The Teen Brain on Drugs, and What to do About It

Scott Caldwell, MA CSAC

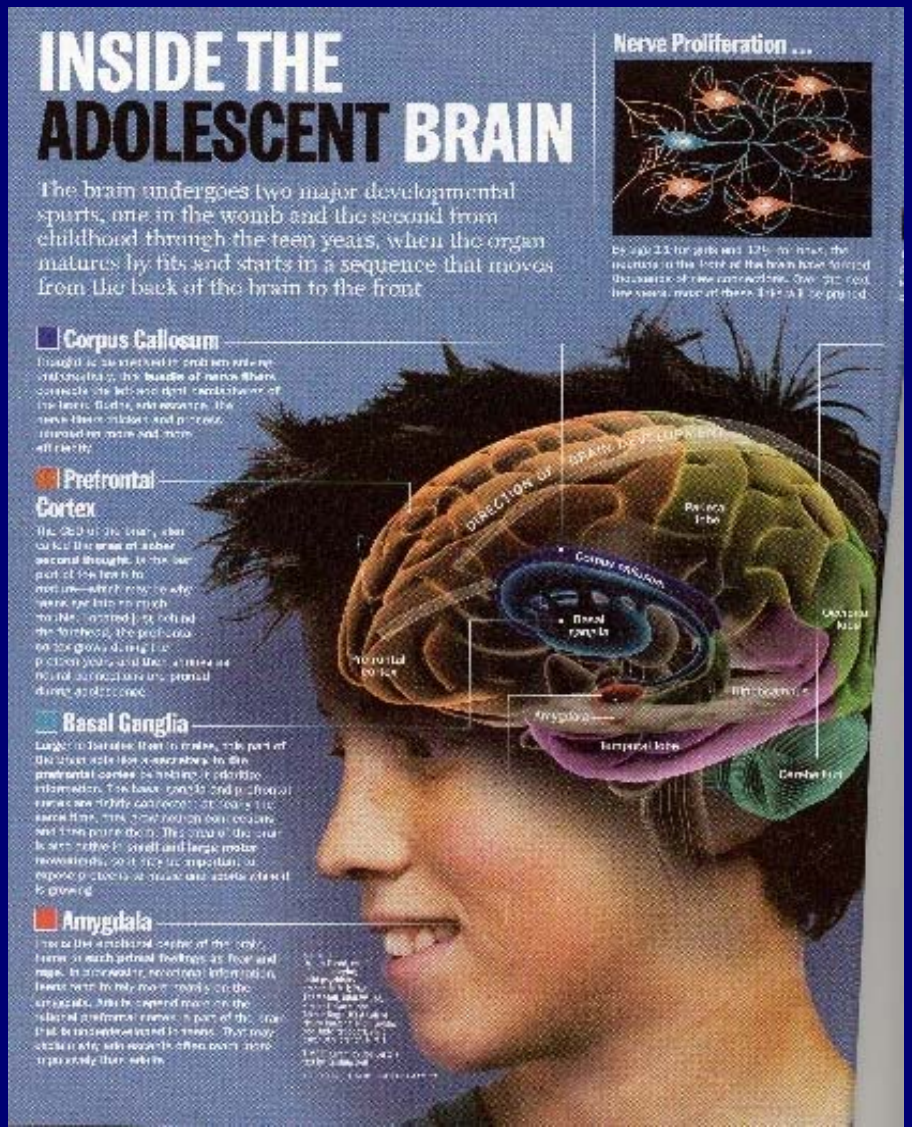
home of teens in control
Connections
COUNSELING

Presentation to WCCF's Juvenile Justice Conference
Madison, WI March 2010

Presentation outline:

I. The teen brain: Key neuroscience discoveries
II. Teens, AOD involvement, and juvenile justice: Overview
III. Effective AOD interventions
IV. Neuroscience implications for best practices with AOD-involved teenagers

I. The Teen Brain: Key Neuroscience Discoveries



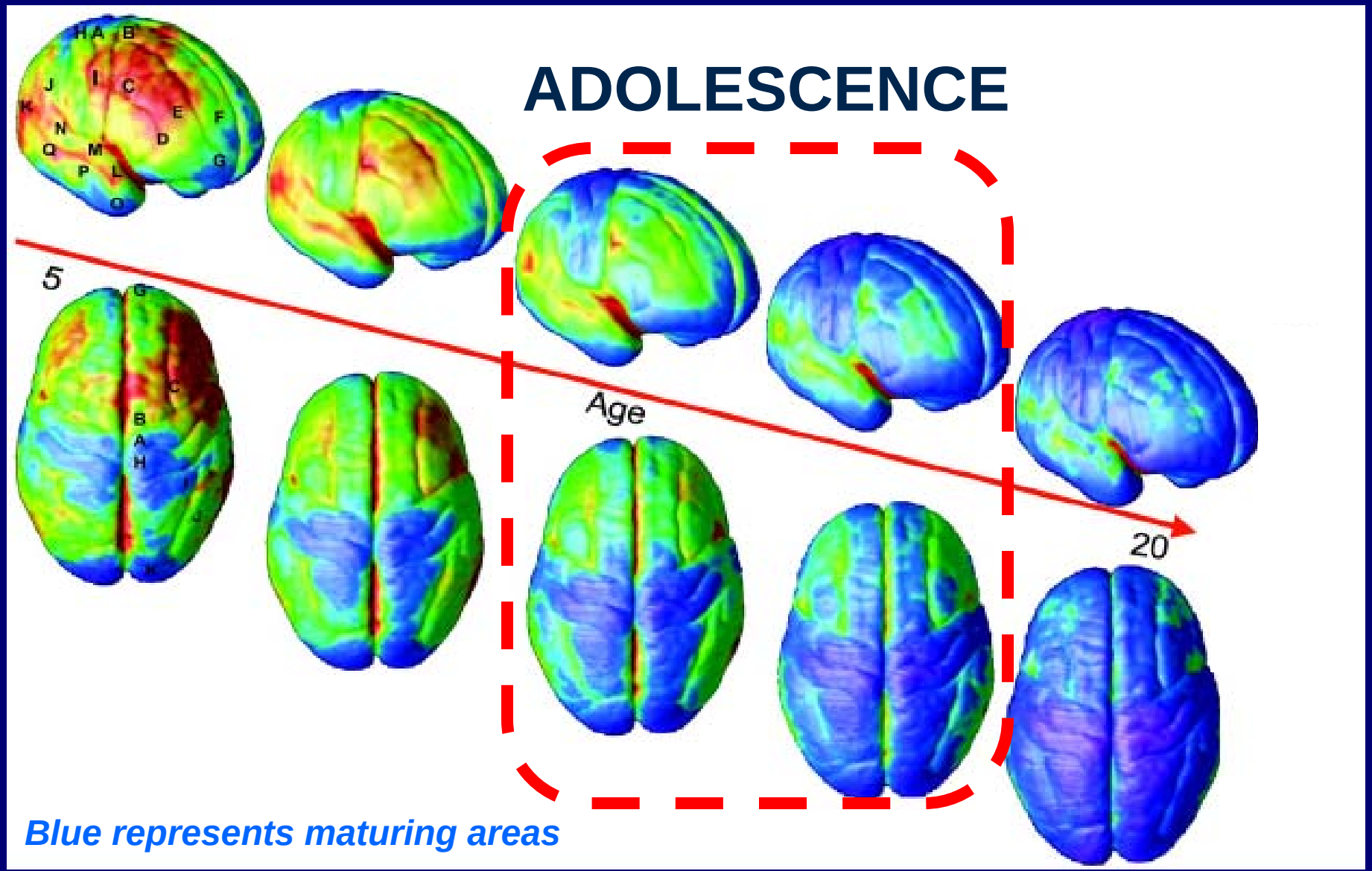
Imaging technology provides windows into the developing brain

Key findings:

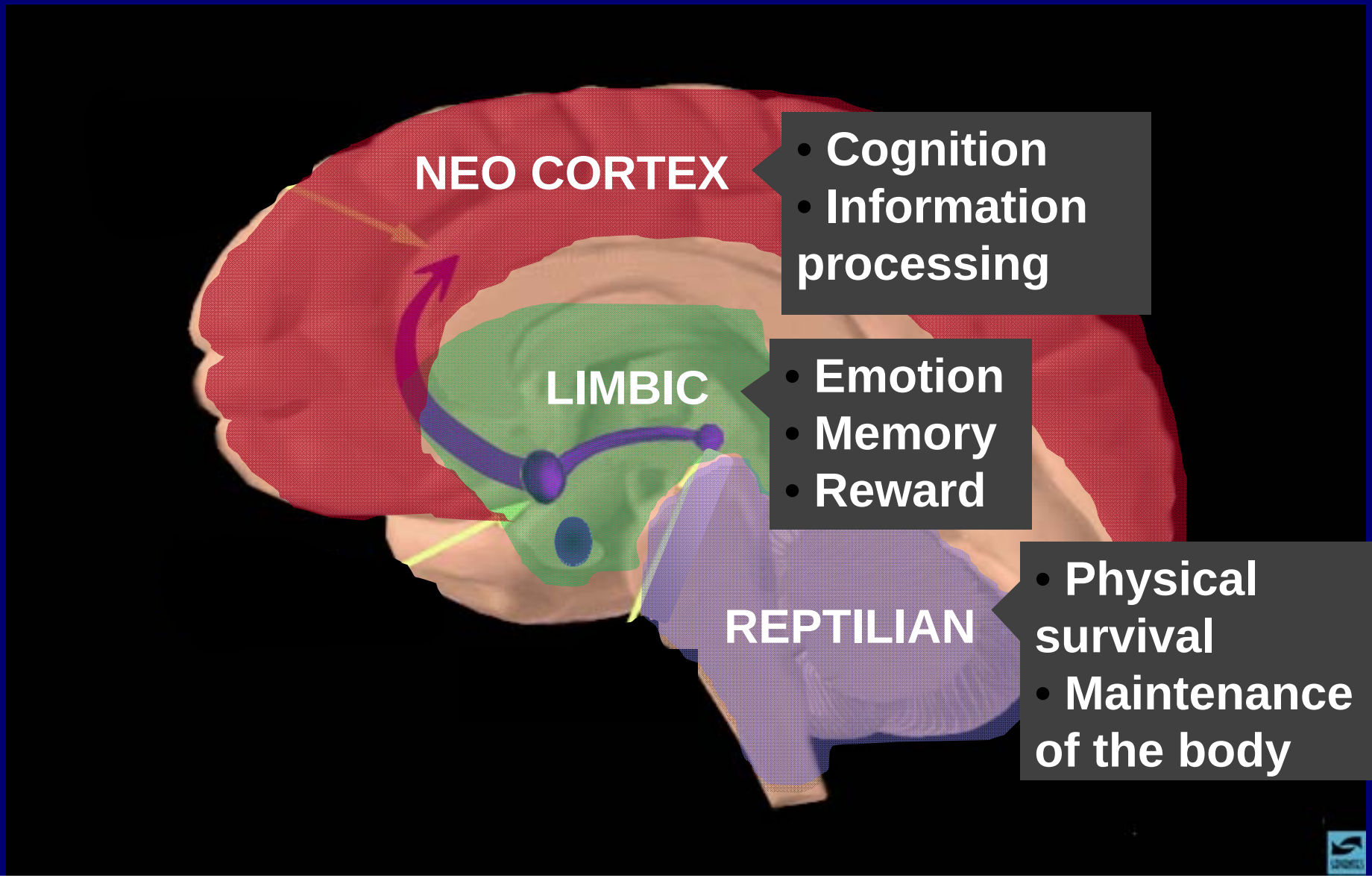
- Profound and unique brain maturation with the onset of adolescence

