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# Management of Tobacco Dependence

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*“Difficult to identify any other condition that presents such a mix of lethality, prevalence, and neglect, despite effective and readily available interventions”*



Fiore et al, U.S. Dept of Health and  
Human Services

# Learning Objectives

## *To be able to:*

- Understand pharmacology of nicotine
- Describe factors contributing to dependence on tobacco smoking
- Recognise tobacco dependence
- Provide brief interventions for people who smoke
- Manage tobacco dependence using pharmacotherapy and psychological approaches



# **FACTS ABOUT NICOTINE**

# Nicotine Dependence Differs From Other Drug Dependencies

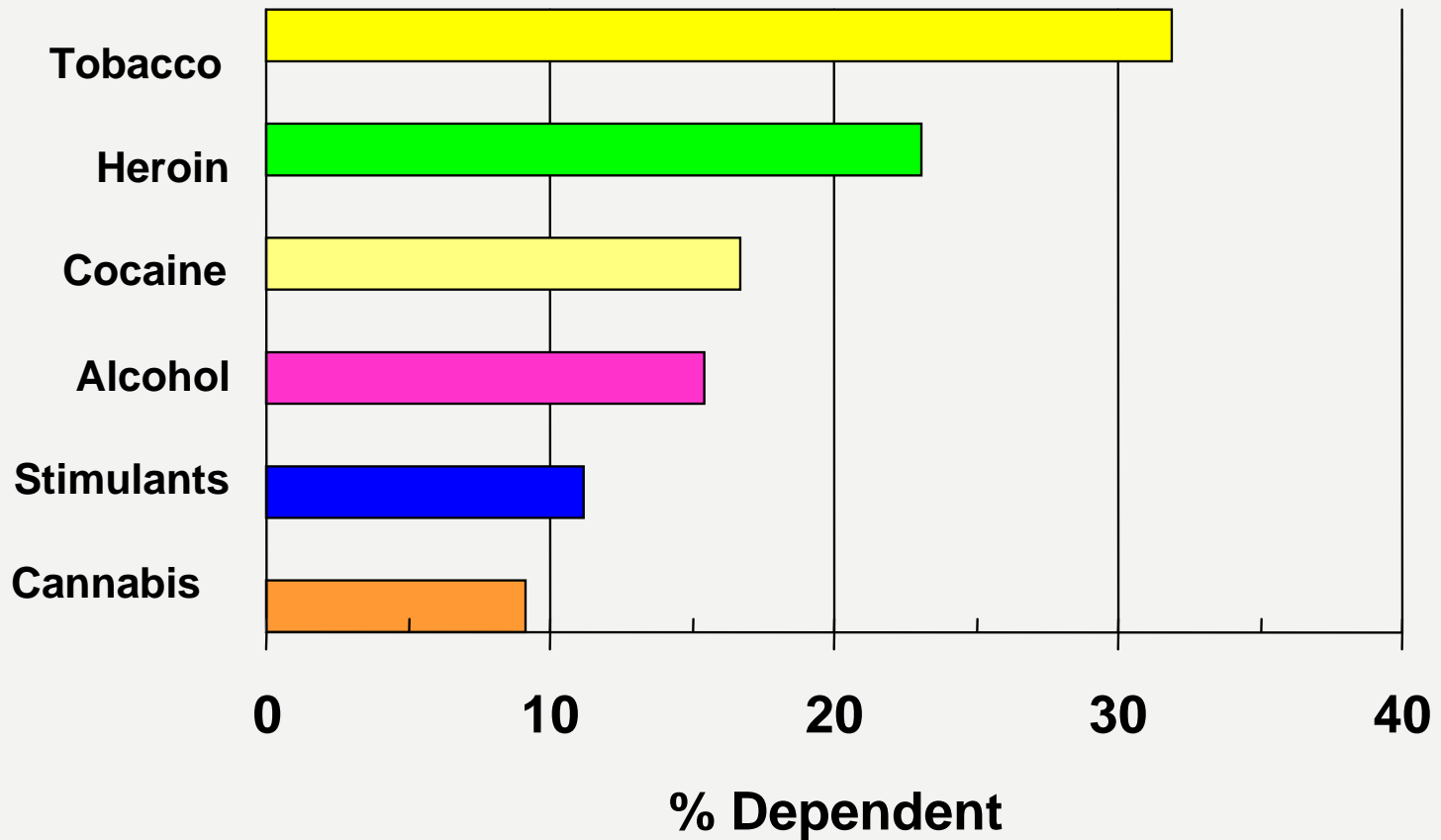
- First, nicotine does not cause behavioral intoxication. As a result, nicotine-dependent persons rarely seek or are referred to psychiatrists.
- Second, much of society's response to drug problems is based on how much damage drug-dependent users inflict on others.

