



*Welcome*



**International Center for  
Leadership in Education**

RIGOROUS LEARNING FOR ALL STUDENTS

# Neuroscience and Chemical Dependency

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**Senior Fellow**  
**ICLE**

A division of Houghton Mifflin Harcourt



# The Brain's Three Questions

Who are  
these  
people?



Why  
are we  
here?

Where are we going?

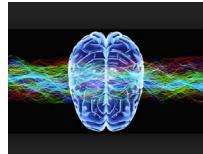
# Agenda

## Welcome

- Introductions & Relationship Building



## Meet Your Brain



## Neuroscience of Trauma & Chemical Dependency



## Building a Great Human Being

- Empathy, Gratitude, Resiliency



## Closing



# Learning Outcomes



- Understand how people learn.
- Understand the how trauma & Chemical Dependency impacts learning.
- How to integrate gratefulness, empathy and resilience into your classroom

# Building Relationships



Two things you learned at this conference



Stand



Find a partner



Introduce yourself



Share your learning

# My Credentials

**Educator for  
41 Years**

**Preschool-  
Higher Ed.**



# Linda's Family





# Meet Your Brain

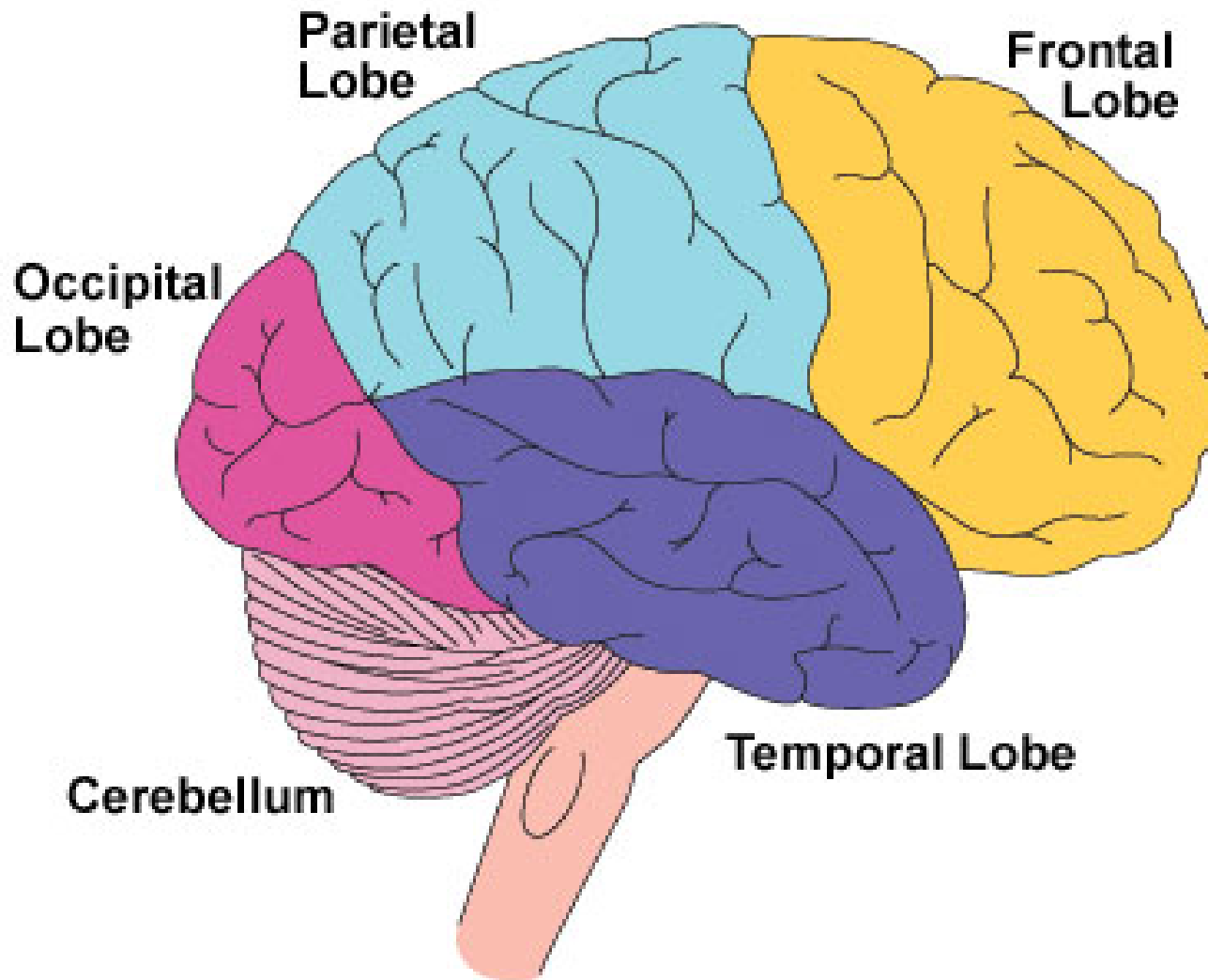




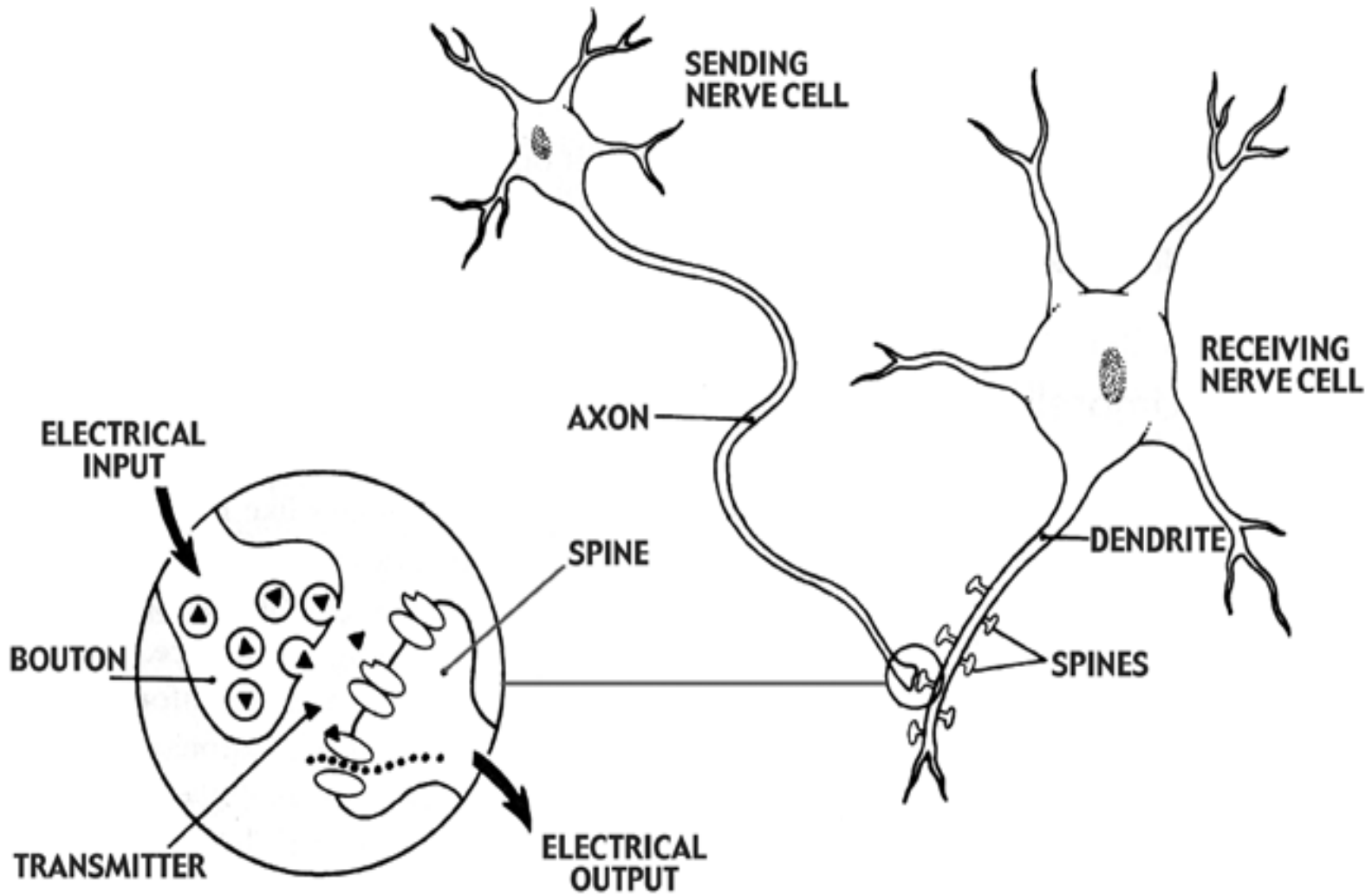
“LEARNING IS  
THE BRAIN’S  
PRIMARY FUNCTION...”

