



**GLOBAL
DOWN SYNDROME
FOUNDATION®**

The Importance for Local Down Syndrome Organizations to Support Science

Michelle Sie Whitten, President & CEO Global Down Syndrome Foundation

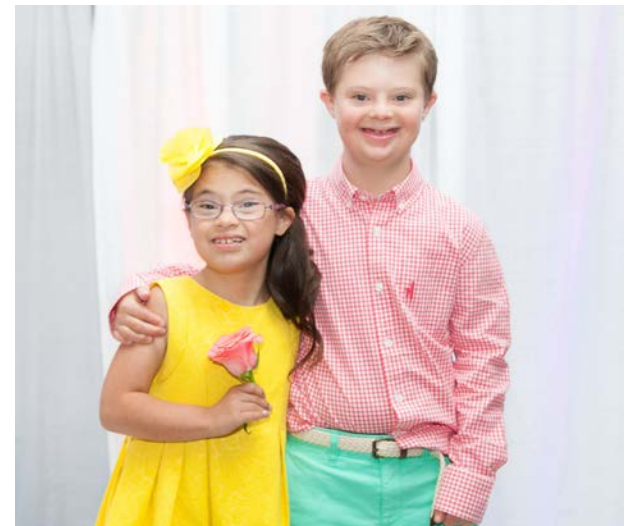
Dr. Joaquín Espinosa, Executive Director Linda Crnic Institute, Director of The Functional Genomics Facility, Co-Leader of the Molecular Oncology Program at the University of Colorado Cancer Center

*DSAIA Leadership Conference – Denver, CO
Saturday, February 24, 2018*

About Down Syndrome

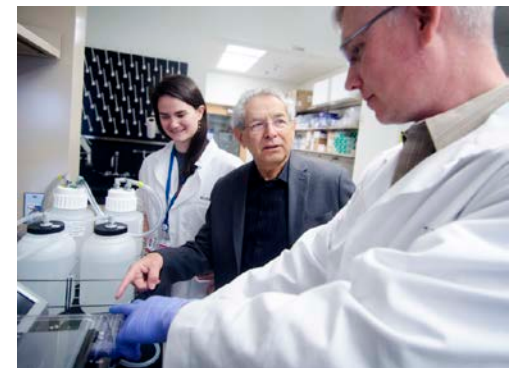
in the U.S. Today

- ❖ **Population** – what is it? 230,000 - 430,000
- ❖ **Live Births** – have increased to 1 in 691 today from 1 in 1,000 in 2002
- ❖ **Lifespan** – has more than doubled to 60 years from 28 years in the 1980s
- ❖ **A Mini Population Explosion** – will continue over the next several decades due to increased live births and lifespan
- ❖ **Societal Trends** – include a small but growing number of people with Down syndrome participating in college programs, choosing to get married, and living independently or semi-independently



Crnic Institute is the 1st Academic Home for Down Syndrome Research

- ❖ Originally?
- ❖ ONE scientist.
- ❖ Today?
- ❖ 34 Labs & Over 120 scientists working on DS research through the Crnic Institute
- ❖ Global Core competencies
 - DS and Alzheimer's Disease, DS and Cancer, DS and Autoimmune Diseases
- ❖ Human Trisome Project
 - People with Down syndrome have a different disease spectrum
 - Co-morbidities: Alzheimer's, Leukemia, Autoimmunity
 - Interferon Pathway
 - People with Down syndrome have high levels of inflammatory proteins in their blood.
 - People with Down syndrome are constantly fighting off a viral infection that does not exist



Crnic Institute - Global Affiliates at a Glance

34 Labs and over 120 Scientists

Alzheimer's Disease



Bettcher



Dell'Acqua



Hoeffer



Kennedy



Potter



Xue

Cognition, Autism and Brain Function



Chen



Maclean



Jones



Maier



Mueller



Santos



Shaikh



Stitzel

Immunology



Lenz



Hsieh



Shen



Spritz



Sullivan



Yeager

Stem Cells and Development



Bilousova



Klymkowsky



Link



Old



Olwin



Pearson

Advanced Genetics and Genomics



Blumenthal



D'Alessandro



Dowell



Johnson



Liu



O'Connor

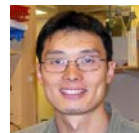
Leukemia



DeGregori



Espinosa



Why is Research Important?

