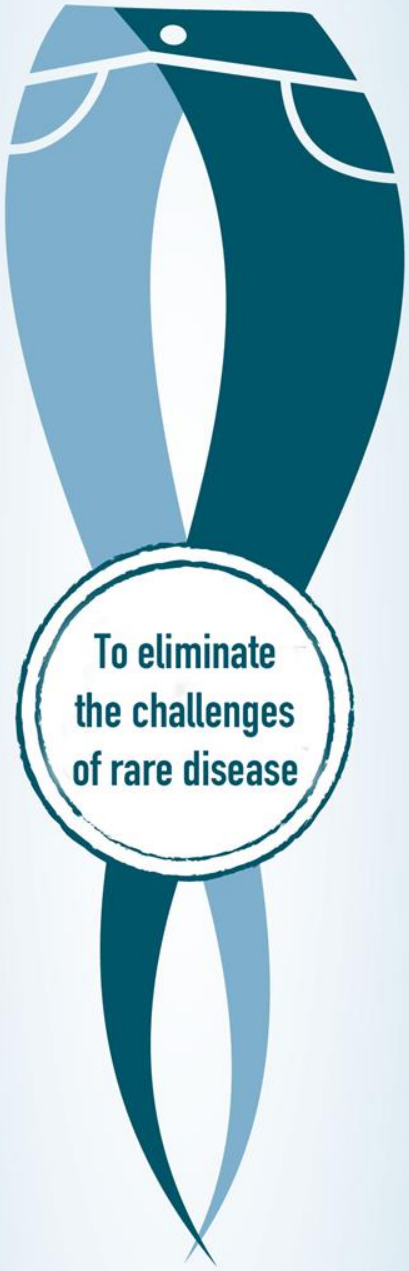

Global Genes™
Allies in Rare Disease

How to Discuss Genetic Disease with Your Loved Ones

April 1, 2015

Sponsored by:

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Meet Today's Panelists:

Jenna Miller
Recombine

Michelle Fox
Invitae

Cyndi Frank
National Gaucher Foundation

Janet Mills
cureCADASIL Association

Moderator:

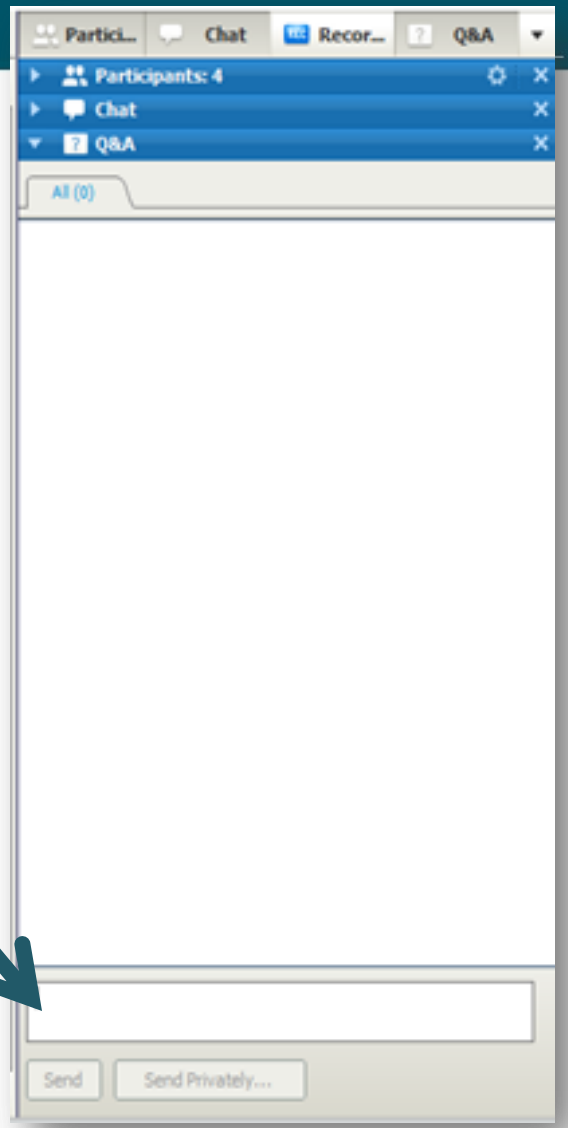
Daniel Levine
Levine Media Group

Submit Your Questions

Throughout the webinar, panelists will be taking questions from the audience

To send in questions, please use WebEx's Q&A feature in the bottom right hand corner