- Remodeling of basic structure

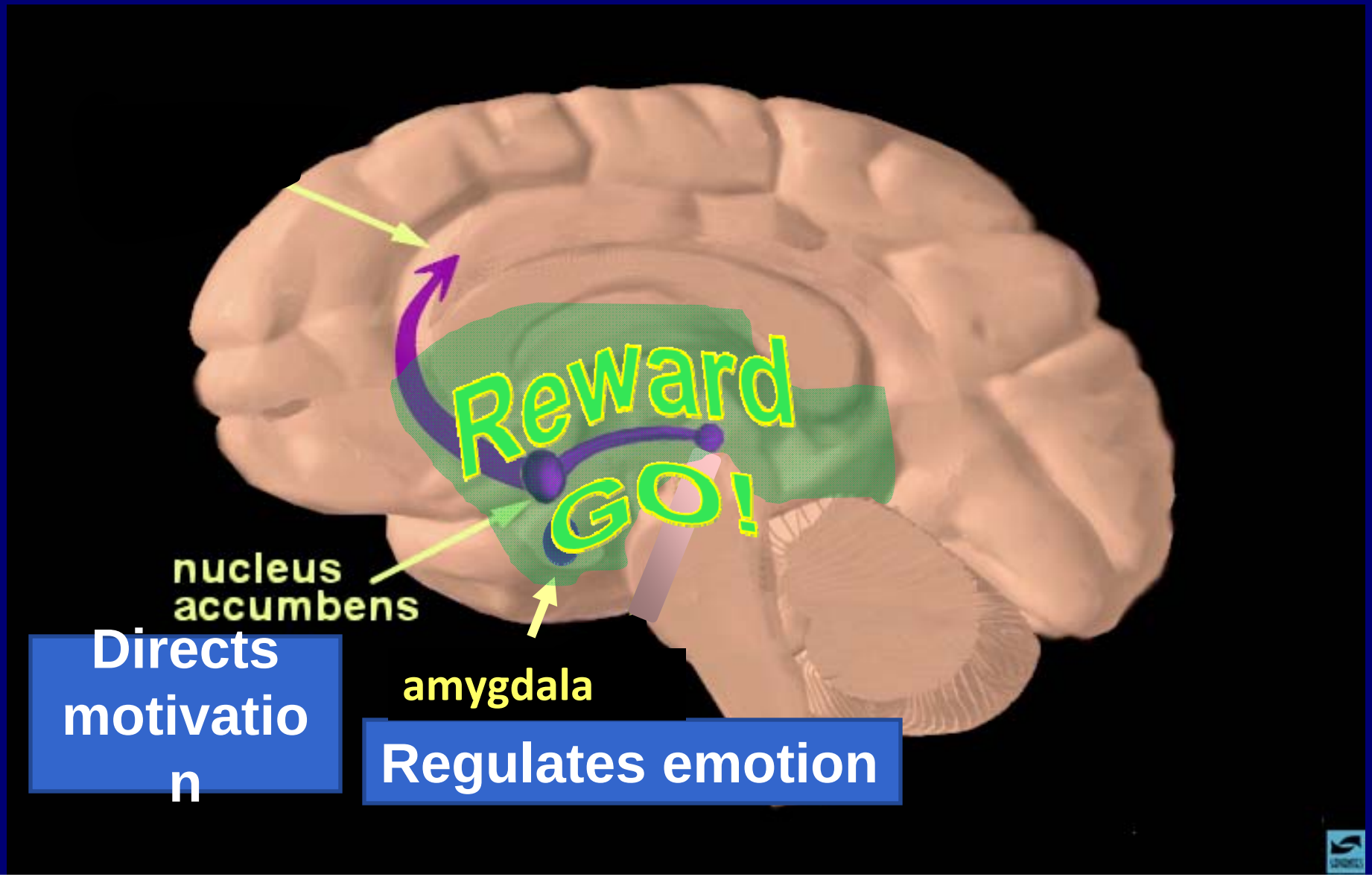
Human Brain Development



3-Brains-in-One



Limbic System: Key Structures

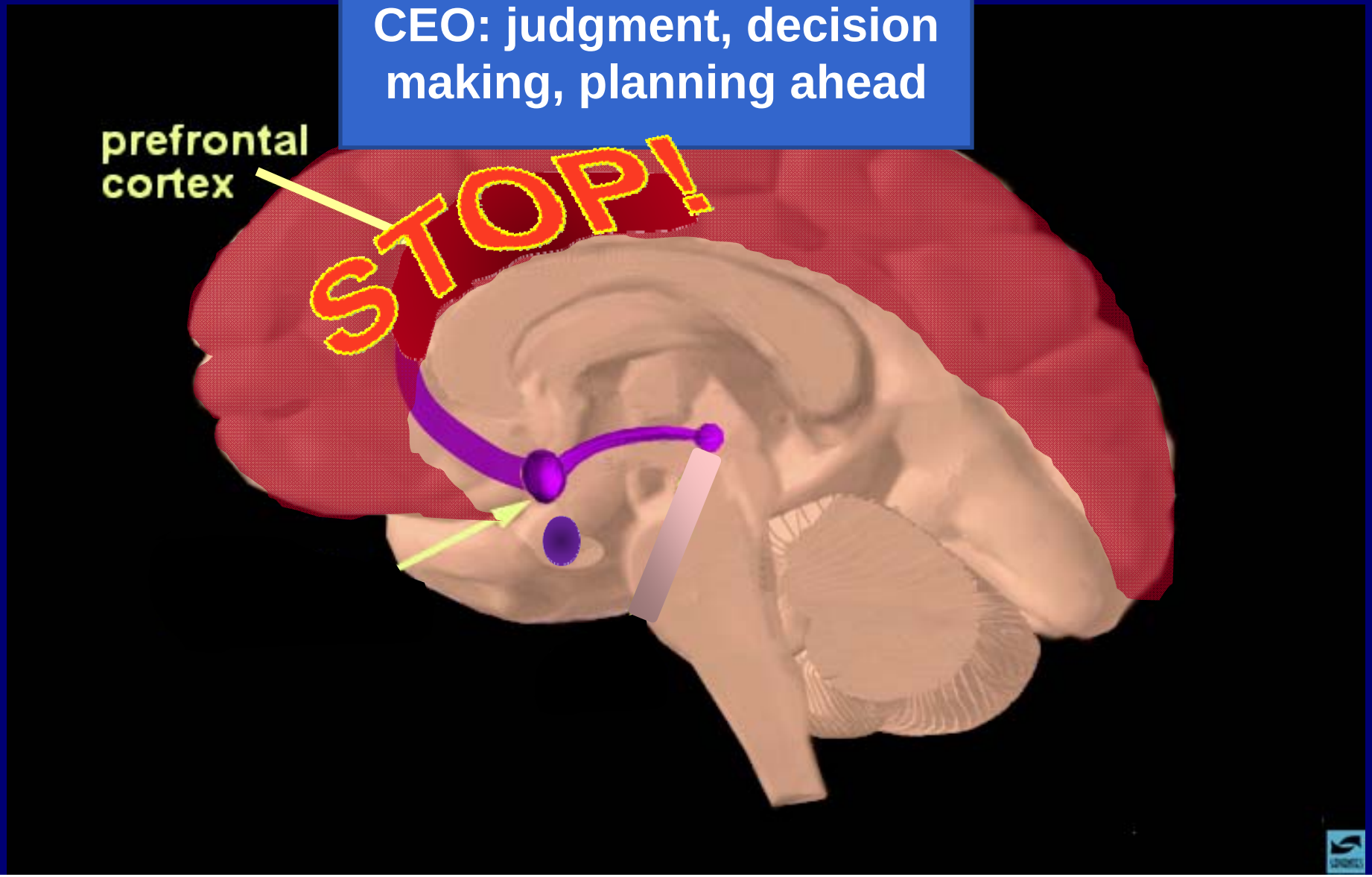


Limbic system during adolescence:

- Very active
- Relationships and reward (**GO!**) highly salient
- Still developing:
  - Motivation
  - Emotional regulation

Neocortex: Key Structure

CEO: judgment, decision making, planning ahead



Neocortex during adolescence:

- Critical thinking and abstract reasoning skills come online
- However, underdeveloped brakes (**STOP!**)
- Prefrontal cortex is the last area to fully develop

Key findings:

- Profound and unique brain maturation with the onset of adolescence
- Remodeling of basic structure
- The brain does not reach full maturity until about age 25!

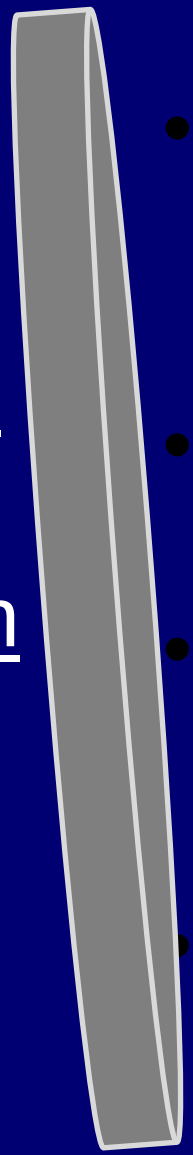
Why do most 16-year-olds drive like they're *missing a part of their brain?*

BECAUSE THEY ARE.

Auto insurance ad in *Wall Street Journal* February 2009

Brains & Behavior: Two sides of the same coin

- Active limbic brain
- Limits to emotional regulation
- Limits to motivation
- Still-developing prefrontal cortex



- Social connections, strong value on friends
- Moodiness, quick to anger, **hot** emotions
- Propensity for low effort, high excitement activities
- Increased risk taking, decreased planning ahead

AOD use amplifies the vulnerabilities.

II. Young People, AOD Involvement, and Juvenile Justice: Overview

Young people, AOD involvement, and juvenile justice:

- High rates of AOD abuse/dependence

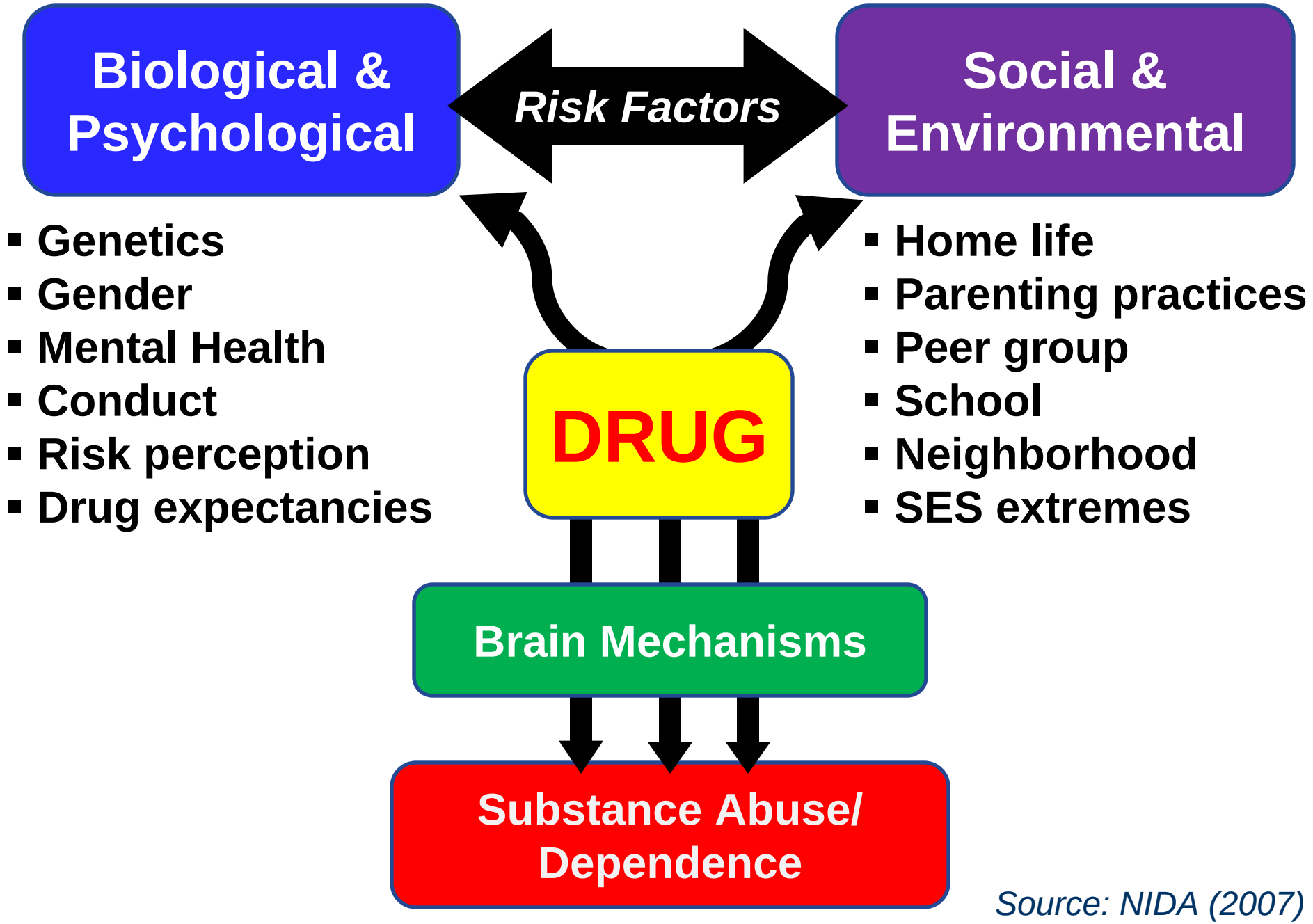
AOD Continuum of Use Severity

Source: Felgus et al. (2009)