Some definitions

❖ Basic Research

- generates new ideas, principles, and theories, which may not be immediately utilized but nonetheless form the basis of progress and development in different fields. Basic research rarely helps practitioners directly with their everyday concerns; nevertheless, it stimulates new ways of thinking that have the potential to revolutionize and dramatically improve how practitioners deal with a problem in the future.

❖ Translational Research

- applies findings from basic science to enhance human health and well-being. In a medical research context, it aims to "translate" findings in fundamental research into medical practice and meaningful health outcomes. Translational research implements a "bench-to-bedside", from laboratory experiments through clinical trials to point-of-care patient applications, model, harnessing knowledge from basic sciences to produce new drugs, devices, and treatment options for patients.

Wikipedia Search!

Why is Research Important?

Some definitions

❖ Clinical Research

- is a branch of healthcare science that determines the safety and effectiveness (efficacy) of medications, devices, diagnostic products and treatment regimes intended for human use. These may be used for prevention, treatment, diagnosis or for relieving symptoms of a disease. Clinical research is different from clinical practice. In clinical practice established treatments are used, while in clinical research evidence is collected to establish a treatment.

❖ Clinical Trials

- are experiments or observations done in clinical research. Such prospective biomedical or behavioral research studies on human participants are designed to answer specific questions about biomedical or behavioral interventions, including new treatments (such as novel vaccines, drugs, dietary choices, dietary supplements, and medical devices) and known interventions that warrant further study and comparison. Clinical trials generate data on safety and efficacy.

Wikipedia Search!

Why is Research Important?

Some definitions

❖ Natural History Research

- The **natural history** of **disease** is the **course** a **disease** takes in individual people from its pathological onset ("inception") until its eventual resolution through complete recovery or death. ... **Natural history** of **disease** is one of the major elements of descriptive **epidemiology**.

❖ Epidemiology

- a branch of medical science that deals with the incidence, distribution, and control of disease in a population.