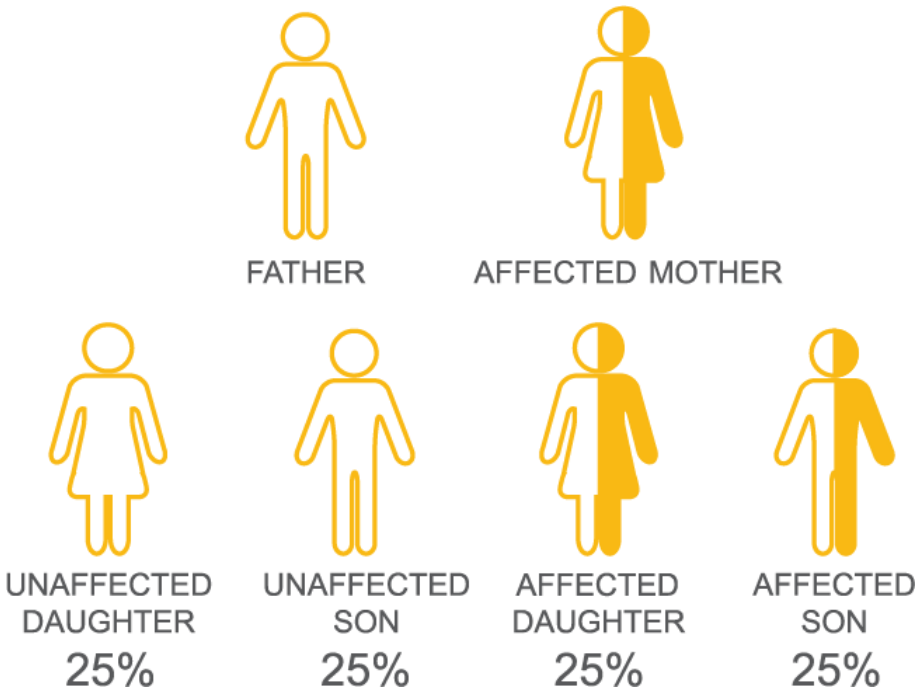
Please feel free to submit questions throughout the presentation