Experimental use	Misuse	Abuse	Dependence
• Use initiation (typically alcohol) • Sporadic or infrequent use	• Use pattern and tolerance developing • Emerging consequences	• Use pattern and tolerance established • Recurrent consequences • Activities and peer choices narrow	•Use is central • Continued use despite severe consequences • Possible withdrawal • Co-occurring problems

Young people, AOD involvement, and juvenile justice:

- High rates of AOD abuse/dependence
- Multiple risk factors exist



Source: NIDA (2007)

Young people, AOD involvement, and juvenile justice:

- High rates of AOD abuse/dependence
- Multiple risk factors exist
- Alcohol and marijuana are most prevalent

Alcohol and teens:

- Binge drinking is the norm
- Greater risk taking
- Decreased health status
- Vulnerability for co-occurring problems
- Risk for cognitive deficits

Source: Clark (2004); Deas et al. (2000); Tapert et al. (2004/2005)

Binge drinking and the teen brain

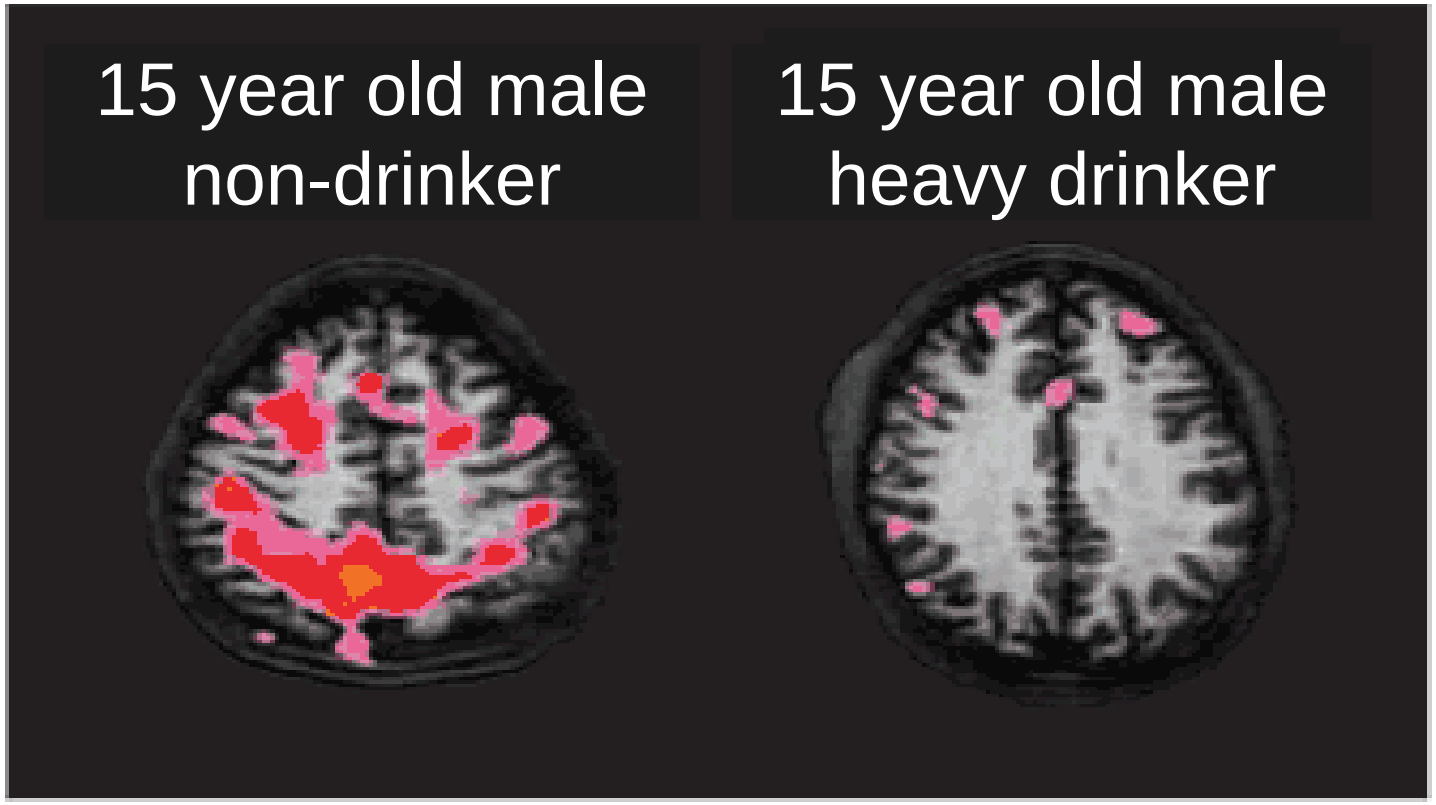
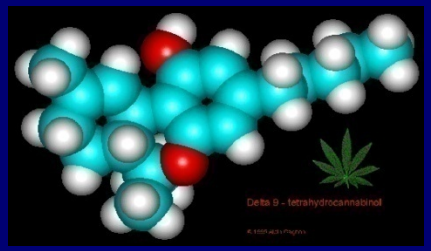


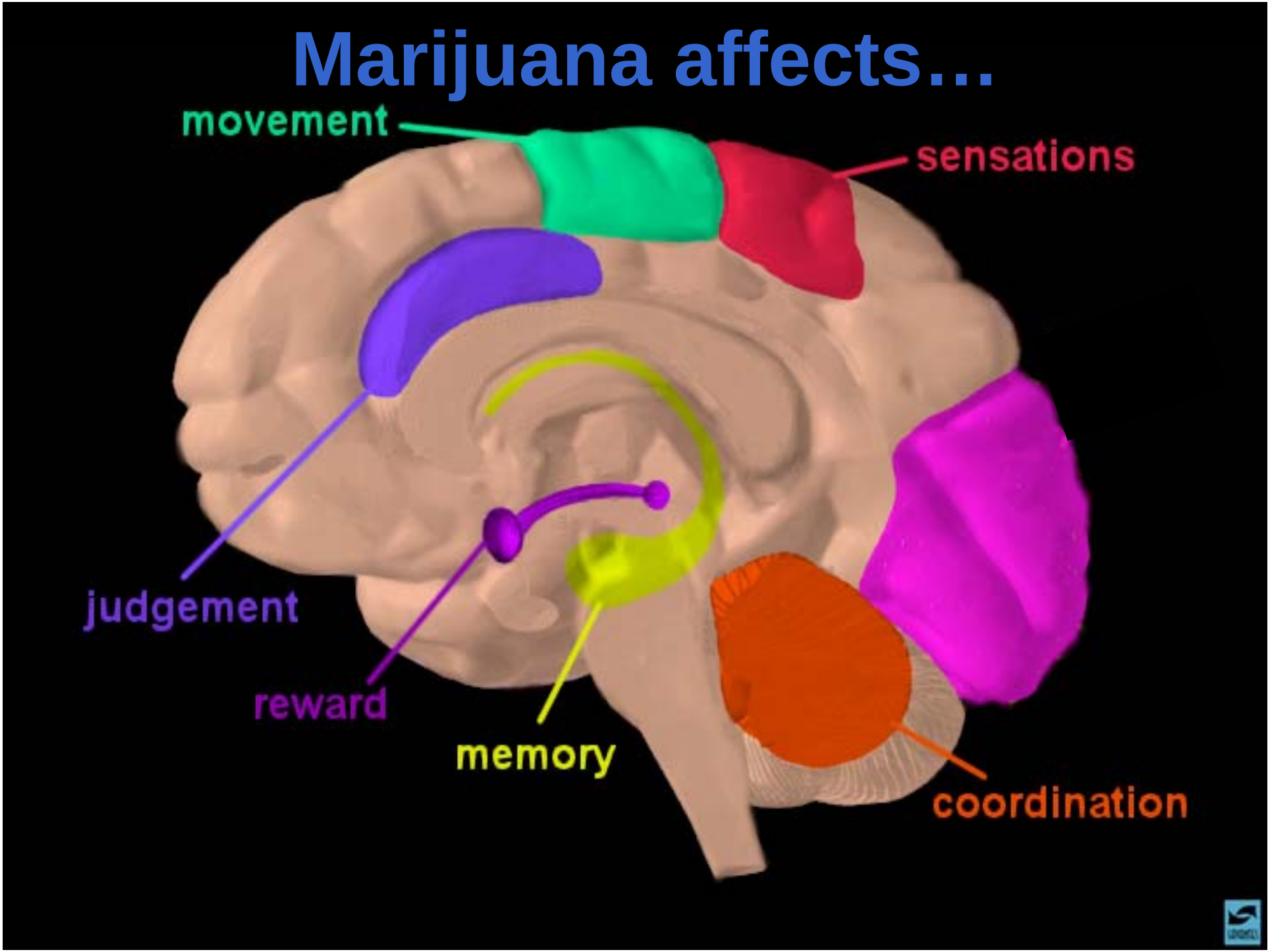
Image from Susan Tapert, PhD, University of California, San Diego.