# Nicotine Dependence Differs From Other Drug Dependencies

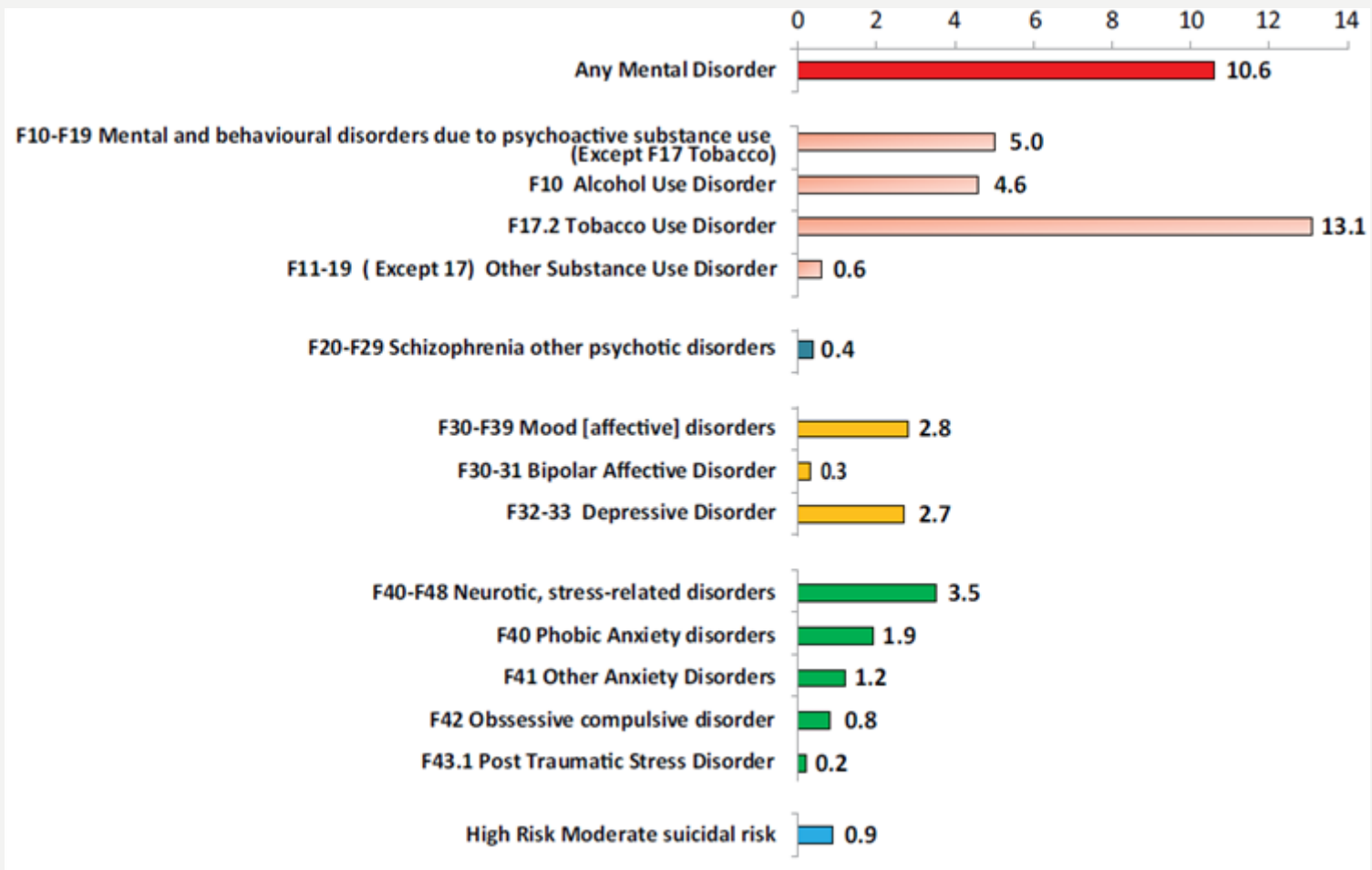
- Third, nicotine via tobacco is a legal drug openly promoted by several large transnational corporations.