Frank Smith, *Insult to Intelligence*

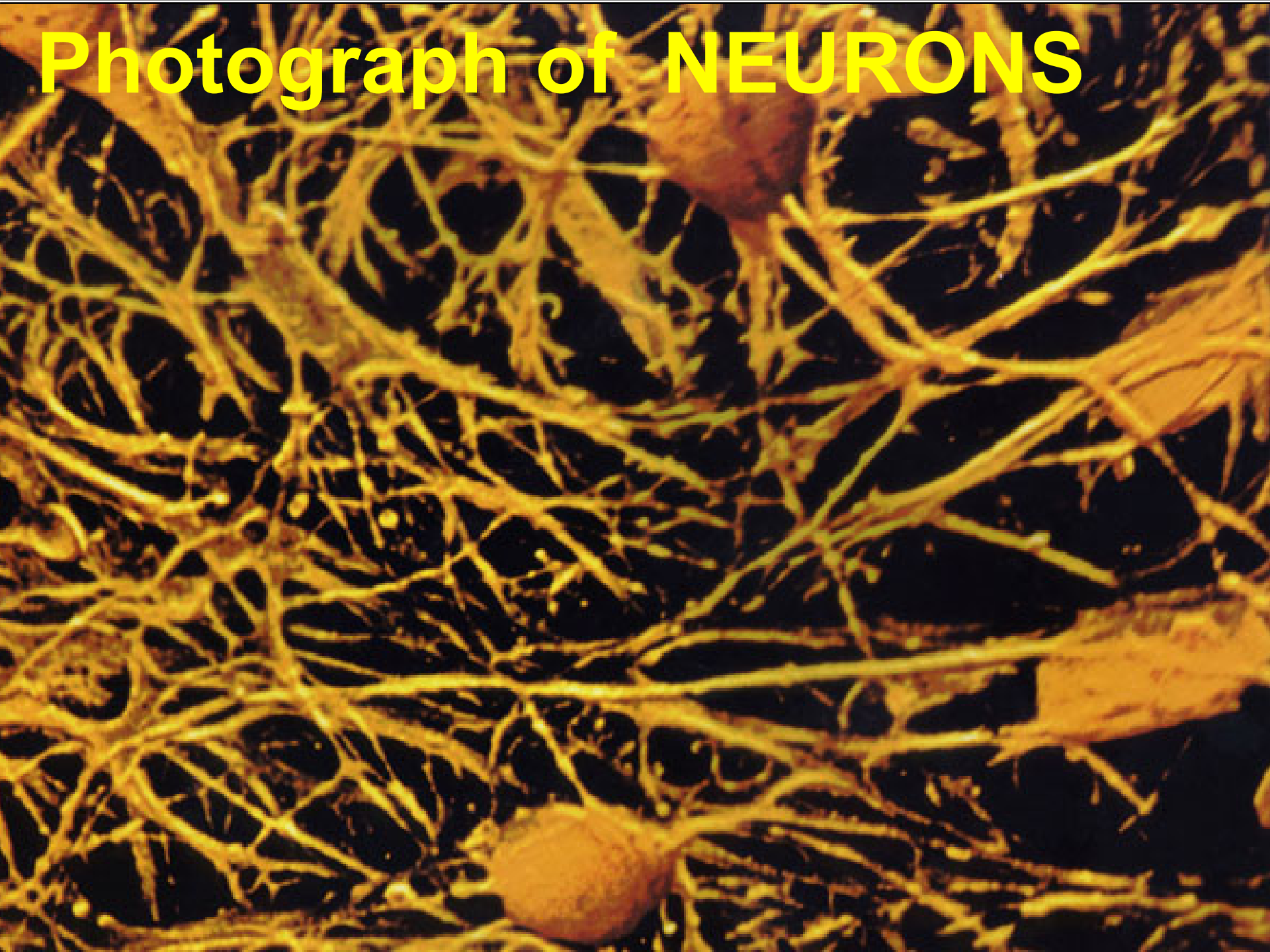
# Lobes of the Brain



# Communication of Neurons



# Photograph of NEURONS



# Brain Structures



# Strategies for the Structures

What lessons have you taught that activated these structures in your students brains?

Amygdala-Emotion

Hippocampus-Memory

Corpus Callosum-Movement

RAS-Attention

Insula- Emotion



# We Have a Growing Mental Health Issue



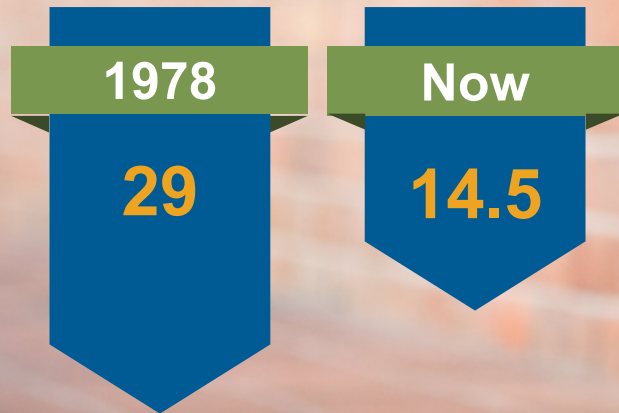
# Mental health and behavioral disorders are diagnosed in 1 out of 7 children ages 2-8



## Most common in non-Hispanic white boys

CDC: Health-care, Family, and Community Factors Associated with Mental, Behavioral, and Developmental Disorders in Early Childhood - United States, 2011-2012

# Average Age of Depression



Source: Ray McNulty, Dean, Southern New Hampshire University

# Stress Impacts Brain Development

# 1 in 12 high school students have cut themselves

Source: Marty Swanbrow Becker, Florida State University,  
Brookings Institute , Brown Center Chalkboard

**16% of high school  
students  
have thought seriously  
about suicide.**

Source: Marty Swanbrow Becker, Florida State University,  
Brookings Institute , Brown Center Chalkboard

**18% of college students  
have thought seriously  
about suicide.**

Source: Marty Swanbrow Becker, Florida State University,  
Brookings Institute , Brown Center Chalkboard

# Girls Since 2010

**65%**  
in suicide

**58%**  
in severe  
depression

**12%**  
of hopeless  
feelings

Source: Clinical Psychological Science,  
Jean M. Twenge, San Diego State University

**The question should not be,  
what is wrong with this  
student?**

**The question should be, what  
happened to this student?**



# Causes

## Technology

- Lack of deferred gratification



# Causes

## Technology

- Lack of deferred gratification
- Lack of deep relationships



# Causes

## Technology

- Lack of deferred gratification
- Lack of deep relationships
- Bullying



# Causes

## Technology

- Lack of deferred gratification
- Lack of deep relationships
- Bullying
- Dark Side



# Causes

## Technology

- Lack of deferred gratification
- Lack of deep relationships
- Bullying
- Dark Side



## Home

- Missing Adults
- Helicopter Adults



## Medical

- Prescription Drugs



## School

- Increasingly Stressful Environment



SEL is not new. It has always been part of our unwritten or hidden curriculum.

# Neuroscience of Trauma and Chemical Dependency



Trauma occurs when a child experiences an intense event that threatens or causes harm to his/her emotional and physical well-being and overwhelms his/her ability to cope.