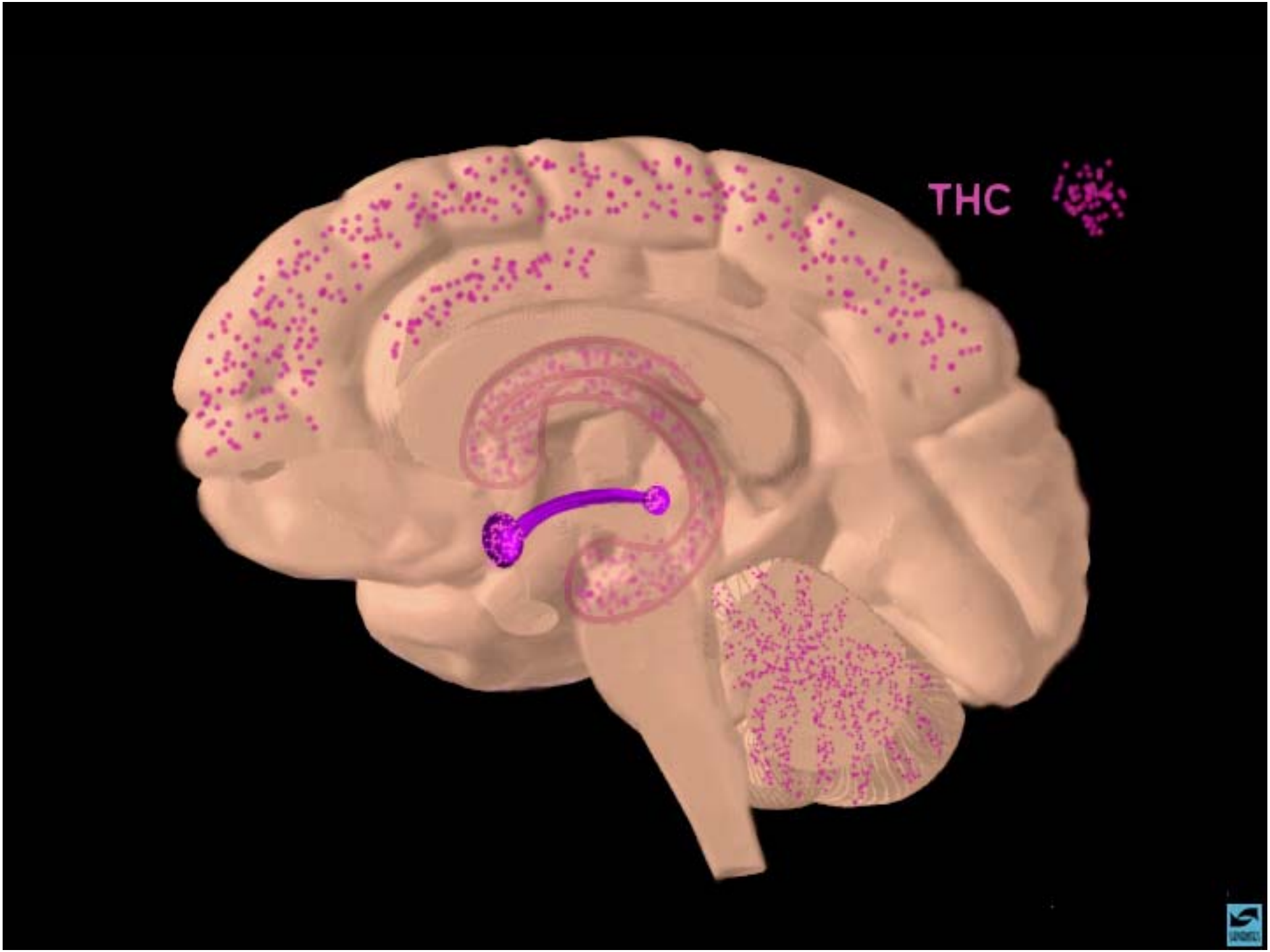
Marijuana and teens:



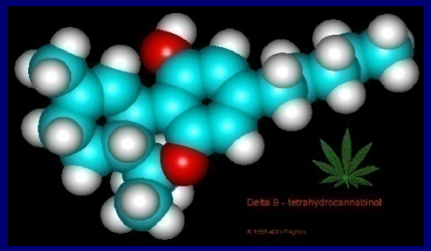
- Substantial increase in THC potency since the 1980s (Univ. of Miss. Marijuana Potency Monitoring Project)

Marijuana affects…




THC

Marijuana and teens:

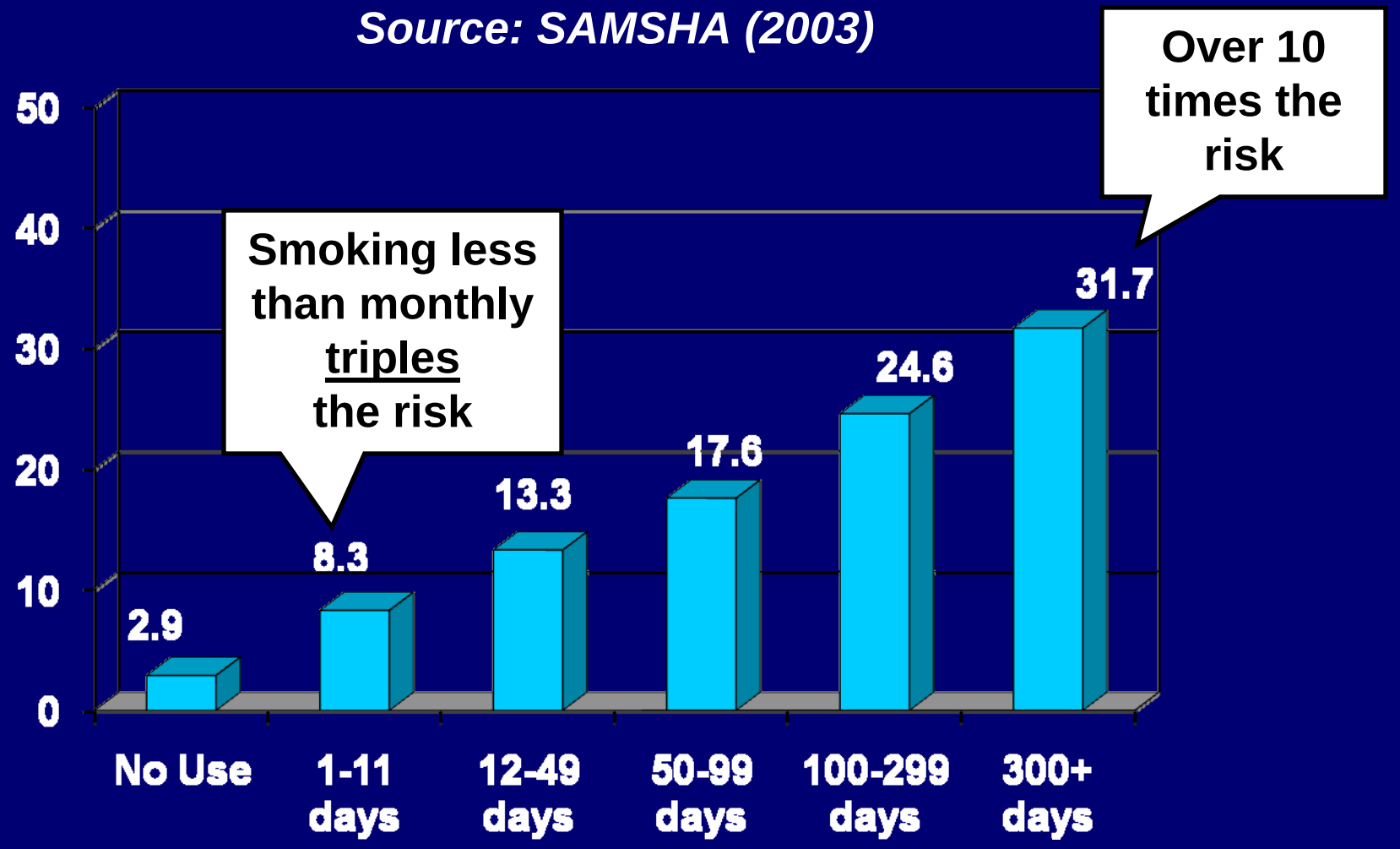


- Substantial increase in THC potency since the 1980s (Univ. of Miss. Marijuana Potency Monitoring Project)
- Rates of cannabis use disorders rising
- Effects associated with:
  - decreased immune system function
  - decreased motivation
  - poor academic achievement
  - delinquency and conduct problems

