Living With Huntington's

Molecular Biologist Cynthia McMurray: Dismantling a DNA Destroyer

Findings

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McMurray Hunts Disease

Molecular biologist Cynthia McMurray seeks the cause of a gene glitch

Photo: Matt C. Meyer

Huntington's disease

- Targets the brain
- Damages DNA in brain cells
- Triggers death of brain cells

Question:

Do you carry the gene for Huntington's?

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Answer: Yes

Everyone carries the gene for Huntington's

- **The Huntington's gene is one of about 20,000 genes in the human genome**
- **But only people with a slight glitch in the gene get Huntington's**
- **Huntington's is highly heritable**

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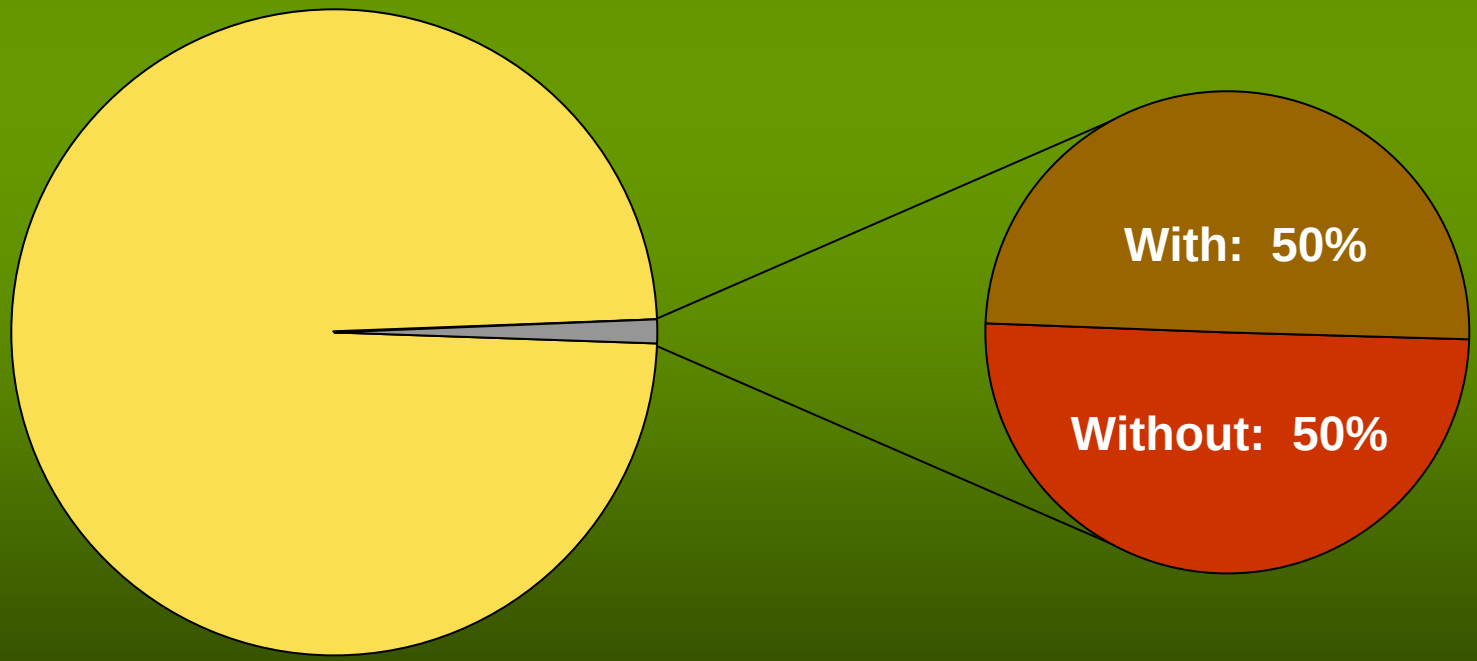
Huntington's Risk

Risk of having Huntington's glitch: 1 in 10,000 in general population (1/10000th %)

Risk of having Huntington's glitch if parent has disease: 50%



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Facts About Huntington's Disease

- Huntington's affects men and women, as well as all races and ethnicities
- Symptoms usually appear in mid-life
- Symptoms can include impaired movement, mood, speech, and memory
- As disease progresses, symptoms worsen
- There is no cure

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Partial Gene Amplification: CAG

- Cytosine, adenine, guanine (CAG) base sequence repeats over and over
- Frequent CAG repeats are found in other brain diseases
  - People with Huntington's have 37-80 CAG repeats
  - People without Huntington's have about 36 or fewer CAG repeats

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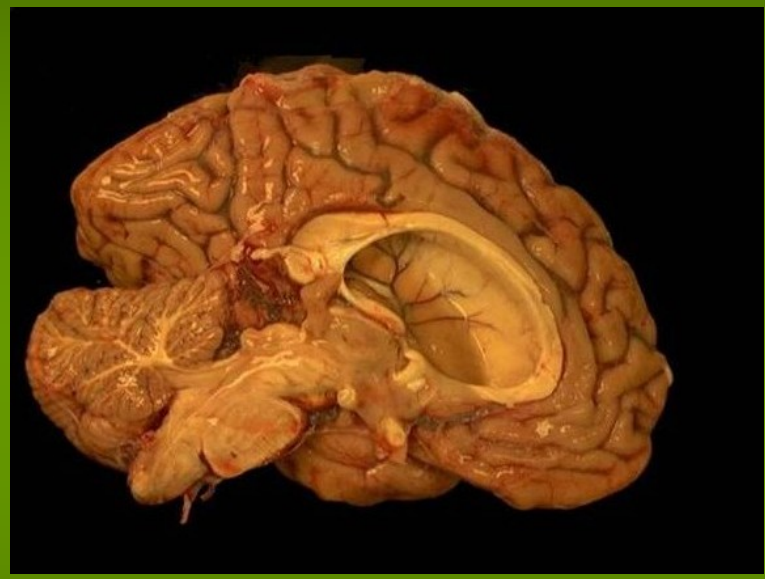
The Effects of DNA Damage



Credit: Harvard Brain Tissue Resource Center at McLean Hospital

- Left: Healthy brain has smaller ventricle
- Right: Nerve cells in Huntington's brain died off, creating a larger hole, or ventricle, in the center

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McMurray's Research

Hypothesis #1: **Unstable DNA causes instability of motion, thoughts, and moods in Huntington's disease**

Discovery #1: **CAG repeats form abnormal looplike structures on parts of DNA, thereby enabling even more CAG repeats**

Next Question: **What allows the looplike structures to become permanent?**

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Understanding DNA Damage

- Reactive oxygen species (free radicals)
- Normal DNA repair machinery
- Cholesterol

What role does McMurray believe these play in Huntington's?

How is this affected in Huntington's?

What possible roles might this lipid play in Huntington's?

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Genetic Destiny?

- Genetic testing can determine if you are at risk for developing some diseases
- Risk for about 1500 diseases can be identified
- DNA from hair, saliva, or skin reveals if you have gene abnormalities

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Research Applications

What are some of the ethical and emotional considerations associated with genetic testing for disease risk?

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