National child Trauma Stress Network

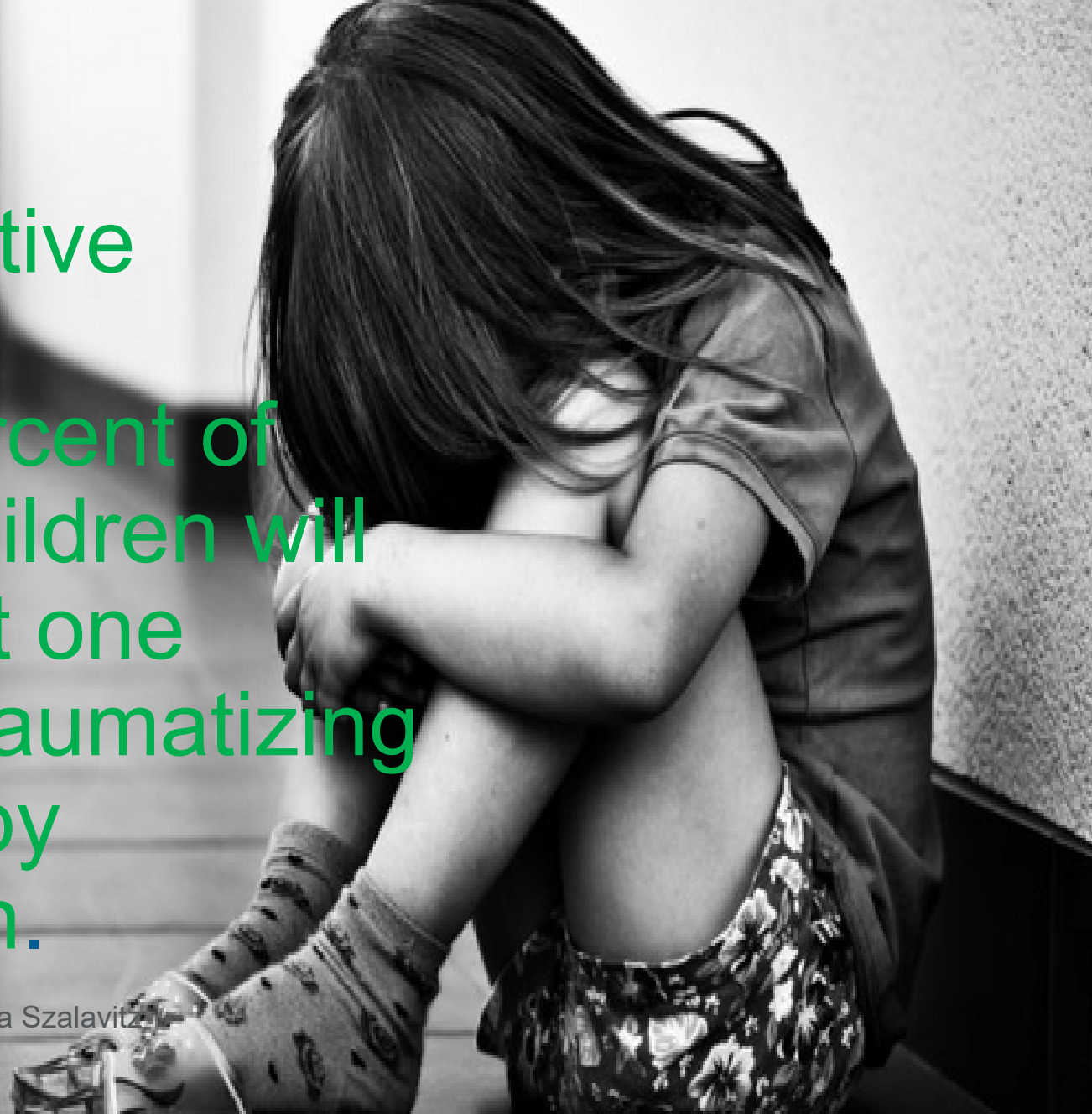


We need to be  
building  
relationships with  
students and  
teaching social  
skills along with

# Trauma

By conservative estimates, about 40 percent of American children will have at least one potentially traumatizing experience by age eighteen.

*The Boy Who was Raised as a Dog*  
Bruce D. Perry, M.D., Ph.D. and Maia Szalavitz



# Results of Trauma

- Alcoholism and alcohol abuse
  - Chronic obstructive pulmonary disease (COPD)
  - Depression
  - Fetal death
  - Health-related quality of life
  - Illicit drug use
  - Ischemic heart disease (IHD)
  - Liver disease
  - Risk for intimate partner violence
  - Multiple sexual partners
  - Sexually transmitted diseases (STDs)
  - Smoking
  - Suicide attempts
  - Unintended pregnancies
  - Early initiation of smoking
  - Early initiation of sexual activity
  - Adolescent pregnancy
- Affective and Emotional dysregulation
  - Cognitive impairment
  - Attachment impairment
  - Behavioral regulation
  - Social development
  - Negative Self concept



**ACE**

**A**dverse  
**C**hildhood  
**E**xperiences



# Adverse Childhood Experiences



- Physical/Emotional/Sexual Abuse
- Physical/Emotional Neglect
- Parental Mental Illness
- Substance Dependence
- Parental Incarceration
- Parental Separation/Divorce
- Parental Domestic Violence

# We Could Add

- Transiency/Relocation/Immigration
- Witnessing violence or crime in the community
- Being shot or shot at
- Criminal behavior in the home/community
- Terminal/chronic illness of loved one
- Military deployment of family member
- Death of a loved on/pet
- Homelessness
- Bullying
- Victimization
- Environmental Event



# Why is This Important?

We all have unconscious subconscious connections where our brain neurobiologically connects small sensory experiences with significant memories and feelings.

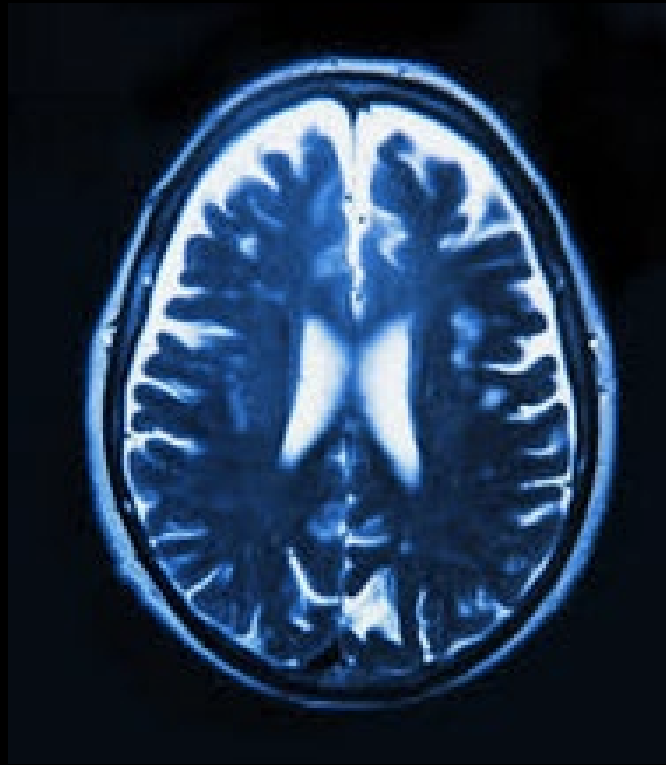
# SO WHAT ABOUT THE BRAIN?

- Neuroscience research of past 30 yrs.---a major origin of psychopathology is trauma to the early developing nervous system, resulting in affective or emotional dysregulation
  - ADHD?
  - Other diagnoses?

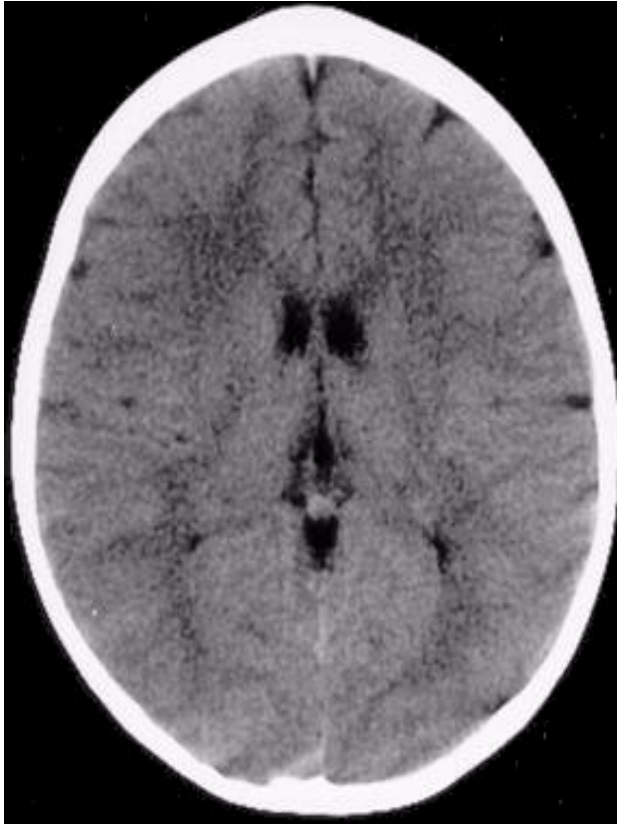




- # Brain scans (from Dr. Bruce Perry)
- CT scans on left—from healthy 3 yr olds with average head size
  - Images on right—from a series of 3 yr olds following severe abuse and neglect in early childhood



# 3 Year Old Children

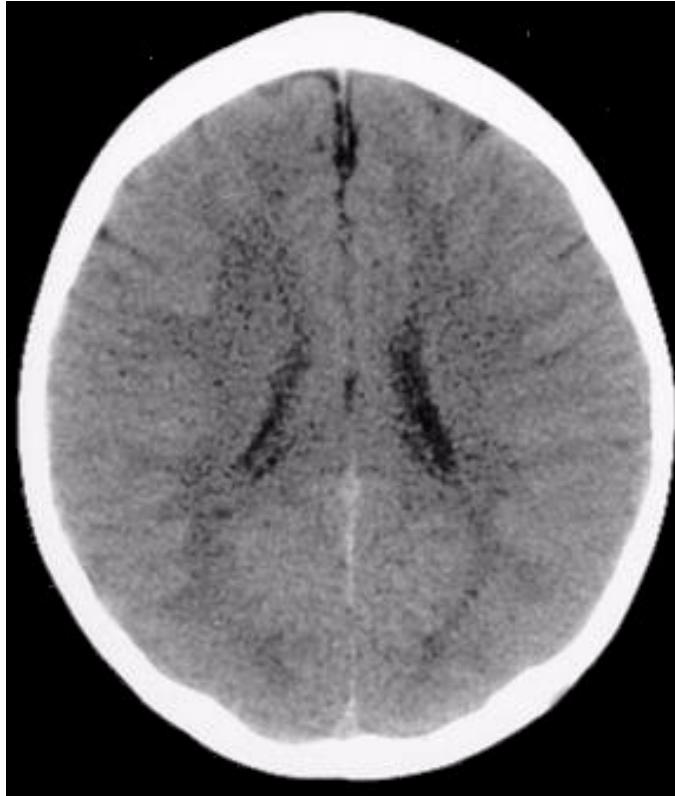


Normal



Extreme Neglect

# 3 Year Old Children



Normal

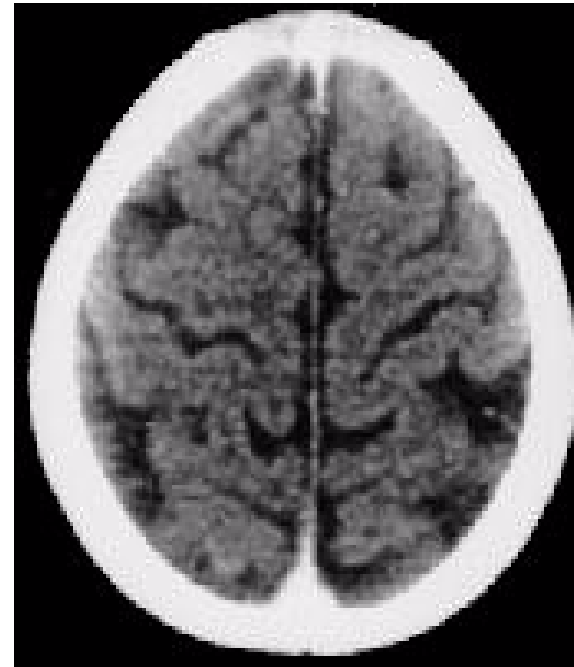


Extreme Neglect

# 3 Year Old Children



Normal



Extreme Neglect

# Basically

- Trauma makes children's brains act primal
- Regresses to brainstem level functions