Source: Dennis et al. (2002); Fergusson & Boden (2008)

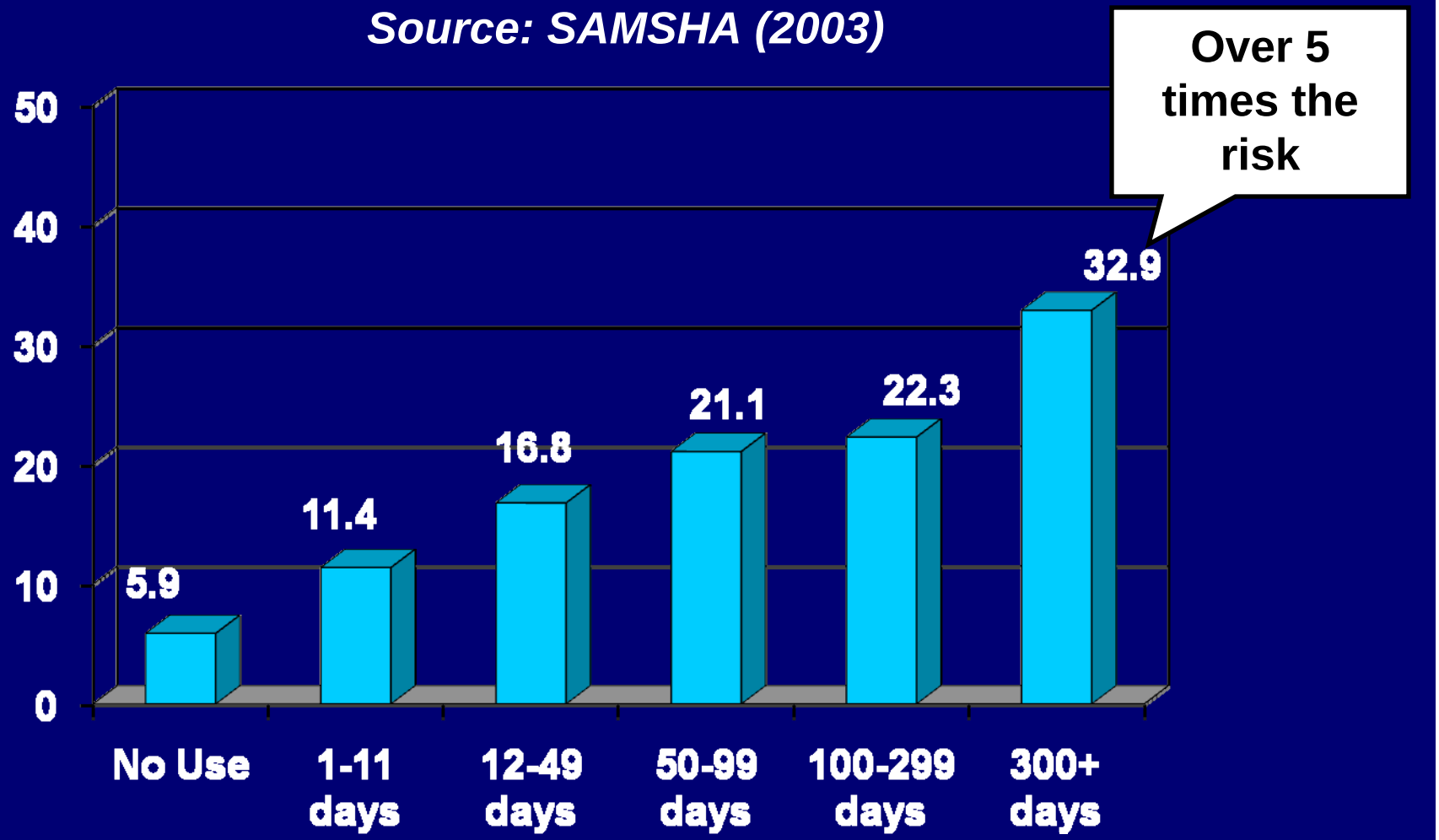
Percentages of those aged 12-17 who stole or tried to steal anything worth $50 or more

Source: SAMSHA (2003)



Percentages of those 12-17 who attacked someone with intent to seriously hurt

Source: SAMSHA (2003)



Cannabis abuse/dependence and teens:

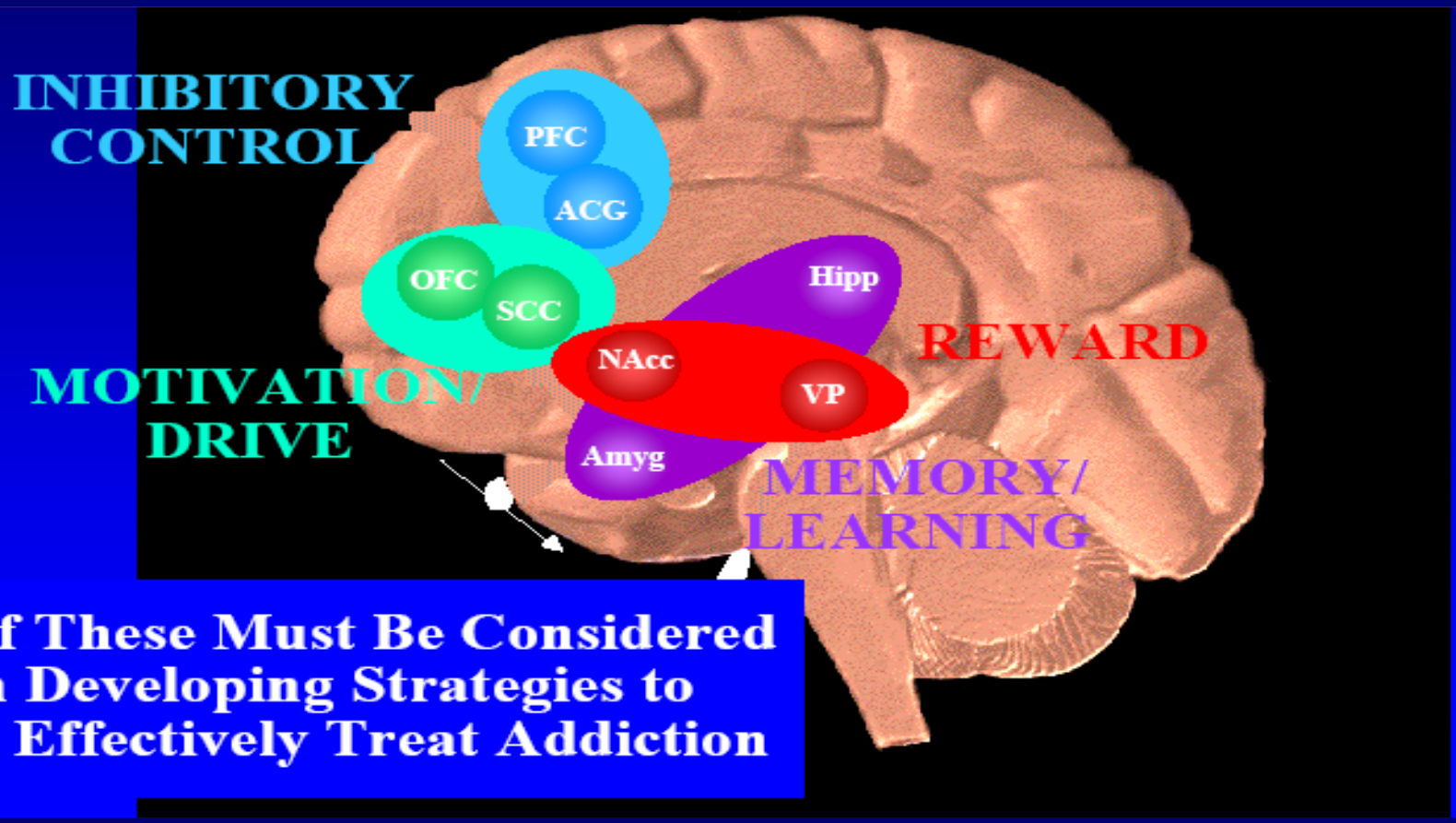
- Hijacks the developing brain
- Tolerance to effects
- Positive expectancies for effects
- Low problem recognition
- Narrowing activities and social relations
- Withdrawal is common when attempting to quit

Cannabis withdrawal prevalence (%) reported by adolescents in outpatient treatment

Source: Vandrey et al. (2005)

Withdrawal Symptom	Moderate – Severe Ratings
Craving	74%
Irritability	50%
Depressed mood	44%
Sleep difficulty	44%
Restlessness	36%
Increased anger	31%
Decreased appetite	27%
Physical symptoms	1% - 18%

The very brain systems developing during adolescence are implicated in addiction.