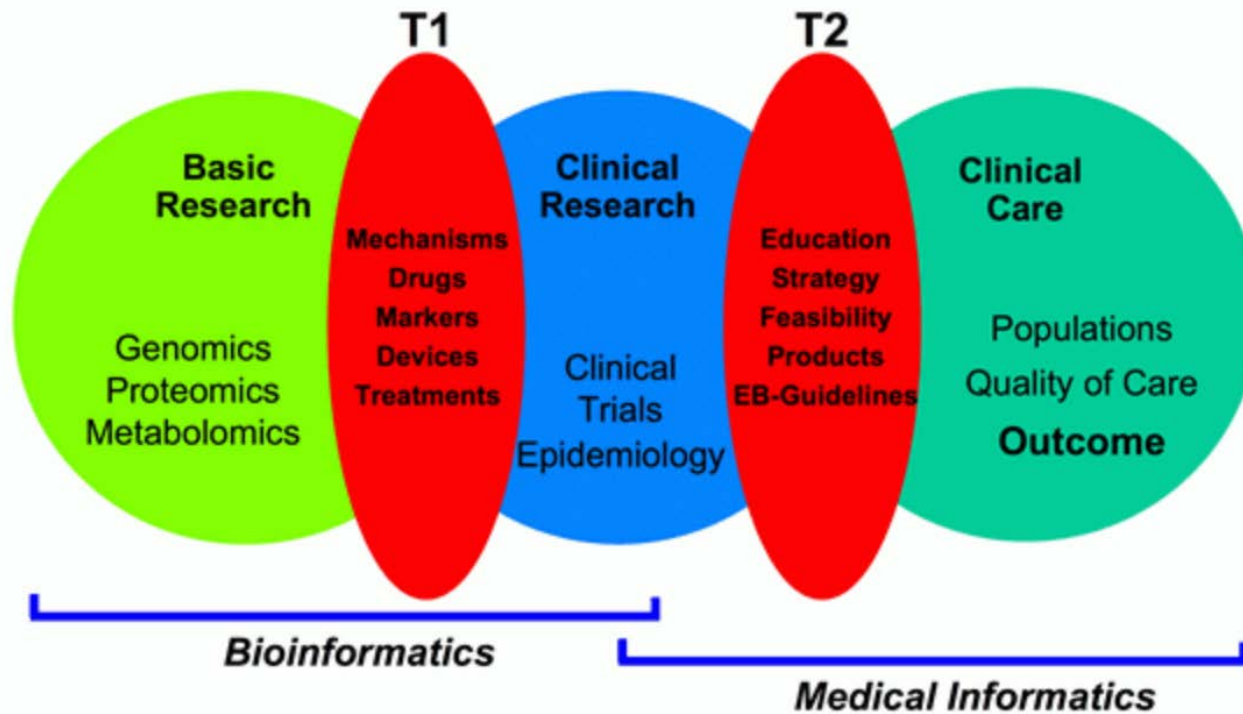
❖ Review of the Literature

- is a text of a scholarly paper...they are secondary sources, and do not report new or original experimental work. Most often associated with academic-oriented literature, such reviews are found in academic journals. A narrow-scope literature review may be included as part of a [peer-reviewed](#) journal article presenting new research, serving to...provide context for the reader.

Wikipedia Search!

The Healthy Pipeline

Translational Research Model



Brain & Spinal Injury Website

A real life example!

❖ **Spinal Muscular Atrophy (SMA)**

- SMA is neuromuscular disorder, the leading genetic cause of death among children under age two
- SMA is the result of mutations in the Survival of Motor Neuron 1 (SMN1) gene. Low levels of SMN protein affect nerve cells of the spinal cord. Babies progressively lose their ability to move, breathe and swallow.

❖ **Prof Adrian Krainer, Ph.D., Cold Spring Harbor Laboratory**

- Using a splicing process to edit RNA, Dr. Krainer has successfully corrected the splicing defect that causes SMA in systems first in test tubes, then in cells taken from SMA patients and grown in the lab, and then in genetically engineered mouse models of SMA.
- In 2009, Dr. Krainer and colleagues identified a compound that stimulates SMN production by altering RNA splicing.
- In December 2016, the FDA approved nusinersen (Spinraza), the first drug approved to treat children (including newborns) and adults with SMA.

A real life example!