# Trauma Dramatically Impacts Biological Systems

- Genetic Expression
- Sensory Processing
- Insulin Receptors
- Neurotransmitter Systems
- Serotonin Transporter
- Dopamine Systems
- Brain Development



# Dysregulation

- State of stress
- Thinking is distorted
- Time sense is distorted
- Short-term memory suppressed
- Regress to younger emotional age
- Regress to lower level brain functions



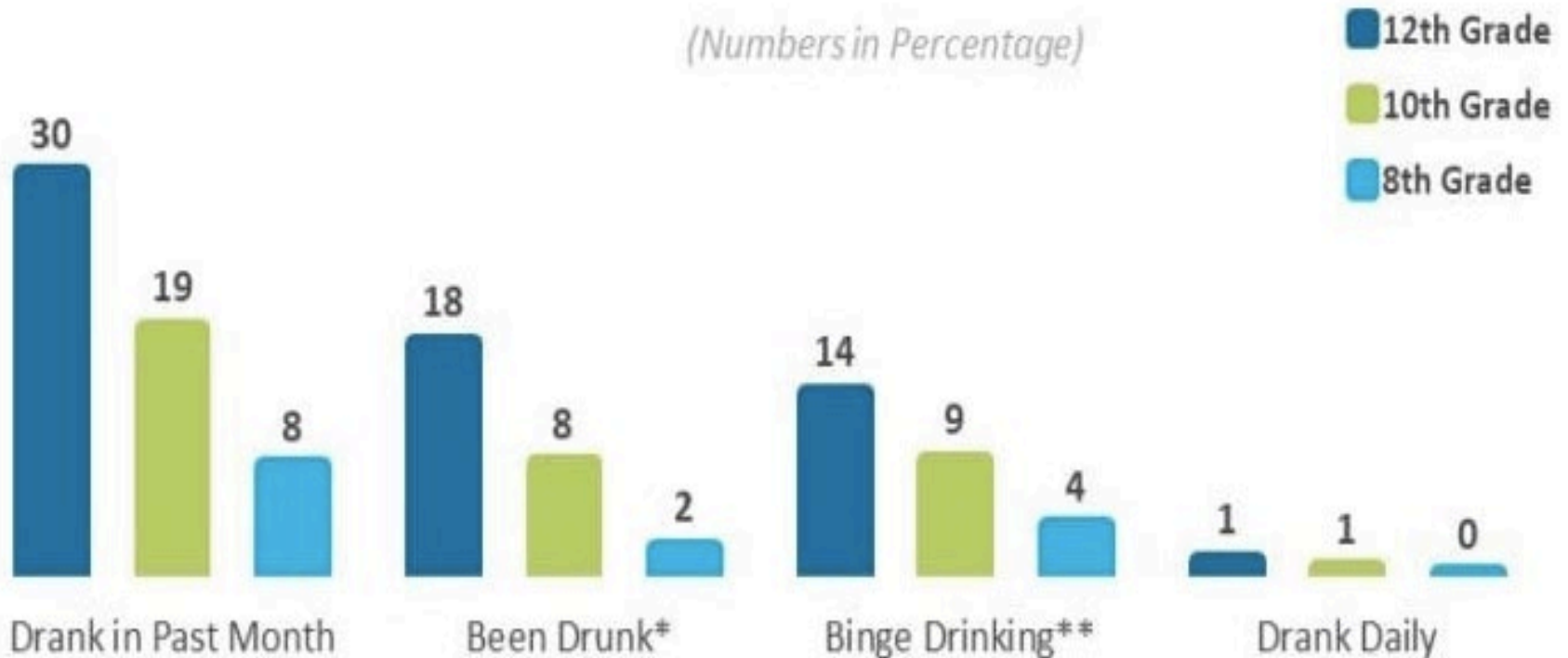
# Chemical Dependency





# Reported Drinking Patterns Among 8<sup>th</sup>, 10<sup>th</sup> and 12<sup>th</sup> Grade Students: 2018

(Numbers in Percentage)



Source: NIDA, *National Survey Results on Drug Use from the Monitoring The Future Study*, Vol. II Miech, R., et al, U. of Michigan, 12/18

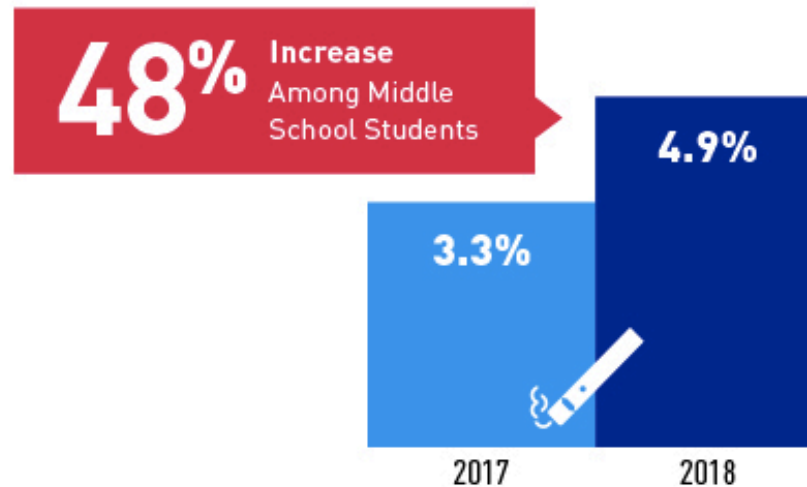
Note: Author state language on the 93/94 survey changed slightly.

\* Been drunk in the previous 30 days. \*\* Five or more drinks in a row in the previous two weeks.



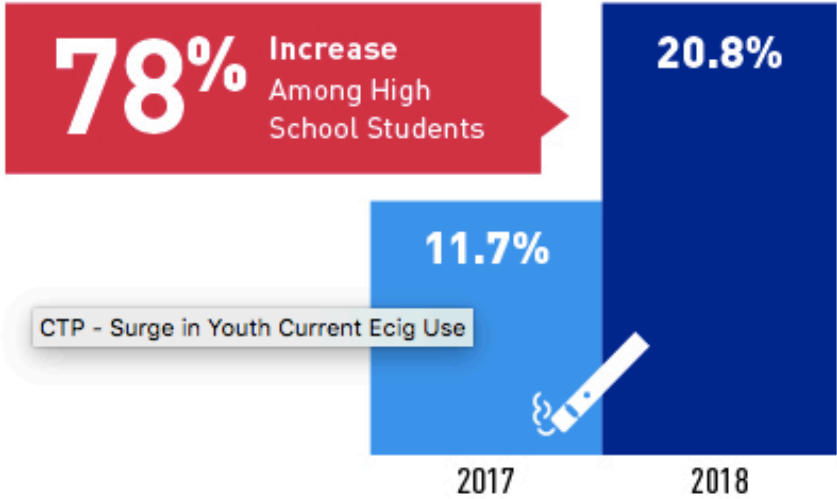
## E-cigarette Use Among Middle School Students

### SURGE IN YOUTH CURRENT E-CIGARETTE USE



# E-cigarette Use among High School Students

## SURGE IN YOUTH CURRENT E-CIGARETTE USE



Top Drugs Past 30 days 2017	12 <sup>th</sup> Grade	10 <sup>th</sup> Grade	8th Grade
Alcohol	33.2%	19.7%	8%
Been drunk	19.1%	8.9%	2.2%
Any illicit drugs or inhalants	19.1%	18.1%	8.8%
Marijuana	22.9%	15.7%	5.5%
Amphetamines	2.6%	2.5%	1.7%

National Institute on Drug Abuse

# Some Consequences To Teen Substance Use:

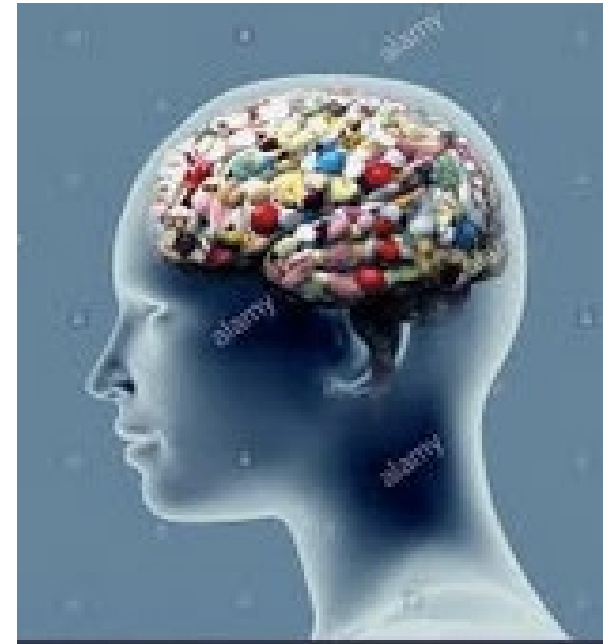
- **Auto Accidents** – 7-fold increased risk to be in an alcohol-related car crash.
- **Sexual Assault** – 89% of victims self-report drinking prior to the assault.
- **Violence** – Roughly half of both assailants and victims admit to using alcohol or drugs before the incident.