All of These Must Be Considered In Developing Strategies to Most Effectively Treat Addiction

Young people, AOD involvement, and juvenile justice:

- High rates of AOD abuse/dependence
- Multiple risk factors exist
- Alcohol and marijuana are most prevalent
- AOD use is a strong predictor of offending
- Entering the system is an opportunity for AOD intervention (*Source: Dennis, 2006*; over 40% of adolescent AOD treatment referrals in WI are from juvenile justice)

Evidence-based AOD interventions

Source: Deas (2008); Tripodi et al. (2010)

- Motivational Interviewing (MI), Motivation Enhancement Therapy (MET), Brief Intervention (BI)
  - 1-4 sessions
  - Non-judgmental and empathetic counseling style
  - Enhance motivation for change (readiness, ability)

Evidence-based AOD interventions

Source: Deas (2008); Tripodi et al. (2010)

- Motivational Interviewing (MI), Motivation Enhancement Therapy (MET), Brief Intervention (BI)
- Cognitive-Behavioral Therapy (CBT), Behavioral Therapy (BT)
  - Functional behavioral analysis
  - Identify triggers for AOD use
  - Skill building through self-monitoring and practice

Evidence-based AOD interventions

Source: Deas (2008); Tripodi et al. (2010)

- Motivational Interviewing (MI), Motivation Enhancement Therapy (MET), Brief Intervention (BI)
- Cognitive-Behavioral Therapy (CBT), Behavioral Therapy (BT)
- Contingency Management
    - Monitoring of AOD (e.g., drug testing)
    - Immediate response with positive reinforcement or consequence

Evidence-based AOD interventions

Source: Deas (2008); Tripodi et al. (2010)

- Motivational Interviewing (MI), Motivation Enhancement Therapy (MET), Brief Intervention (BI)
- Cognitive-Behavioral Therapy (CBT), Behavioral Therapy (BT)
- Contingency Management
- Family-based therapies
  - Target family-based risk factors
  - Change interactional patterns
  - Increase support and accountability

Ineffective AOD interventions with youth:

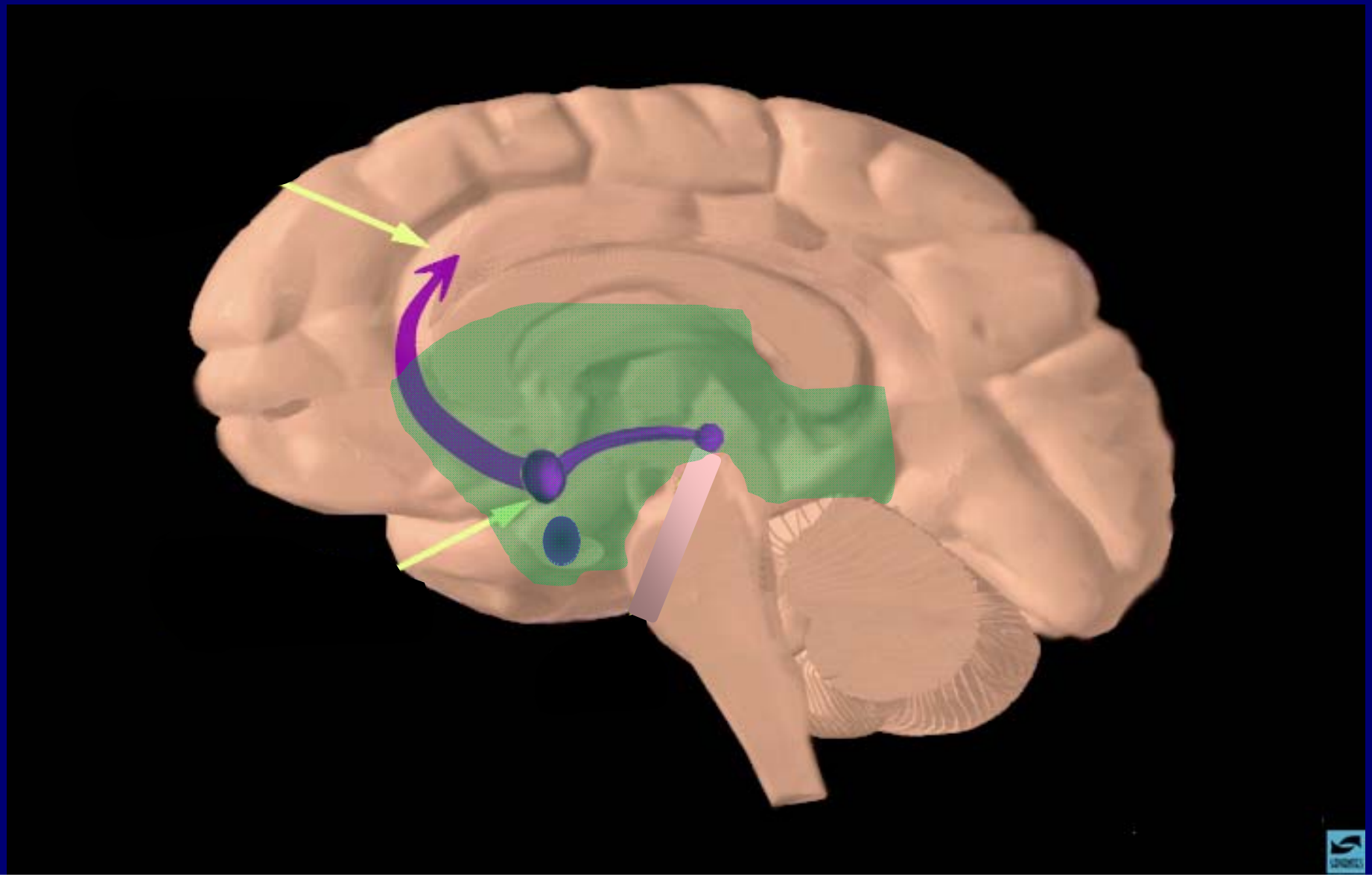
- Confrontation
- Scare tactics (“scared straight”)
- Education, films, lectures (D.A.R.E.)

Summary: What we know

1. The teen brain is a work in progress
2. The science of addiction highlights teen vulnerability to drugs of abuse
3. Evidence-based AOD interventions exist for teens, but are rarely implemented

IV. 8 Neuroscience Implications for Best Practices with AOD-Involved Adolescents

Best practices related to the limbic teen brain…



1. Relationships matter.

Use a non-judgmental and empathetic communication style

(EBP: Client-centered Rogerian therapy, Motivational Interviewing)

2. Target teen motivation for behavior change.

Readiness

Willingness

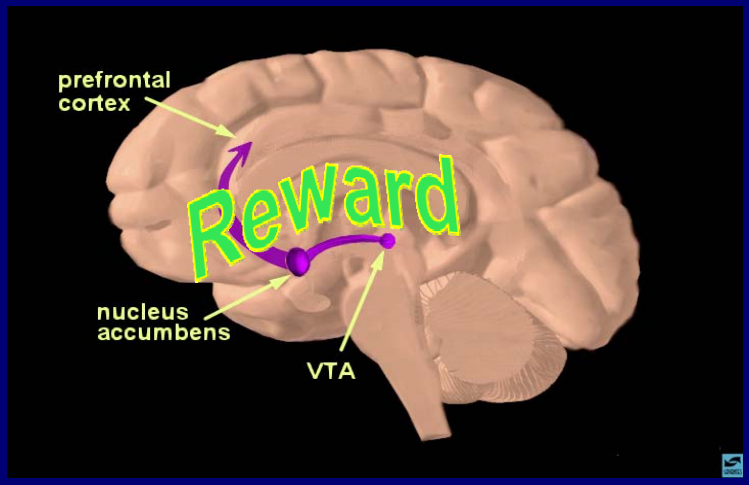
Ability

(EBP: Motivational Interviewing, MET, BI)

3. Create and encourage alternative reward opportunities.

We're in competition for teens' reward circuitry

(and it's not a level playing field)