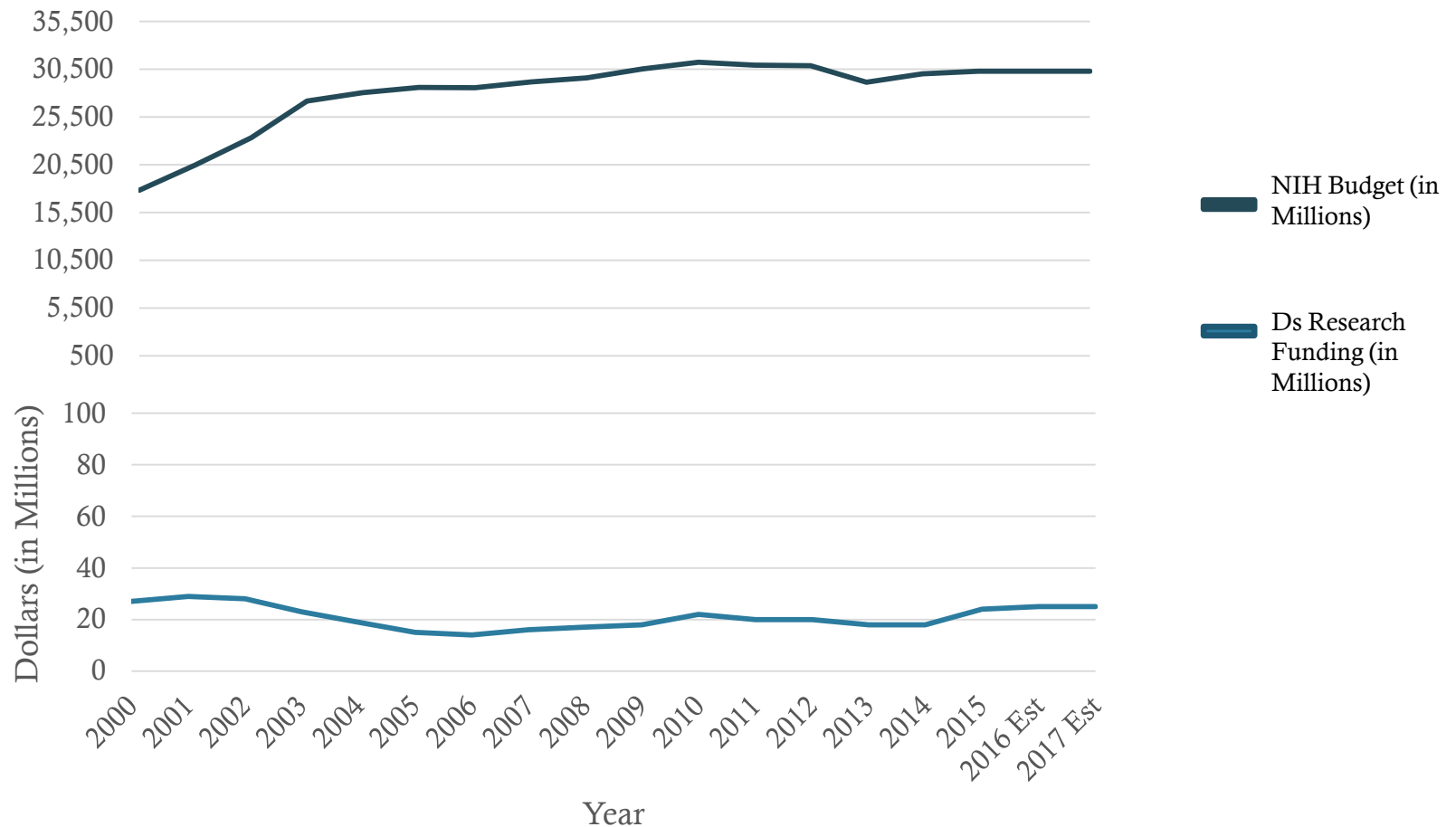
Our Problem

- ❖ The precipitous decline and flat funding of Down syndrome research at the NIH has left us with major gaps
 - Clinical Research is an estimated 35% of grants funded
- ❖ Little to no basic research, clinical research (including clinical trials), epidemiology (including natural history), or even review of the literature
- ❖ Negatively effects our ability to establish medical care guidelines for adults
- ❖ Guidelines or recommendations are important for families, medical professionals and eventually, insurance...

Research for People with Down Syndrome: National Institutes of Health Funding

Year	NIH Actual Total Obligations by Budget Mechanism (In Millions & Rounded)	NIH Budget Percent Increase from Previous Year	CF Research Funding (Dollars in Millions)	Fragile X Research Funding (Dollars in Millions)	MS Research Funding (Dollars in Millions)	Autism Research Funding (Dollars in Millions)	DS Research Funding (Dollars in Millions)	DS Research Funding if Proportionate to NIH Budget (In Millions & Rounded)	DS Research Funding to NIH Budget (Rounded)
2000	17,814						27		0.0015
2001	20,513	15.2					29	31	0.0014
2002	23,188	13.0					28	35	0.0012
2003	26,740	15.3					23	40	0.0009
2004	28,100	5.1					19	42	0.0007
2005	28,626	1.9					15	43	0.0005
2006	28,533	-0.3					14	43	0.0005
2007	29,034	1.8					16	44	0.0006
2008	29,320	1.0	90	26	169	118	17	44	0.0006
2009	30,207	3.0	86	27	137	132	18	45	0.0006
2010	31,036	2.7	86	25	133	160	22	46	0.0007
2011	30,630	-1.3	79	29	122	169	20	45	0.0007
2012	30,802	0.6	86	27	115	192	20	45	0.0006
2013	29,137	-5.4	78	30	112	186	18	43	0.0006
2014	30,019	3.0	77	36	102	188	18	44	0.0006
2015	30,293	0.9	80	38	94	208	24	44	0.0008
2016	32,259	6.5	89	44	97	232	27	47	0.0008
2017 Est	32,259	0.0	91	46	101	243	28	47	0.0009