Jenna Miller, MS, CGC

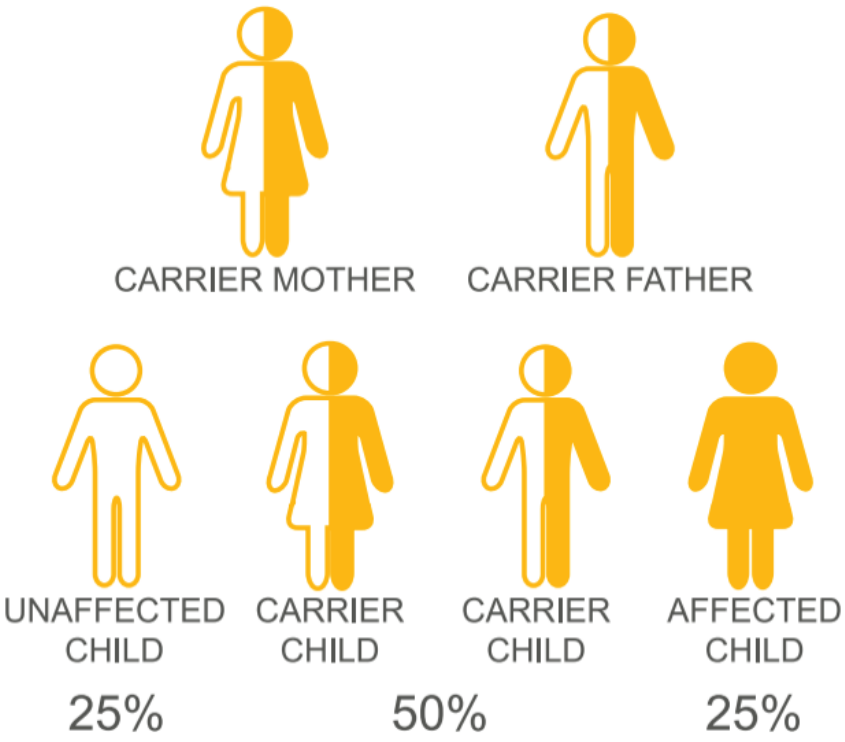
Genetic Counselor

Patterns of Inheritance: Autosomal Dominant



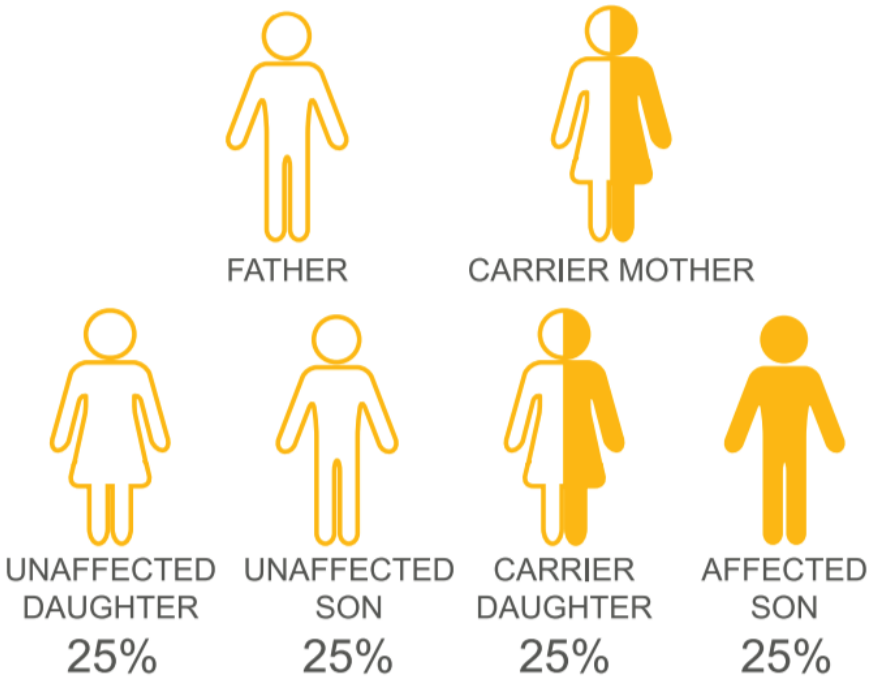
If one partner carries a mutation for an autosomal dominant genetic disease, the couple's child has a **1 in 2 (50%) chance** of having that genetic disease.

Patterns of Inheritance: Autosomal Recessive



If both partners carry mutations for an autosomal recessive genetic disease, their child has a **1 in 4 (25%) chance** of having that genetic disease.

Patterns of Inheritance: X-Linked Recessive



If the female partner is a carrier of an X-linked genetic disease, her male child has a **1 in 2 (50%) chance** of having that genetic disease.

INVITAE

Michelle Fox, MS, LCGC

Genetic Counselor Consultant*

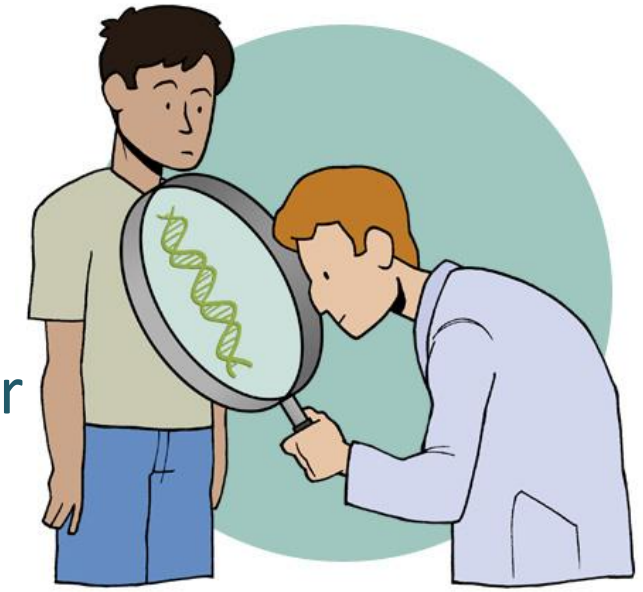
Global Genes™
Allies in Rare Disease

Michelle Fox is an independent contractor with multiple affiliations. Invitae has given Michelle permission to refer to Invitae in connection with this webinar.

hope. it's in our genes.

Finding an Answer

- Seeking an underlying diagnosis for child/individual with possible genetic disorder
- Different approaches:
  - Wanting to know
  - Denial
- For many parents, knowing is better than not knowing
- Not always bad news
- Finding an answer is just the beginning



Communicating Abnormal Results

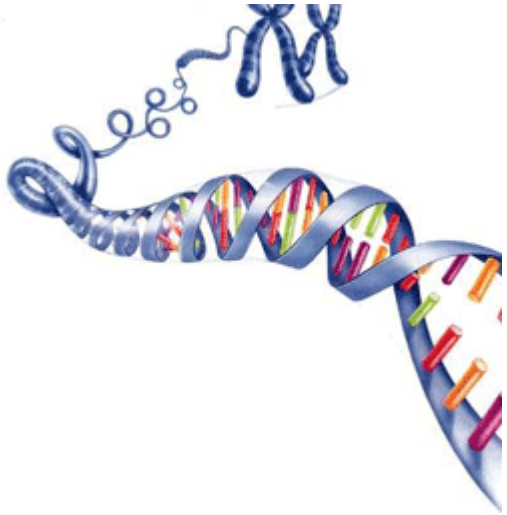
- Explain the results of an abnormal genetic test
- What does it mean for my child?
- What does it mean for us/our families?
- What should we do?
- Support group information
- Put parents/patients in touch with others
- Communicate with the primary doctor and other specialists

Genetic Counseling Plan

- Giving results in person/phone
- Who should attend the session?
- Would you like to speak without your child in the room?
- Explaining when it is vital that your child know information about his/her diagnosis
- Speaking to the child about genetic disease