Thus, nicotine use appears legitimate, and deviant behaviors are not needed to acquire the drug.

# Addiction Potential - Drug Dependence Among Ever-users

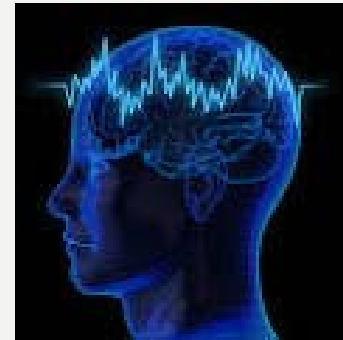


# Prevalence of Various Disorders- NMHS, 2016

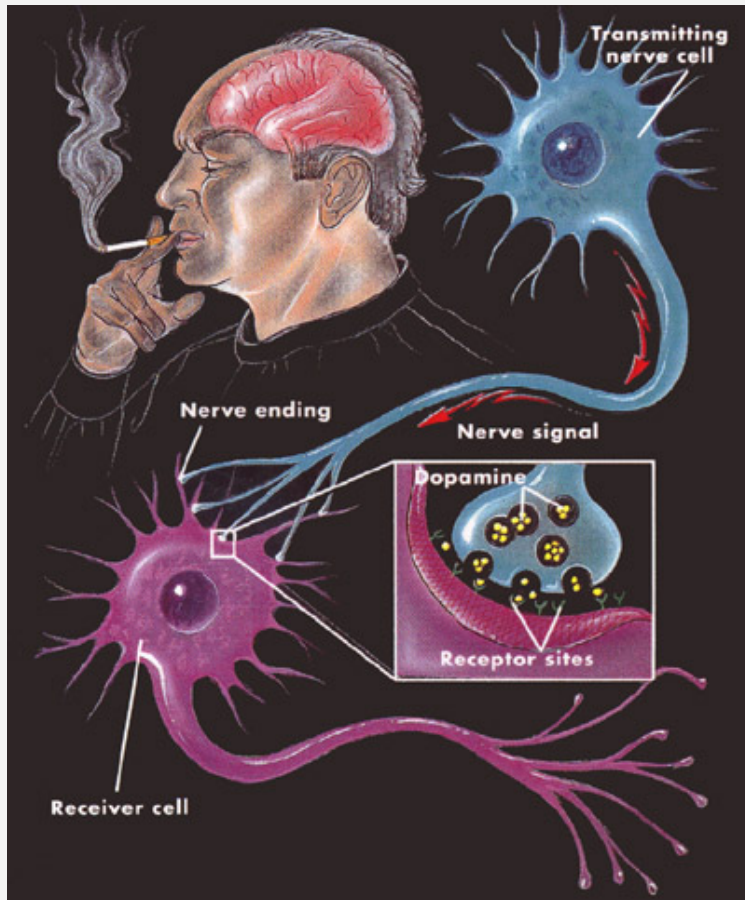




# Linking Behavior to Biology



# Pharmacokinetics



- Readily crosses the BBB
- Reach brain in ~ 7 secs
- $\frac{1}{2}$  life is around 2 hours
- Average cigarette yields about 1 mg of absorbed nicotine
- One of the most toxic drugs known – 60 mg is lethal and death follows intake within a few minutes