Research for People with Down Syndrome: National Institutes of Health Funding



Down Syndrome Research

- ❖ **Low Government Funding** – Despite being the leading cause of developmental delay in the U.S. and the world, Down syndrome is one of the least funded genetic conditions by the NIH and has been since 2001.
- ❖ **Precipitous decline in funding** – From 2001 to 2006, NIH funding for Down syndrome research plummeted from \$29 million to \$14 million despite significant growth of the NIH budget.
- ❖ **Parity** – From 2001 to 2017, Down syndrome funding would have been \$744 million - more than double the actual \$356 million – had this research been funded in parity with the NIH budget.
- ❖ **Comparables** – Annual NIH research funding for Down syndrome is 2x to 45x less per capita compared to diseases with similar prevalence (e.g. Multiple Sclerosis) or chromosomal conditions and developmental disabilities (e.g. Fragile X or Autism).
- ❖ **Funding in 2018** – Despite a recent and impressive increase in overall NIH funding, the agency is estimating a devastating cut to Down syndrome research from \$27 million to \$21 million – a 22% decrease.
- ❖ **Down syndrome & Alzheimer's disease** – The Eunice Kennedy Shriver National Institute of Child Health and Human Development and the National Institute of Aging acknowledge the close connection between Down syndrome and Alzheimer's disease and have co-organized and funded an important longitudinal biomarker study.



WHAT DO WE NEED?

WHAT IS GLOBAL DOING?

**HOW CAN LOCAL DOWN SYNDROME
ORGANIZATIONS HELP?**

Trans-NIH Research

- ❖ **We believe it is critical that Congress recognize and support a trans-NIH initiative:** such as the Crnic Institute Human Trisome Project™, that is focused on Down syndrome and its comorbid diseases and conditions.
- ❖ **This NIH inter-Institute collaboration could be a force multiplier for research for at least 10 NIH institutes:**
 1. Eunice Kennedy Shriver National Institute of Child Health and Human Development (NICHD)
 2. National Institute on Aging (NIA)
 3. National Institute of Allergy and Infectious Diseases (NIAID)
 4. National Institute of Arthritis and Musculoskeletal and Skin Diseases (NIAMS)
 5. National Institute of Diabetes and Digestive and Kidney Diseases (NIDDKD)
 6. National Heart, Lung and Blood Institute (NHLBI)
 7. National Center for Advancing Translational Sciences (NCATS)
 8. National Institute of Neurological Disorders and Stroke (NINDS)
 9. National Cancer Institute (NCI)
 10. National Institute on Deafness and Other Communication Disorders