Family Communication

- You are the only person that can communicate information about genetic testing/genetic diagnosis with other family members
- Give accurate information
- Share genetic test reports/family member can be specific when seeking genetic testing
- Give family members the name/contact information of your genetic counselor



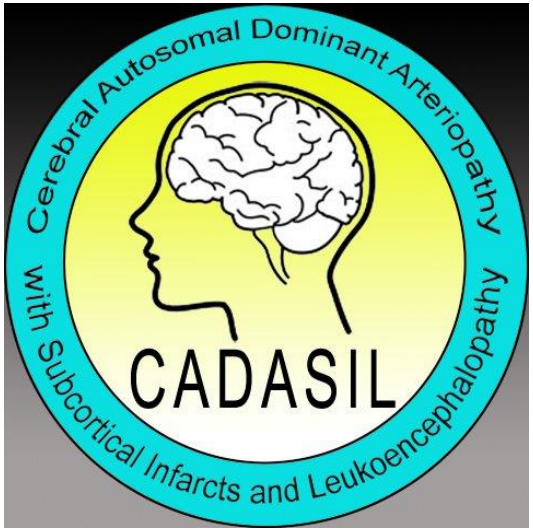
Starting the Conversation

- Gathering information about your family history
- Picking the right time to talk to your family about a genetic disorder
  - Family dinners
  - Holiday celebrations
  - Family reunions

Janet Mills

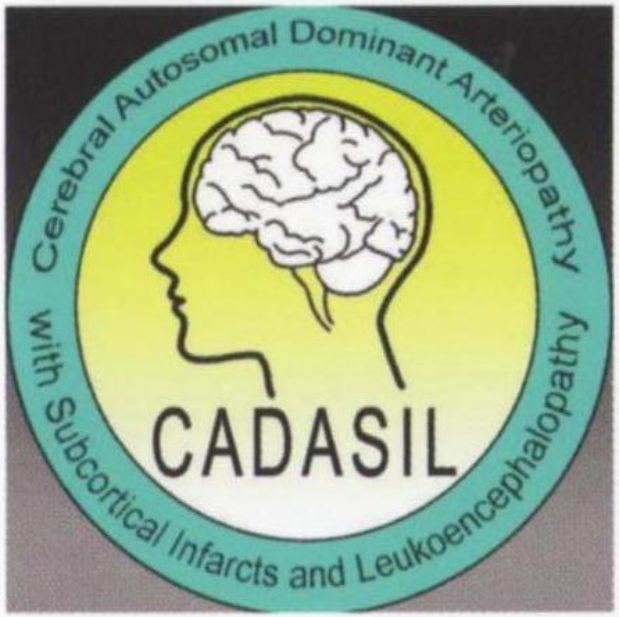
Trustee and Patient Advocate

CADASIL is caused by a mutation of the Notch 3 gene on the 19th chromosome



Our blood vessels, especially those in the brain, are compromised with genetic material.

CADASIL



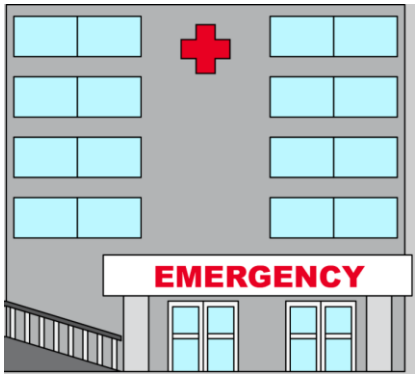
Often misdiagnosed as MS or other neurological disorders

Symptoms may include:

Migraines with aura →Began in my teens
Headaches/pressure in head →Began in my teens
Numbness/tingling in extremeties →Experience now
Mood disorders/anxiety/depression →Began in my teens
Fatigue/apathy →Experience now
Ischemic episodes/TIAs →Led to seeking dx/diagnosis
Dizziness/balance/gait problems →Led to seeking dx
Visual disturbances →Led to seeking dx
Cognitive/memory issues →Experience now
Seizures/spells →Led to seeking dx
Stroke/hemiparesis
Progressive dementia

Other symptoms I have: nausea and lightheadedness; feeling like I have the flu.

Road to Diagnosis



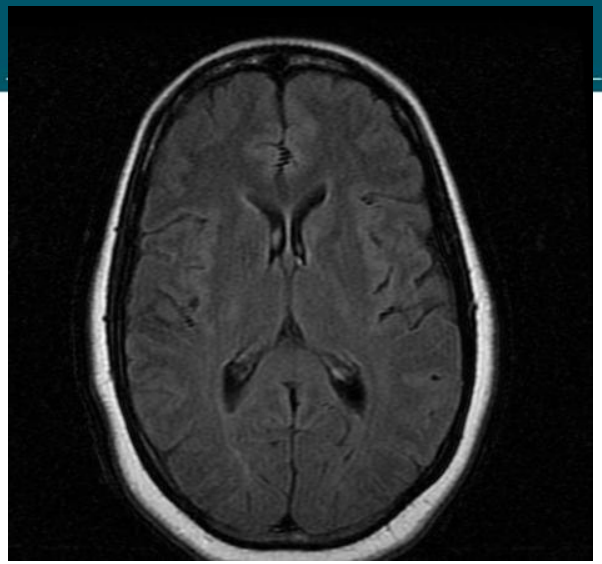
Black-out → Husband took me to Emergency Room