# Dopamine Reward Pathway

Prefrontal cortex

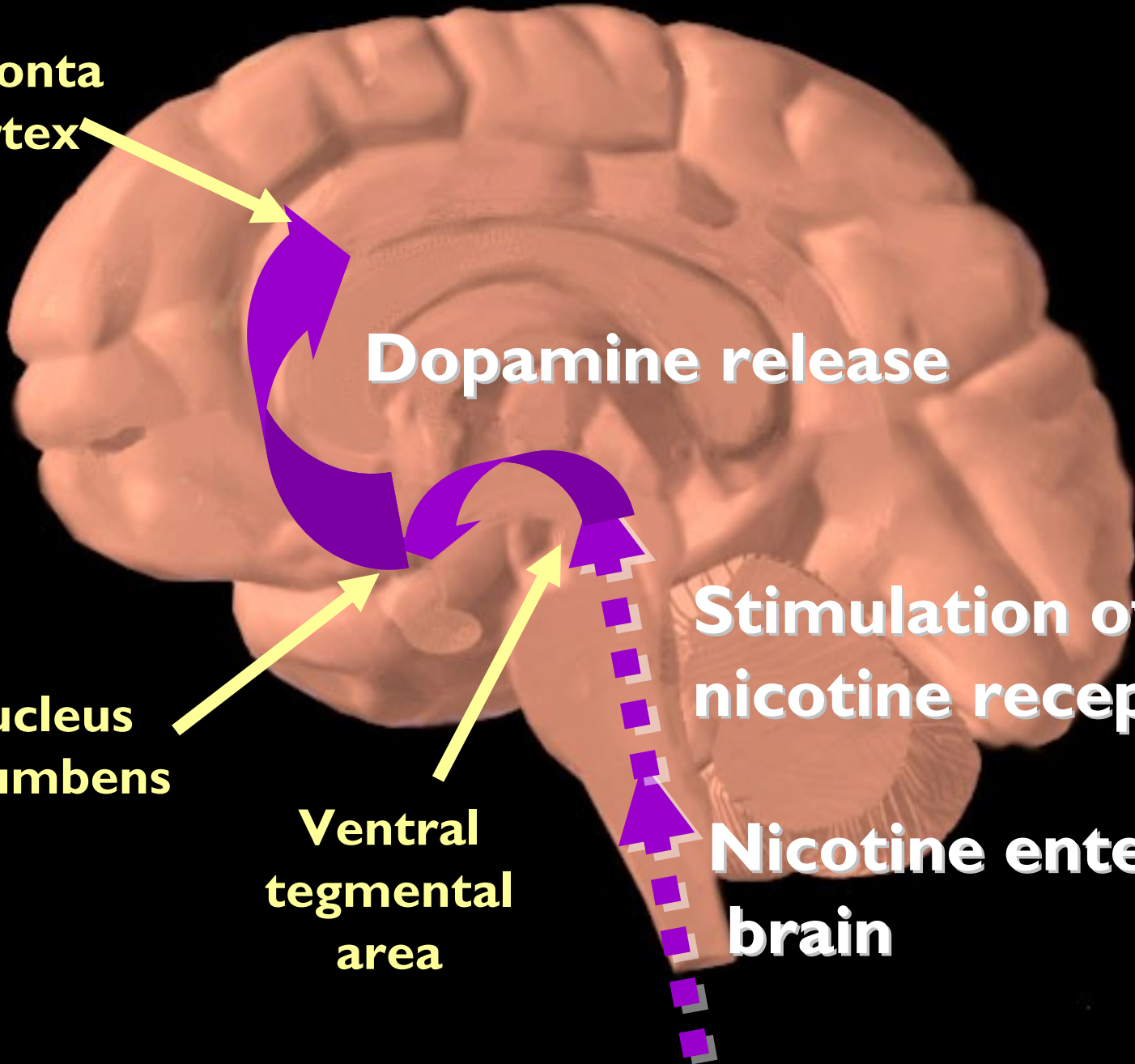
Dopamine release

Stimulation of nicotine receptors

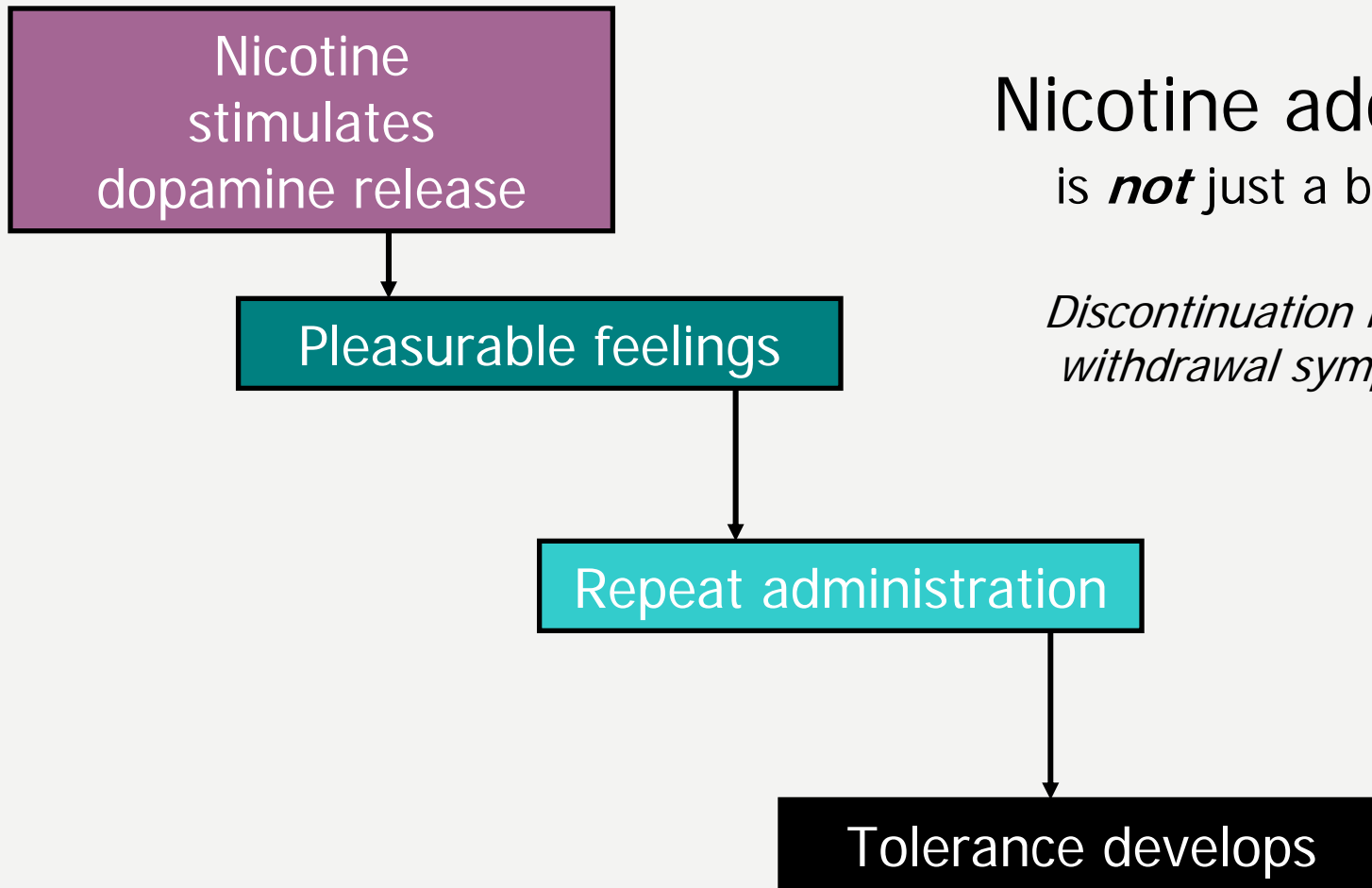
Nucleus accumbens