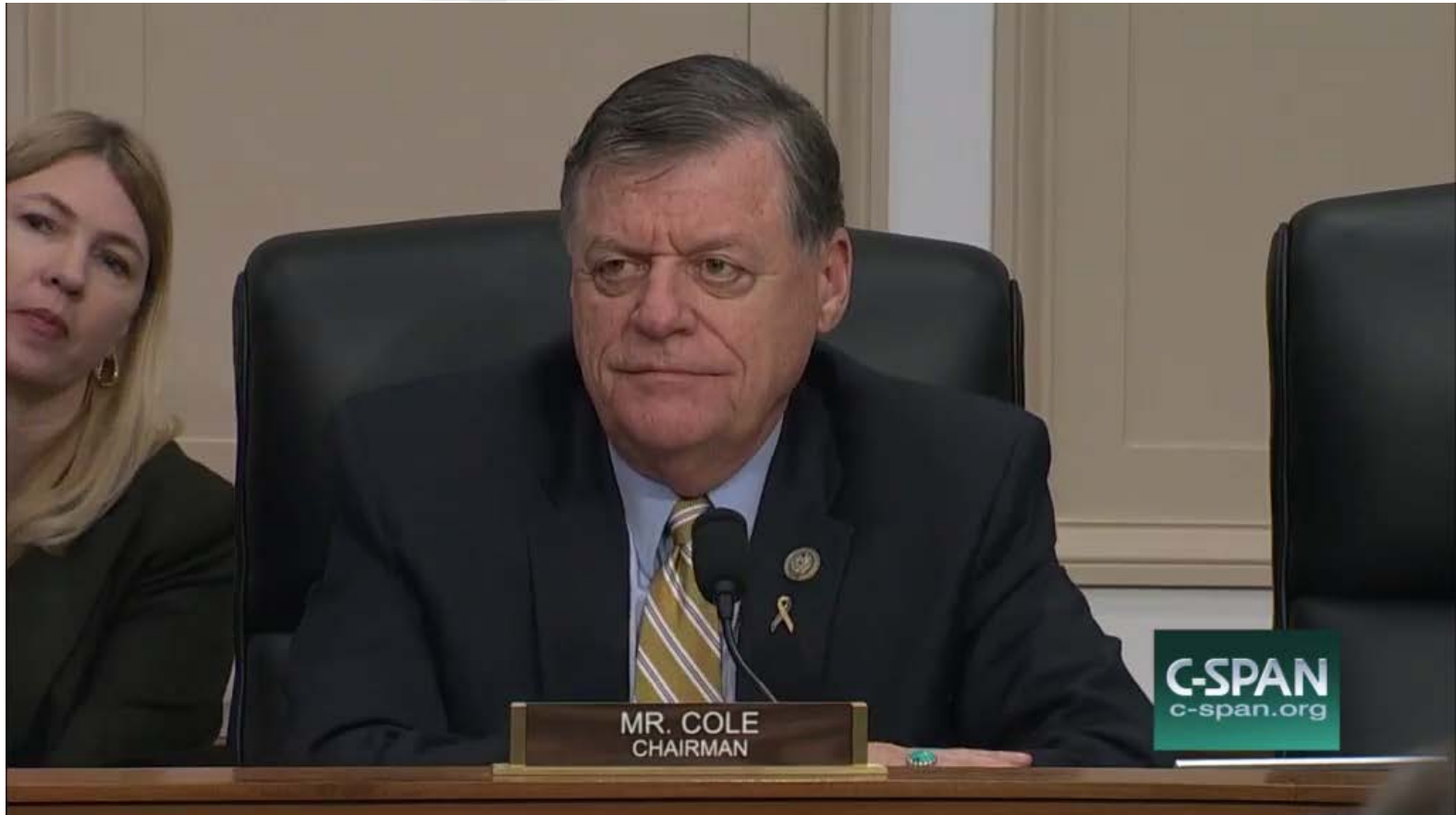
We are on the verge of seeing our advocacy lead to increased funding!

Global Makes History in Washington, DC Congress Holds Unprecedented Hearing on Need for Increased NIH Funding for Down Syndrome Research



Global Q Awardee, Frank Stephens

Testimony reaches 160M views!



How You Can Help

- ❖ **Help us get over the finish line with FY18 NIH funding for Down syndrome research.**
- ❖ **Help us advocate for NIH funding for the Crnic Institute Human Trisome Project.**
 - The HTP cost of approximately \$35 million is difficult for one institute to carry but amortized across multiple institutes it can and should be done as soon as possible.
- ❖ **Sign up for the HTP or any research that you deem is worthwhile and safe.**
- ❖ **Advocate for clinics and centers to work together.**
- ❖ **Donate! Our seed funding is the ONLY thing that has allowed us to re-establish the pipeline of excellent Down syndrome research. \$50,000 is enough to get a lab started or further a specific research idea.**