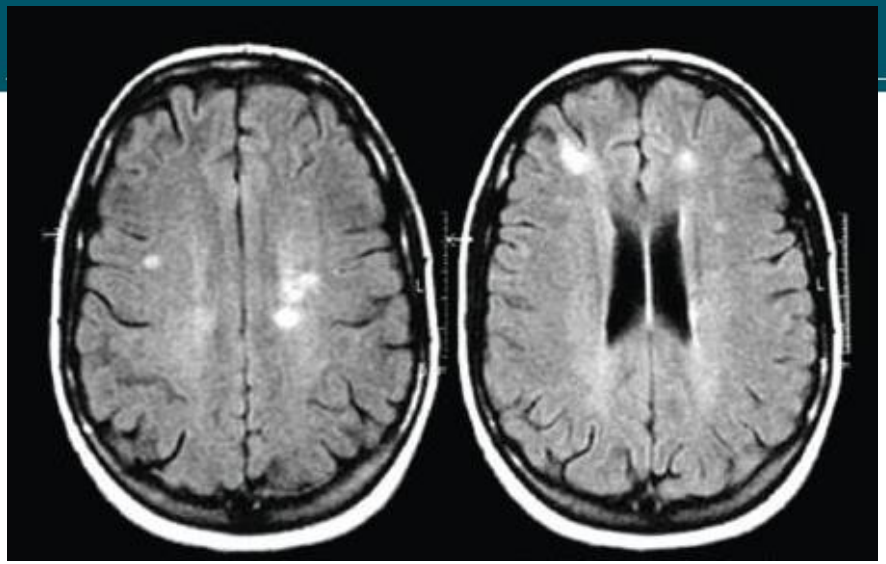
CT scan of head indicated → Brain MRI

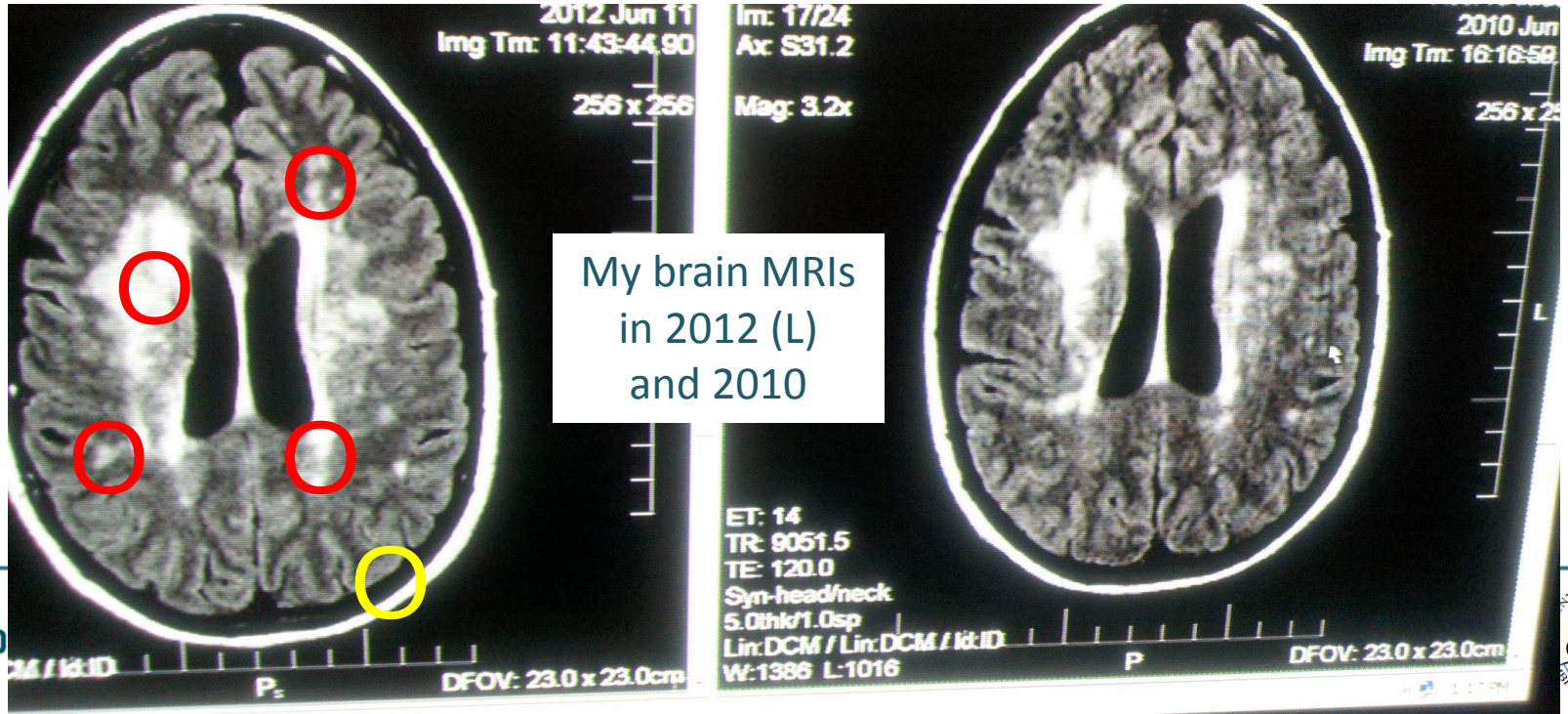
Brain MRI results: “We believe you have MS.”

