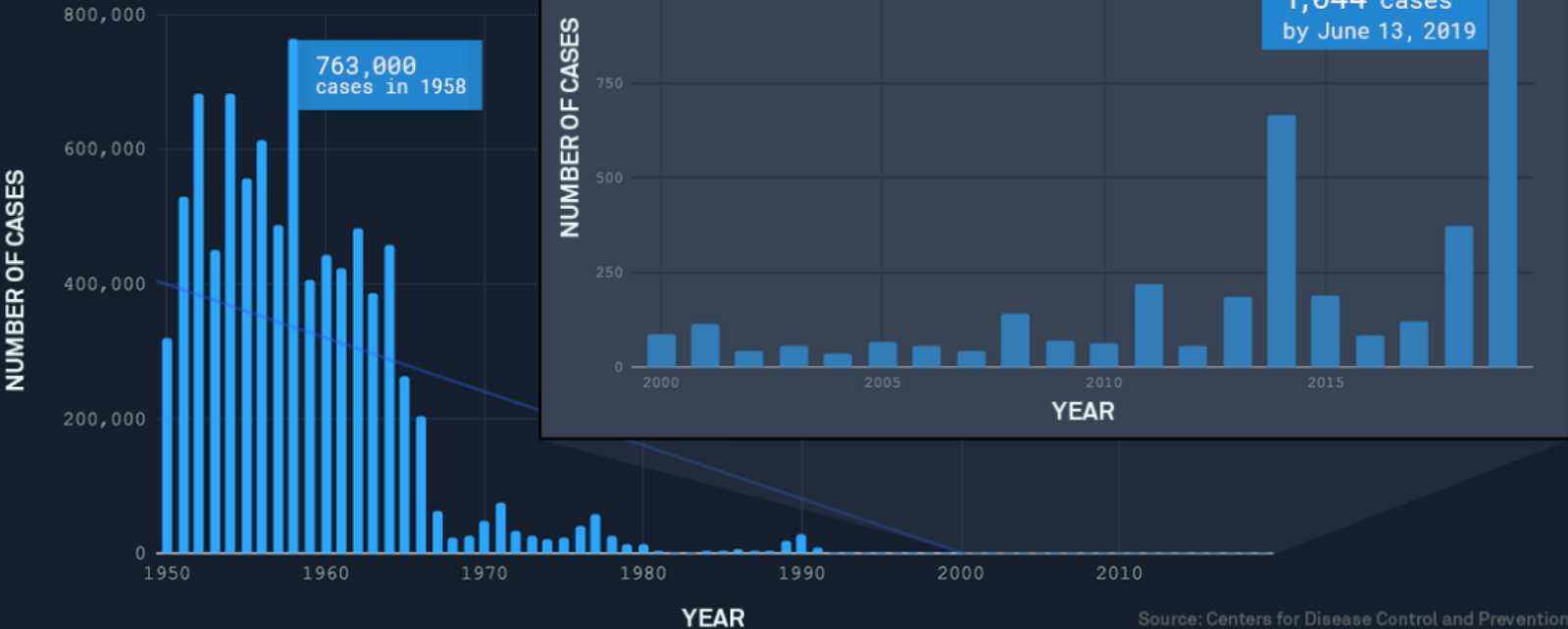
Findings In this modeling study of children (age 2-11 years), a 5% reduction in measles, mumps, and rubella vaccination coverage resulted in a 3-fold increase in annual measles cases with an additional US\$2.1 million in public sector costs.

Meaning Even small declines in vaccination coverage in children owing to vaccine hesitancy may have substantial public health and economic consequences that will be larger when considering unvaccinated infants, adolescents, and adults.



Cases of measles since 1950

Measles reached a peak of 763,000 cases in 1958. Fast-forward 42 years and it was eliminated in the U.S. In 2019, the virus has mounted a comeback, reaching its highest level in 25 years.



Sarkar et al (2019) Lancet Infect Dis
Measles resurgence in the USA: how international travel
compounds vaccine resistance

IMAGE(S) REMOVED FOR COPYRIGHT PURPOSES

Four Factors Driving Antivax in America

- The Media Empire
- The Political Machine
- Deliberate Predation
- Lack of Robust Vaccine Advocacy

The Antivax Media Empire

Dominating the Internet

IMAGE(S) REMOVED FOR COPYRIGHT PURPOSES

>480 Antivaccine
Misinformation Websites

The Antivax Political Machine



Predation in NY: 40 Hospitalizations, including 11 ICU Admissions

IMAGE(S) REMOVED FOR COPYRIGHT PURPOSES

The NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE

Patches of Disorganization in the Neocortex of Children with Autism

Rich Stoner, Ph.D., Maggie L. Chow, Ph.D., Maureen P. Boyle, Ph.D.,
Susan M. Sunkin, Ph.D., Peter R. Mouton, Ph.D., Subhojit Roy, M.D., Ph.D.,
Anthony Wynshaw-Boris, M.D., Ph.D., Sophia A. Colamarino, Ph.D.,
Ed S. Lein, Ph.D., and Eric Courchesne, Ph.D.

ABSTRACT

BACKGROUND

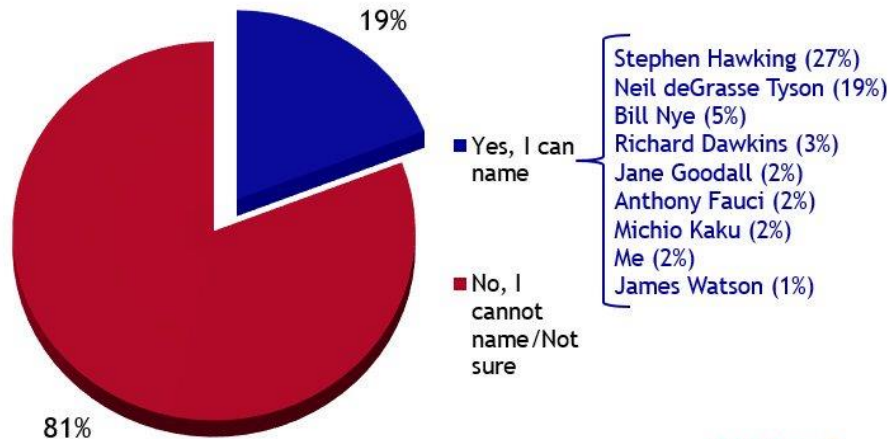
Autism involves early brain overgrowth and dysfunction, which is most strongly evident in the prefrontal cortex. As assessed on pathological analysis, an excess of neurons in the prefrontal cortex among children with autism signals a disturbance in prenatal development and may be concomitant with abnormal cell type and



Science and Public Engagement

Most Americans Cannot Name a Living Scientist

Can you name a living scientist?



Zogby
Analytics

Source: A Research!America poll of U.S. adults conducted in partnership with Zogby Analytics in January 2017.

RESEARCH
AMERICA
AN ALLIANCE FOR DISCOVERIES IN HEALTH

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