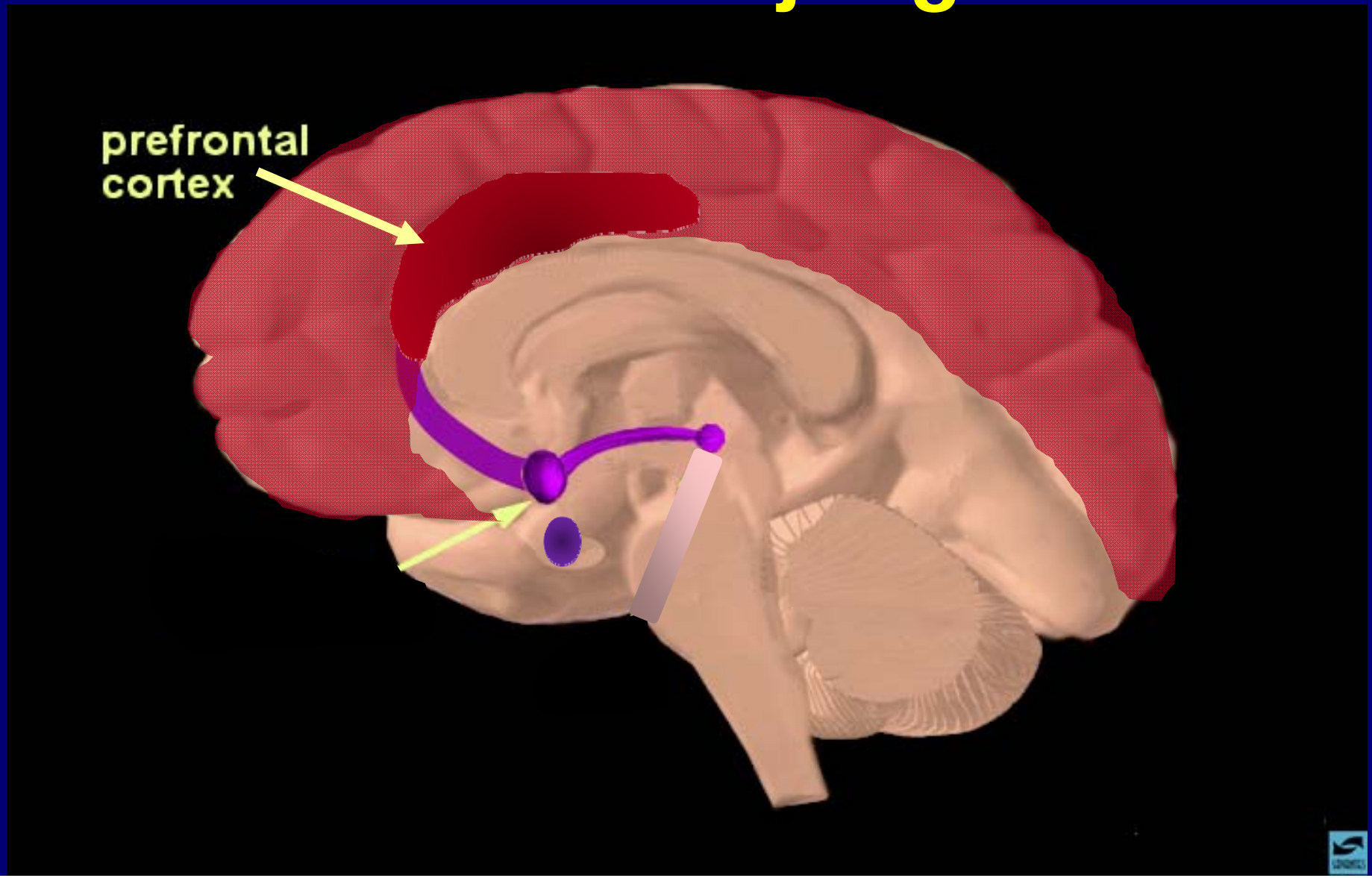


4. Increase teen emotional self-regulation.

Effective coping with stressors is a powerful protective factor

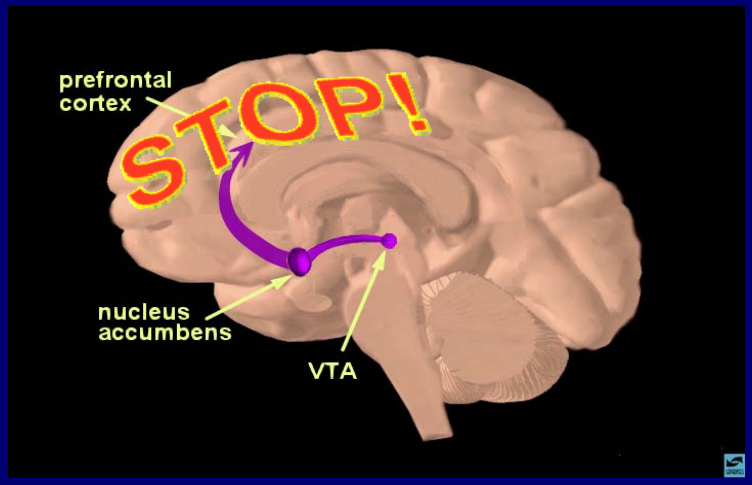
(EBP: CBT, Family-based interventions)

Best practices related to teens' limitations with judgment…



5. Shore up the brakes.

- *functional behavior analysis*
  - *increase self-monitoring*
  - *build AOD resistance skills*



(EBP: CBT, BT, Contingency Management)

6. Clear no AOD use rule.

- Clear expectations for behavior
- Enforceable
- Amenable to monitoring in juvenile justice (e.g., drug testing)
- Link to contingencies

7. Accountability for AOD use.

The teen brain learns through experience.

The best consequences are immediate, firm but fair, consistent, and meaningful.

8. Involve and coach the caregivers.

On what?

All the above!

(EBP: BI, Family-based interventions)

Conclusions

1. Neuroscience findings underscore the "what" and "why" of effective teen AOD interventions
2. Some best practices are easier to implement than others.
3. However, even small adjustments to practice-as-usual can make a difference
4. Non-specialists play a critical role for addressing teen AOD use in the juvenile justice system

Key References

- Childress, A. R. (2006). What can human brain imaging tell us about vulnerability to addiction and relapse? In W. R. Miller, & K. M. Carroll (Eds.), Rethinking substance abuse: What the science shows, and what we should do about it (pp. 46-60). New York: The Guilford Press.
- Clark, D. B. (2004). The natural history of adolescent alcohol use disorders. Addiction, 99(Suppl. 2), 5-22.
- Deas, D. (2008). Evidence-based treatments for alcohol use disorders in adolescents. Pediatrics, 121(Suppl. 4), S348-S354.
- Deas, D., et al. (2000). Adolescents are not adults: Developmental considerations in alcohol users. Alcoholism: Clinical and Experimental Research, 24(2), 232-237.
- Dennis, M. L., Babor, T. F., Roebuck, M. C., & Donaldson, J. (2002). Changing the focus: The case for recognizing and treating cannabis use disorders. Addiction, 97(Suppl. 1), 4-15.
- Dennis, M. L. (2006, April). *The current renaissance of adolescent treatment.* Talk given at Project Fresh Light Partnership Meeting, Madison, WI. Retrieved from: www.chestnut.org/LI/Posters/1-The_Current_Renaissance_of_Adolescent_Treatment_4-17-06.pps

Key References (cont.)

- Felgus, M. A., Caldwell, S. B., & Hesselbrock, V. (2009). Assessing alcohol-involved adolescents: Toward a diagnostic taxonomy. Journal of Substance Use, 14(1).
- Fergusson, D. M., & Boden, J. M. (2008). Cannabis use and later life outcomes. Addition, 103, 969-976.
- NIDA (National Institute on Drug Abuse) (2007). Drugs, brains, and behavior: The science of addiction. Retrieved from: www.drugabuse.gov/scienceofaddiction/
- Tapert, S. F., Caldwell, L., & Burke, C. (2004/2005). Alcohol and the adolescent brain. Alcohol Research & Health, 28(4), 205-212.
- Tripodi, S. J., Bender, K., Litschge, C., & Vaughn, M. G. (2010). Interventions for reducing adolescent alcohol abuse: A meta-analytic review. Archives of Pediatric Medicine, 164(1), 85-91.
- Vandrey R., et al. (2005). Cannabis withdrawal in adolescent treatment seekers. Drug and Alcohol Dependence, 78, 205-210.
- Winters, K. C. (2004). Effects of drugs of abuse on the developing brain. Retrieved from: www.tresearch.org/resources/presentations/WintersBrain2004.ppt#1

Thank you.

s.caldwell@tds.net