National Institute on Drug Abuse

# What do drugs do to your brain?

Different drugs different results

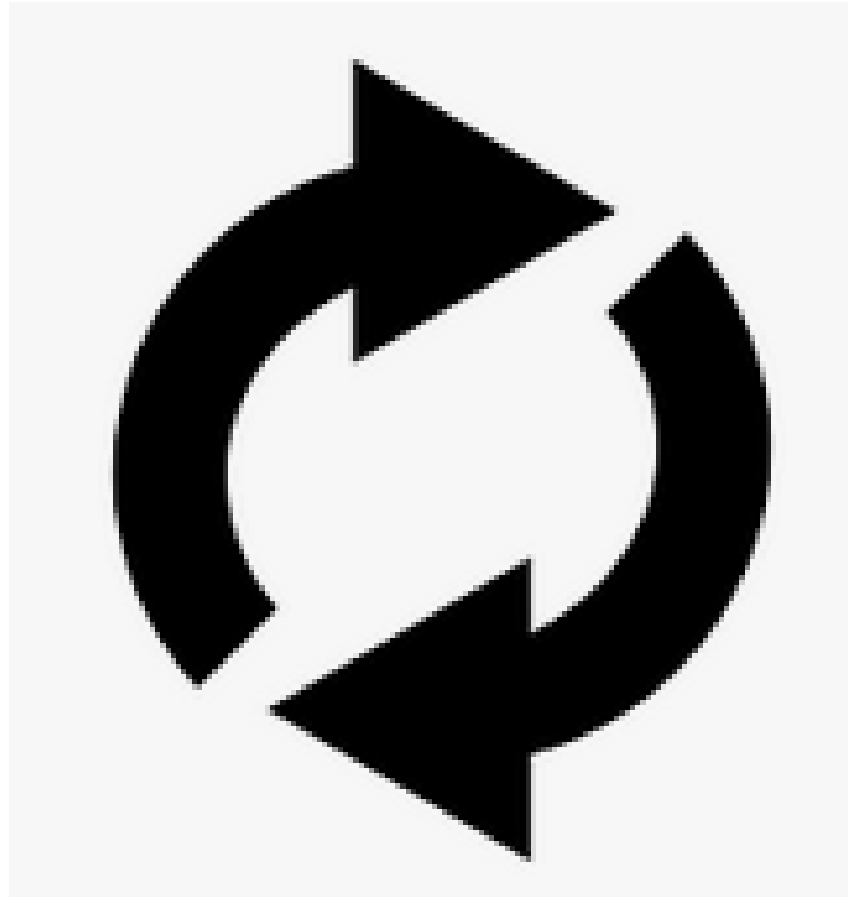
One common thread:  
They alter the  
mesolimbic  
pathway (reward pathway)



Brains are wired for survival

Brains connect activities with feeling good

Reward circuit is kick-started brain notes this needs to be remembered, and teaches us to do it again and again



# Drugs “highjack” Neural Circuitry

Repeated drug use-brain adjusts to the surges of dopamine (reduces dopamine receptors and makes less)

**Like turning volume down on dopamine signal**

## Result:

Ability to feel pleasure is reduced

Person feels flat, lifeless and depressed needs the drug to feel good again.





# Teen Drug Experimentation

Half of all new drug users are under the age of 18.

Experimentation plays the biggest role in teenage drug use.

Experimentation is a fact of life and just because a teen has tried drugs or alcohol doesn't mean they will become an addict..

Although we know what happens to the brain when someone becomes addicted, we can't predict how many times a person must use a drug before becoming addicted.

A combination of factors related to your genes, environment, and your personal development increases the chance that taking drugs will lead to addiction.

Teens who abuse drugs may have a greater risk of developing an addiction when they are adults.

It's important to know the difference between drug abuse and addiction. Many teens experiment with drugs, but aren't addicted.

**Teen drug abuse can have long-term cognitive and behavioral effects since the teenage brain is still developing.**

# Common reasons teens abuse drugs include:



CURIOSITY



PEER  
PRESSURE



STRESS



EMOTIONAL  
STRUGGLES



A DESIRE TO  
ESCAPE

# Some common signs of teen drug abuse include:

Bad grades

Bloodshot eyes

Laughing for no reason

Loss of interest in activities

Poor hygiene

Diminished personal appearance

Avoiding eye contact

Frequent hunger or “munchies”

Smell of smoke on breath or clothes

Secretive behavior

Unusual tiredness

Missing curfew

# Prevention Of Substance Abuse/Chemical Dependence

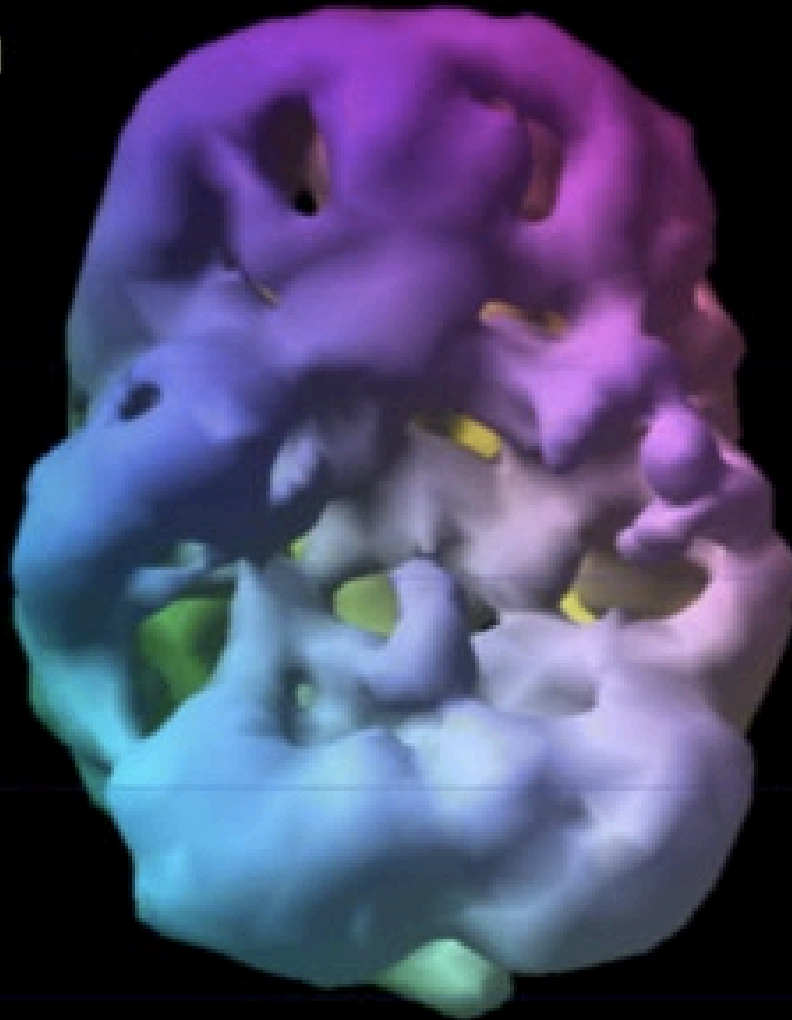
**School-based  
prevention  
programs**