Normal Brain MRI

MS patient with mild to moderate symptoms







My brain MRIs in 2012 (L) and 2010

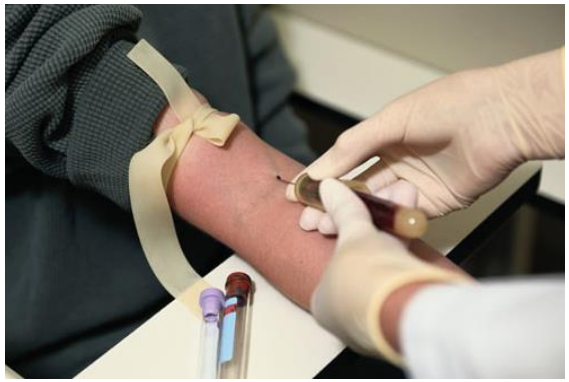
Ruling Out MS and Other Conditions

- Various blood screenings (generally normal)
- Spinal tap (normal)
- Optic nerve (normal)
- EEG (normal; more intensive testing after diagnosis showed brain activity never seen before by neuropsychologist)
- EKG (normal)
- Skeletal x-rays (some irregularities)

Ruling Out MS and Other Conditions

My local neurologist in WY mentioned CADASIL at my 1st appointment with him soon after my 1st brain MRI, but since it is a genetic disease and there is **no history in my family**, we didn't seriously consider it for many months and after other tests came back negative or inconclusive.

An MS specialist in CO also suspected CADASIL, so my blood was drawn for the specific CADASIL diagnostic test, which was sent to Athena/Quest Labs in MA.



After a 6 week wait, the results came back positive.

We all saw **a geneticist and a genetic counselor** before anyone else was tested. They helped my family members understand the inheritance pattern of CADASIL and how "autosomal dominant" meant it only takes the DNA from one affected parent to pass on the mutation. Every offspring of an affected parent has a **50/50 chance** of having the mutation that causes CADASIL.

I am NOT a hypochondriac!

There really IS something wrong with my brain!

Now I have an answer for all these weird symptoms!

FINALLY!

I am NOT going insane!

I no longer feel misunderstood and suicidal!

This is *no one's* fault!

Who Needs to Know, and Why?

My doctors

Any medical professional I come in contact with needs to know the risks to me for any procedure, even routine ones.

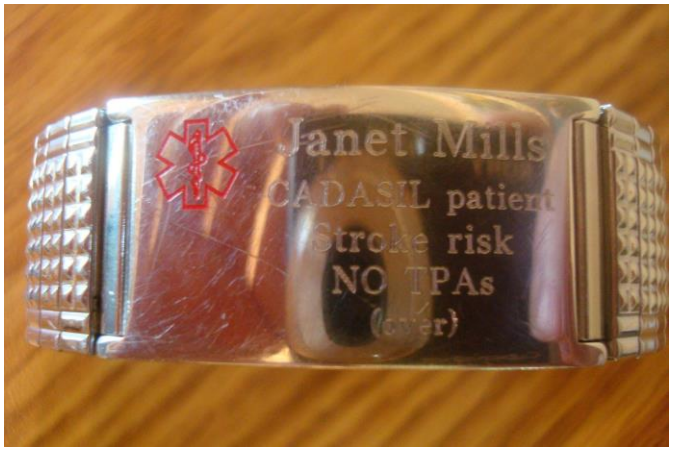
My family

Especially those biologically related to me, as they could have CADASIL also, which places them at risk for stroke.

My friends

They may be with me when I have a TIA, stroke, or severe migraine. They need to know where I keep my medical info and what they can do to help.

If a CADASIL patient has a stroke, s/he is cautioned against receiving TPAs or other typically used stroke medications at the hospital due to the risk of a fatal cerebral hemorrhage.