Ventral tegmental area

Nicotine enters brain



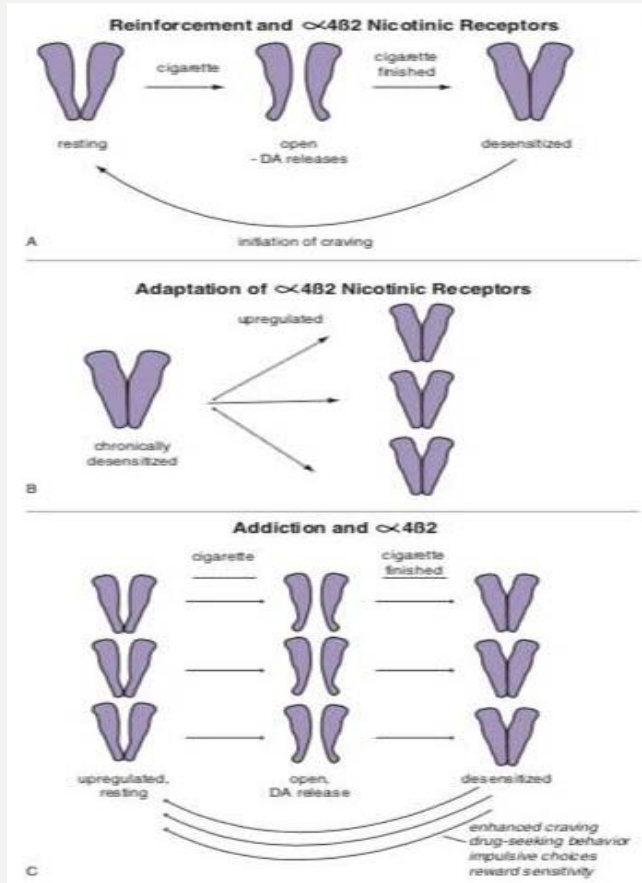
# Biology of Nicotine Addiction: Role of Dopamine



Nicotine addiction is *not* just a bad habit.