**Community-  
based  
prevention  
programs**

**Family-  
focused  
prevention  
programs**

## Drug user's brain from the under side

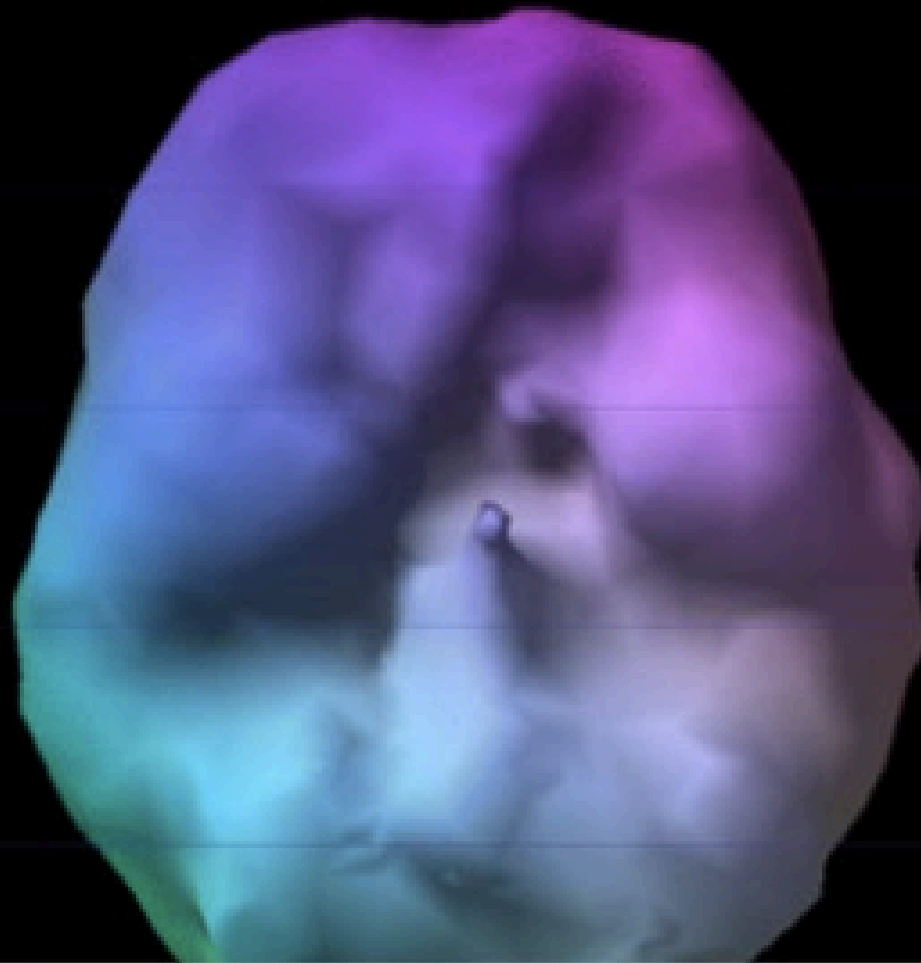
AMEN CLINIC BRAIN  
SPECT GALLERY



[http://www.amenclinic.com/bp/spect\\_rotations/viewimage.php?img=da\\_CS.gif](http://www.amenclinic.com/bp/spect_rotations/viewimage.php?img=da_CS.gif)

# Healthy brain from the underside

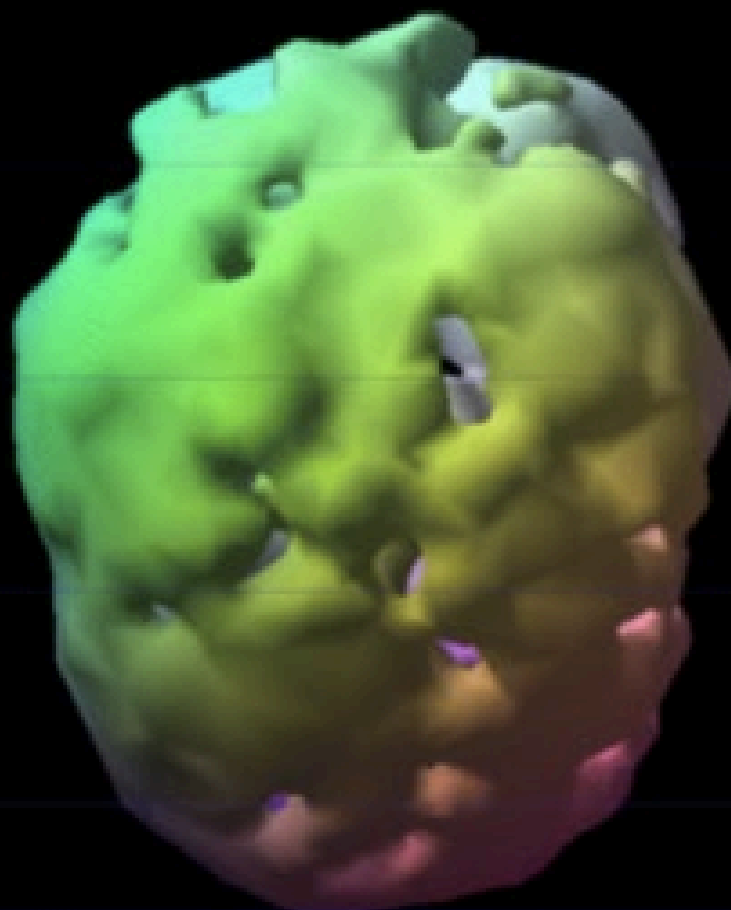
AMEN CLINIC BRAIN  
SPECT GALLERY





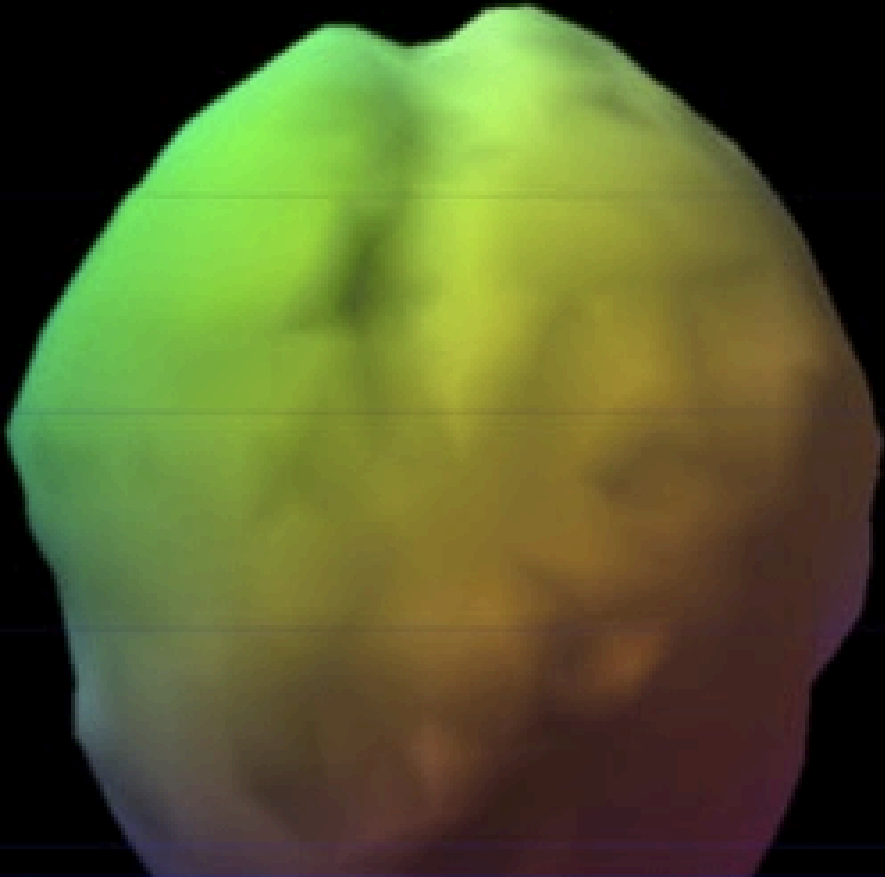
## Drug user's brain from the top

AMEN CLINIC BRAIN  
SPECT GALLERY



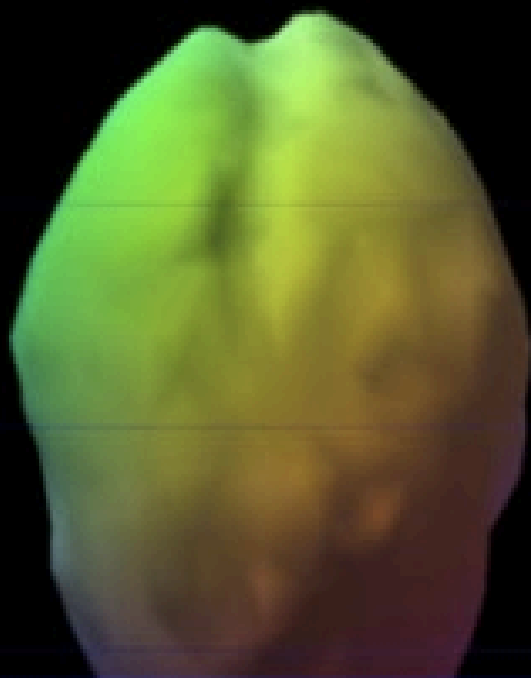
Healthy brain from the top

AMEN CLINIC BRAIN  
SPECT GALLERY

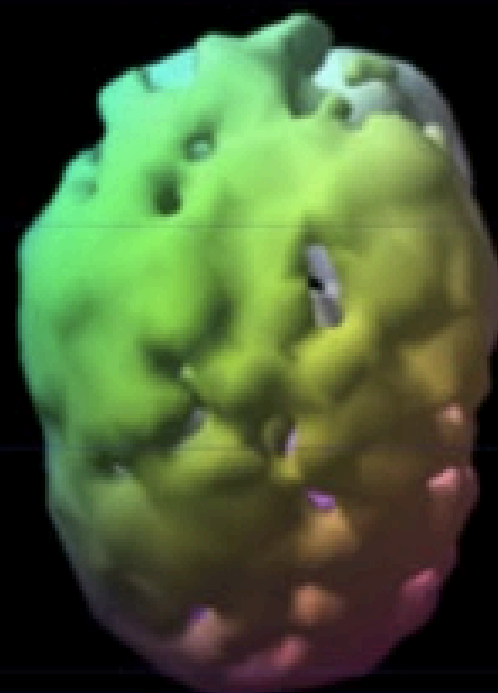


# Side by Side

Healthy




Drug User



# WHICH BRAIN DO YOU WANT?



4 YEARS OF  
ALCOHOL



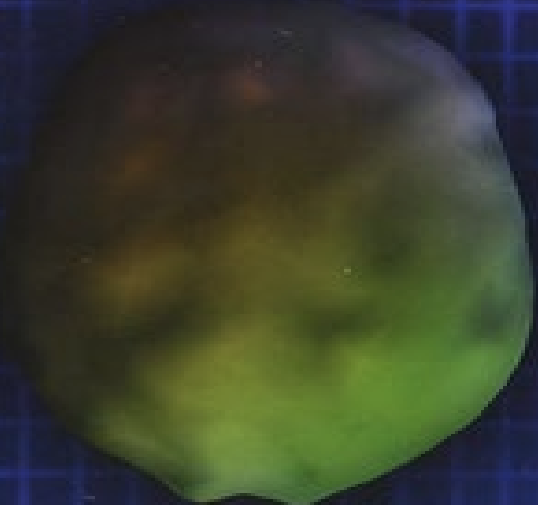
2 YEARS OF  
MARIJUANA



2 YEARS OF  
INHALANTS



3 YEARS OF  
COCAINE



HEALTHY, DRUG-FREE BRAIN  
S.P.E.C.T. SCAN

DANIEL AMEN, M.D.