Final Thoughts and Pieces of Advice

Some patients with genetic conditions find it difficult to secure:

- Affordable medical insurance
- Life insurance
- Long term care coverage,
- Other services

I strongly recommend seeing a genetic counselor and considering all the things you need to have in place before being tested for a genetic condition.

For more information about CADASIL, go to:

curecadasil.org

Cyndi Frank

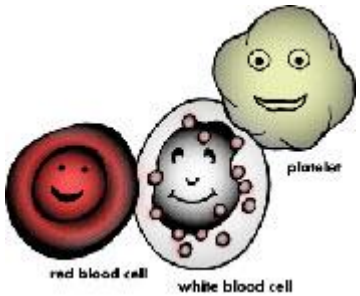
Director of Patient Advocacy and Meetings

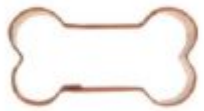
What is Gaucher Disease?

- Autosomal recessive genetic disorder caused by the deficiency of the enzyme glucocerebrosidase
- Most common Jewish genetic disease affecting Ashkenazi Jews
- Inherited metabolic disorder caused by a gene mutation on the first chromosome
- Most common lysosomal storage disease

Typical Type 1 Gaucher Symptoms

- Bone pain, fractures, joint replacements
- Excessive bleeding
- Easy bruising
- Enlarged liver and spleen
- Extremely low red blood counts
- Brown spots and yellow skin from liver disease
- Extreme fatigue
- Weak immune system
- Possible lung involvement





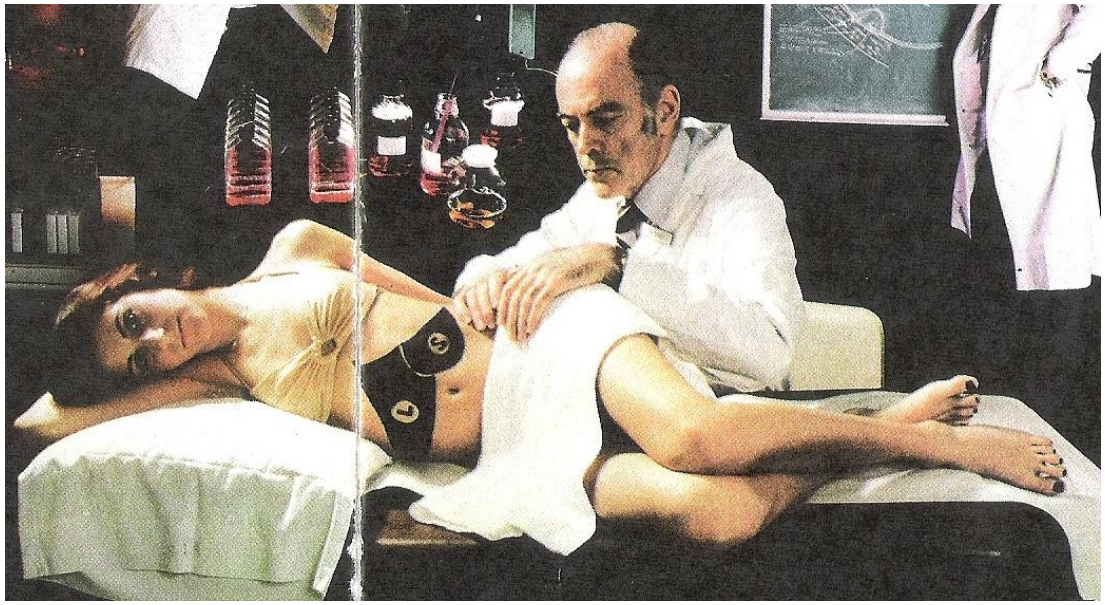
Diagnosis:

- Symptomatic since infancy
- Misdiagnosed at age 12 with malnutrition, then leukemia
- After 1 year of bi-weekly blood tests, finally diagnosed in 1976 at age 13 (yes, that makes me 51)
- No treatment and no hope

Prognosis:

- The specialists told my parents
- My parents told me
  - No treatment
  - Degenerative disease
  - Will use a wheel chair by 20
  - Probably won't live past 30

Acting Out:



- Dismissal
- Rebellion
- Self pity
- And the crazy things teens do

Present & Future

Cyndi Frank
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Phone: 415.839.5155
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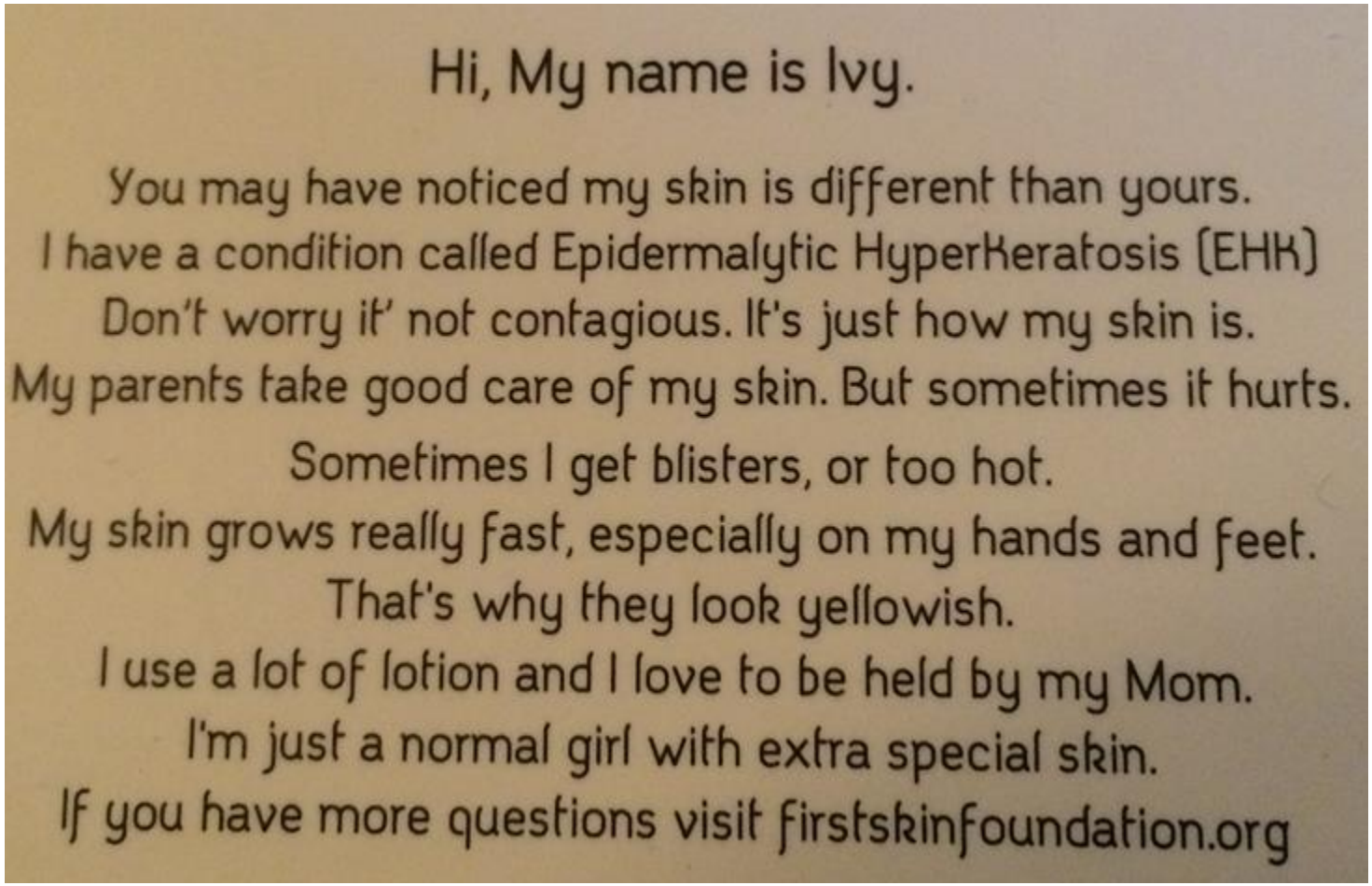
cyndi@gaucherdisease.org
www.gaucherdisease.org

National Gaucher Foundation, Inc.
EDUCATION • SUPPORT • HOPE

Jenna's Niece, Ivy



Doctors, Genetic Counselors & Angels

- Treating the physical aspects of disease
- Treating the emotional aspects of disease
  - Getting support
  - Figuring out how to manage chronic disease
  - Figuring out how to move forward

Genetic Counseling

Purpose is to communicate complex information about genetic disorders:

- Inheritance pattern
- Implications for patient and family members
- Testing options
- Management/treatment options
- Support and resources

Shared decision making

Follow up

Genetic Counseling Training

- Masters level training in genetics
- 2 year programs accredited by the American Council for Genetic Counseling (ACGC)
- Certification by the American Board of Genetic Counseling (ABGC)
- Course work and on the job training
- Emphasis on communication skills
- Team work

Genetics Resources

- Check with your genetic counselor or physician
- Seek appropriate specialist/treatment when you can
- Ask questions about your family history
- Genesinlife.org
- Invitae.com
- Recombine.com
- Global Genes Toolkit on Genetics/Genetic Testing

Thank You Panelists!

Jenna Miller
Recombine

Michelle Fox
Invitae

Cyndi Frank
National Gaucher Foundation

Janet Mills
cureCADASIL Association

Moderator:

Daniel Levine
Levine Media Group

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Leveraging a Rare Disease Center of Excellence

June 1st at 10 am PST

Register today at
http://globalgenes.org/june2015webinar/