Born to be Bad? The Biological Basis of Criminal Behavior

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Introduction:

Is there a biological reason why some people become violent offenders? This is an area of biology with many legal, ethical, and societal implications. Tonight we will focus on what the biology can, and cannot, tell us about the causes of violent behavior. We will talk about the studies that have been done, their results, and their limitations. Along the way we will take a crash course in neuroscience and human genetics, as well as examine two real world cases where biological evidence was used in criminal trials. By the end of the evening, we hope you will have a solid understanding of the neurobiological and genetic studies that have been done on violent behavior so that you can make an informed decision about how you feel about the use of this science in society.

About me:

I’m a fourth year graduate student in Karen Cichowksi’s lab at Harvard Medical School. In lab, I work on identifying therapies for solid tumors. Previously, I have given two lectures for SITN, and I will be serving as a content coordinator for the lecture series this fall. I am interested in science education and continuing science education outside of school, so I hope to incorporate an emphasis on the public’s understanding of current science into my future career. Before coming to Harvard, I grew up in a Chicago suburb and graduated from Williams College. In my spare time I enjoy visiting art museums, cheering on the Chicago White Sox, and going shopping.

Key Terms:

Instrumental Aggression: Lack of emotional sensitivity (hypoactive), predatory or goal-oriented aggression, often associated with psychopathy

Reactive Aggression: Excess of emotional sensitivity (hyperactive), inability to control emotion

Psychopathy: A personality disorder characterized by impulsivity, ego-centrism, and a lack of remorse and empathy, associated with high risk of recidivism in violent offenders

Functional Specialization: A theory of brain organization that suggests that different regions of the brain are specialized to carry out different functions (i.e. frontal cortex carries out executive functions)

PET Imaging: A type of functional imaging that measures glucose uptake as a readout for activity

Functional MRI (fMRI): A type of functional imaging that measures oxygen levels in the blood as a readout for activity
Neurons: The basic unit of the brain responsible for transmitting information through electrical and chemical signals

Neurotransmitters: Chemicals that carry a signal across the synapse from one neuron to another, examples: serotonin, dopamine, epinephrine, norepinephrine

Re-uptake Transporters: A protein located on the signaling end of a neuron responsible for bringing neurotransmitters back into the first neuron to end the chemical signal

Behavioral Genetics: The study of how genes influence behavior

Chromosomes: An organized structure of DNA found in your cells, each person has two copies of every chromosome—one from the mother and one from the father

Gene: The basic unit of heredity—each gene contains the instructions to make one protein

Allele: Alternative forms of a single gene—ex: human blood type alleles A,B, and O

Heritability: A measure of the amount of observed variation in a population that is due to genetic variation

Genome Wide Association Study: An unbiased approach to identify genes associated with a trait—looks at sites all across the genome (the entirety of a person’s genetic information)

Candidate Gene Approach: An approach that focuses on a specific gene of interest and looks for an association between alterations in that gene and a trait

More sources on the subject:
NPR Fresh Air Interview with author/criminologist Adrien Raine: http://www.npr.org/2013/05/01/180096559/criminologist-believes-violent-behavior-is-biological

Next Seminar (May 29, 2013):
Heather Olins: The Alien World of Hydrothermal Vents

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