# What Can Educators Do?



# Building a Great Human Being: Empathy, Gratitude, Resiliency



# Brain plasticity...



## Rewire your brain

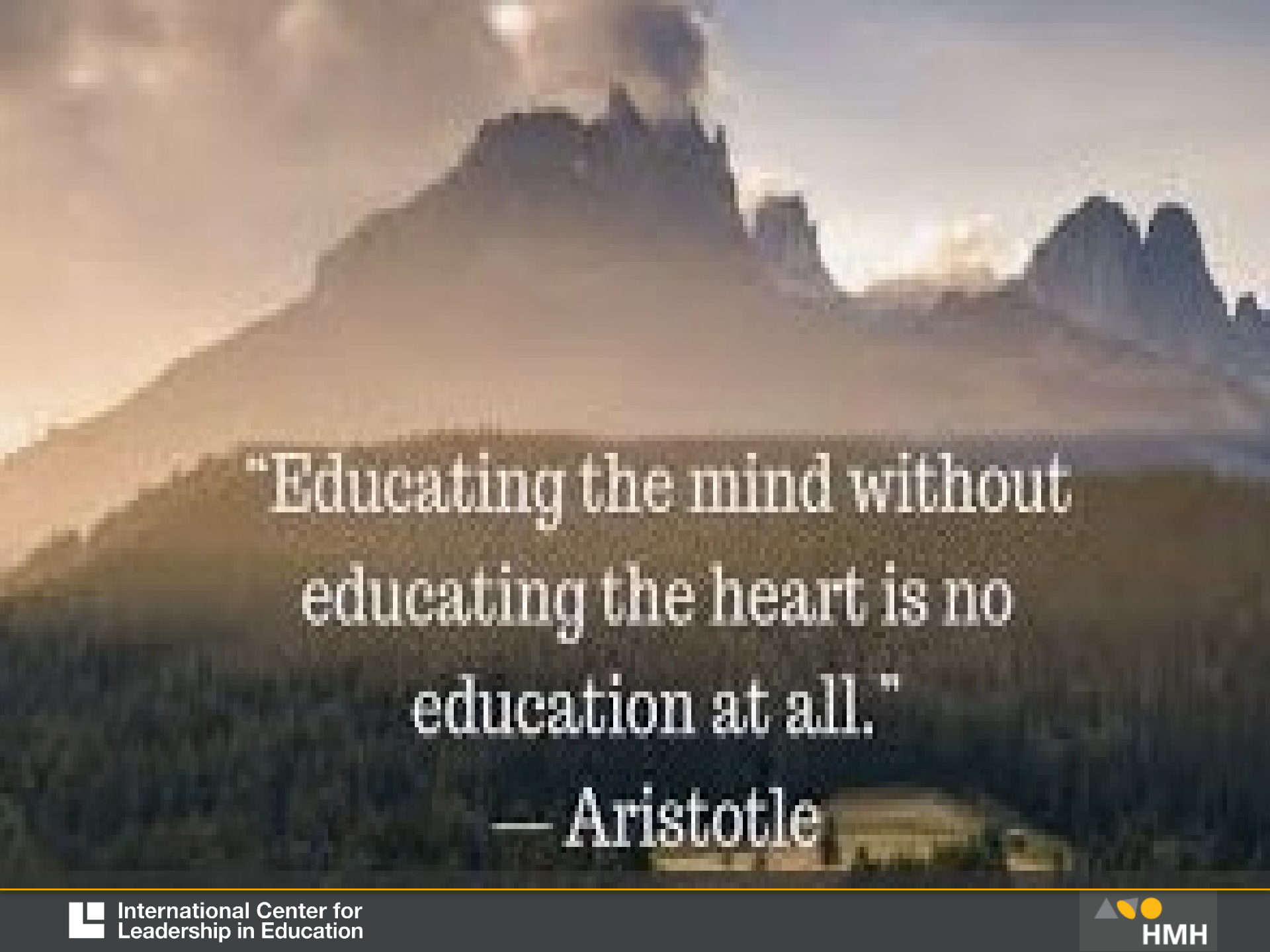
*(literally!)*

# What is Brain Plasticity?

- Brain (neuro) Plasticity (Introduced in 1949 but really understood in recent yrs):
- **The brain changes throughout life**
  - slower rate as we age
  - brain alters (it physically and chemically changes) in response to what it experiences
  - by learning new information, we can reshape our brain via changes at nerve cell level
  - thinking, learning, acting change the brain's functioning and its structure
  - We used to think the brain matured in adolescence and that was the end of growth (not so); changes are lifelong





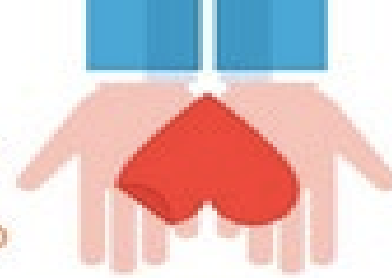


“Educating the mind without  
educating the heart is no  
education at all.”

— Aristotle

# 10 Letters to Live By

Alphabet of the Heart ©



**Compassion:**

Open your heart and be compassionate to yourself and others.

**Dignity:**

Recognize the dignity of every human being.

**Equanimity:**

While acknowledging the ups and downs, try to find an even keel.

**Forgiveness:**

Give forgiveness to those who have failed you or made you angry.

**GratITUDE:**

Keep in the front of your mind gratitude for all that you have.

**Humility:**

Remember that you are no better and no worse than others you encounter.

**Integrity:**

Value honesty and integrity and use it to guide your actions.

**Justice:**

Acknowledge your obligations to those who are most vulnerable.

**Kindness:**

Kindness does not require suffering; only the recognition of another's humanity.

**Love:**

And finally Love which contains and binds all. Let your heart be open to love yourself and give love freely to others.

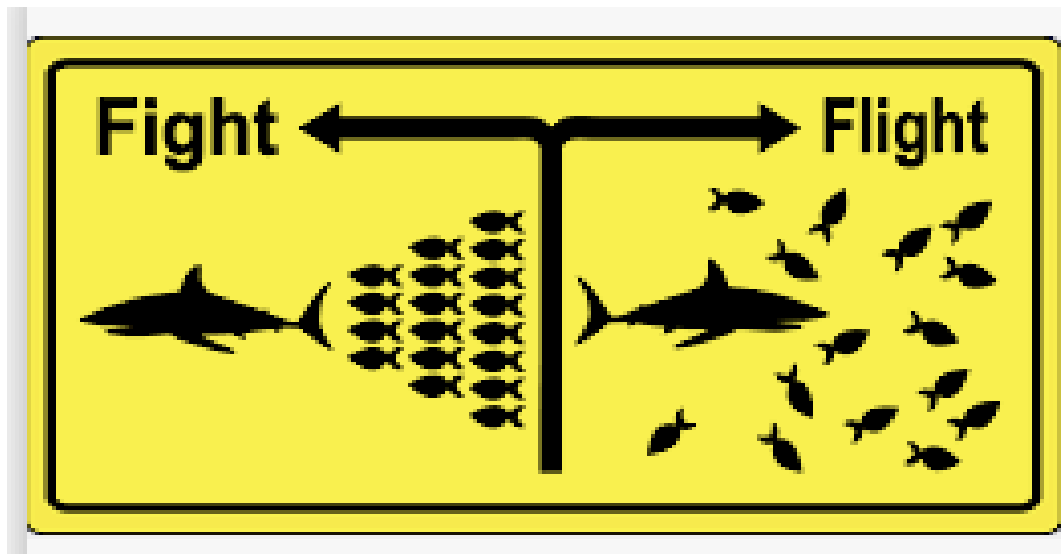
James R. Doty MD

James R. Doty, M.D., founder and director of the Center for Compassion and Altruism Research and Education (CCARE) at Stanford University

# The Biology of NOT Belonging

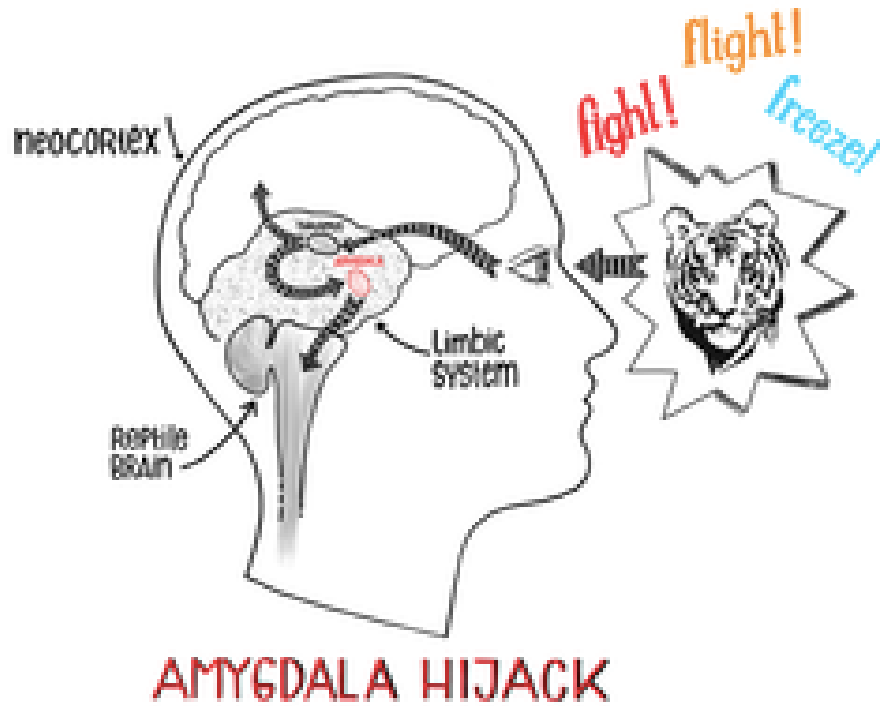
Perceived Threat Response

Amygdala hijack—Fight, flight, freeze



# The Biology of NOT Belonging

“Social pain activates the same region of the brain that signals physical pain.”



“We are all neurobiologically wired for social connection and attachment to others.”

Dr. Lori Desautels, “Brains in Pain Cannot Learn”

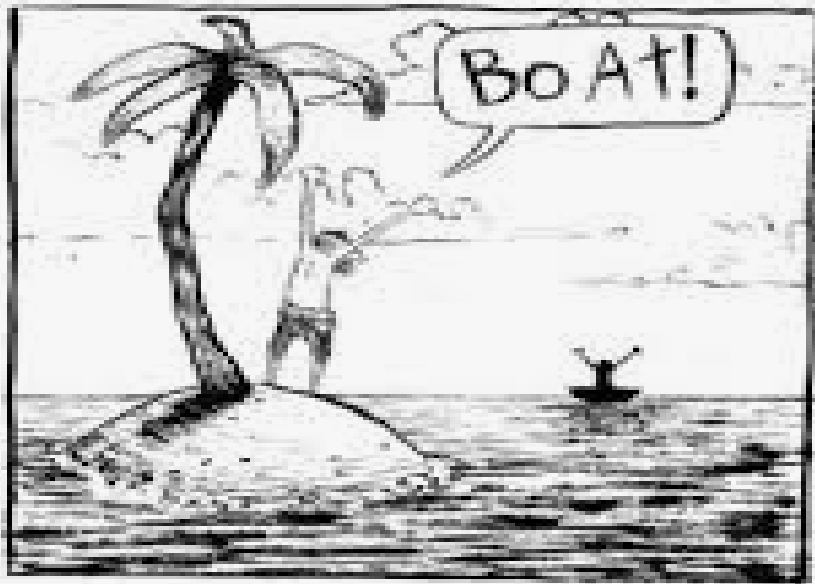
# You have to Maslow before you Bloom

## MASLOW'S HIERARCHY OF NEEDS



# Cognitive Empathy

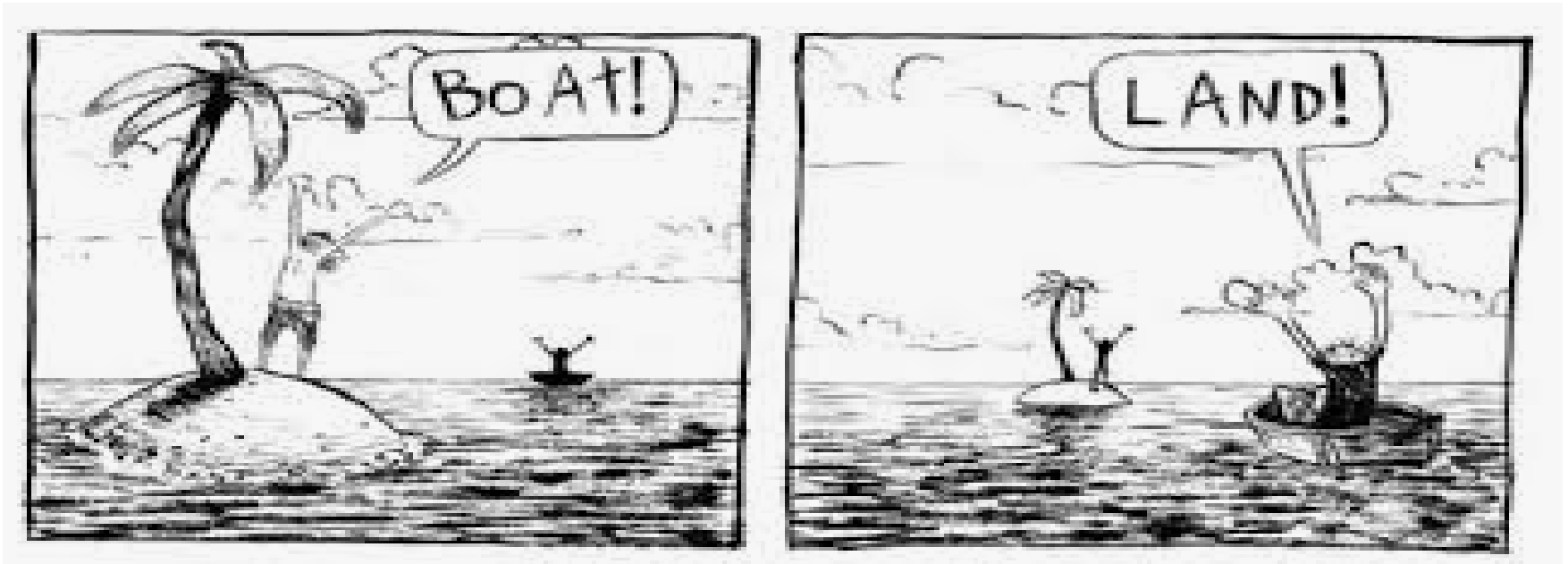
Cognitive Empathy refers to our ability to label and understand other people's emotions, take their perspective, "stand in their shoes."





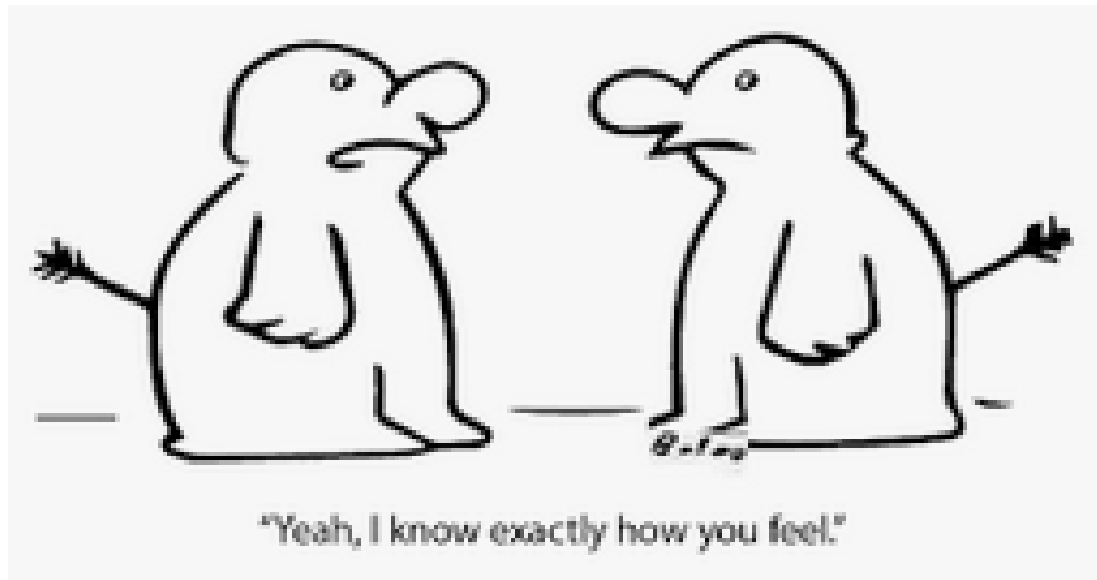
# Compassionate Empathy

“We not only understand a person’s predicament and feel with them, but we are spontaneously moved to help, if needed.”



# Affective Empathy

Affective empathy refers to the sensations and feeling we have in response to others' expressions.



# Build Empathy by Building Relationships





Gratitude

# Attitude of Gratitude & Appreciation

## The Power of Expressing Appreciation

Hey \_\_\_\_\_,

I just was thinking about you and I wanted to say thanks for \_\_\_\_\_. I really appreciated \_\_\_\_\_ because (say how it positively impacted you). I just wanted you to know.



# Linda's "Joy" Book



# Linda Jordan

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