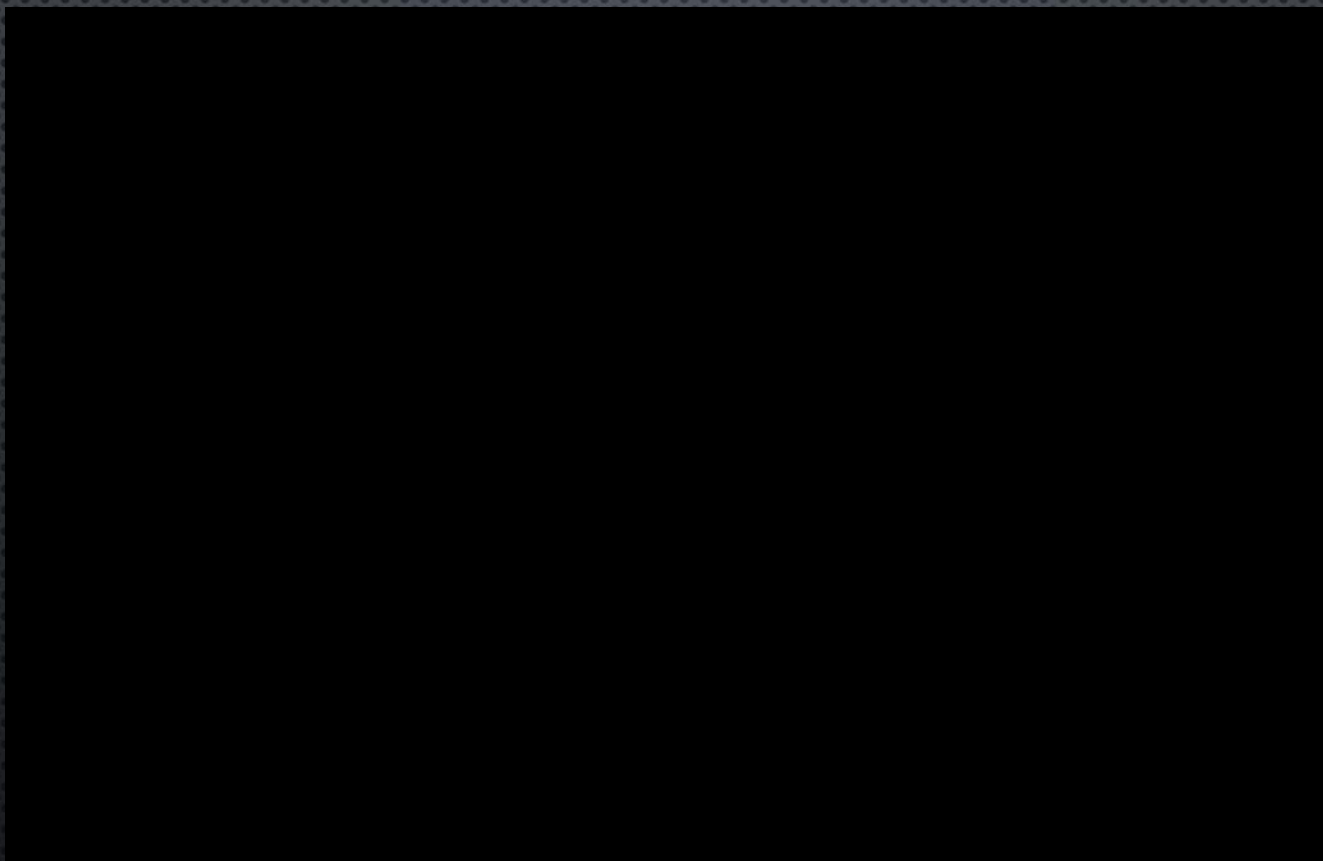
*Discontinuation leads to withdrawal symptoms.*

# Nicotinic Receptor- Cigarette Length



Three states of the nAChR ion channels:

- Closed (at rest)
- Open (cations flow into the cell)
- Desensitized (closed and not responsive to agonists)



# Chronic Administration of Nicotine: Effects on the Brain

Human smokers have increased nicotine receptors in the prefrontal cortex.

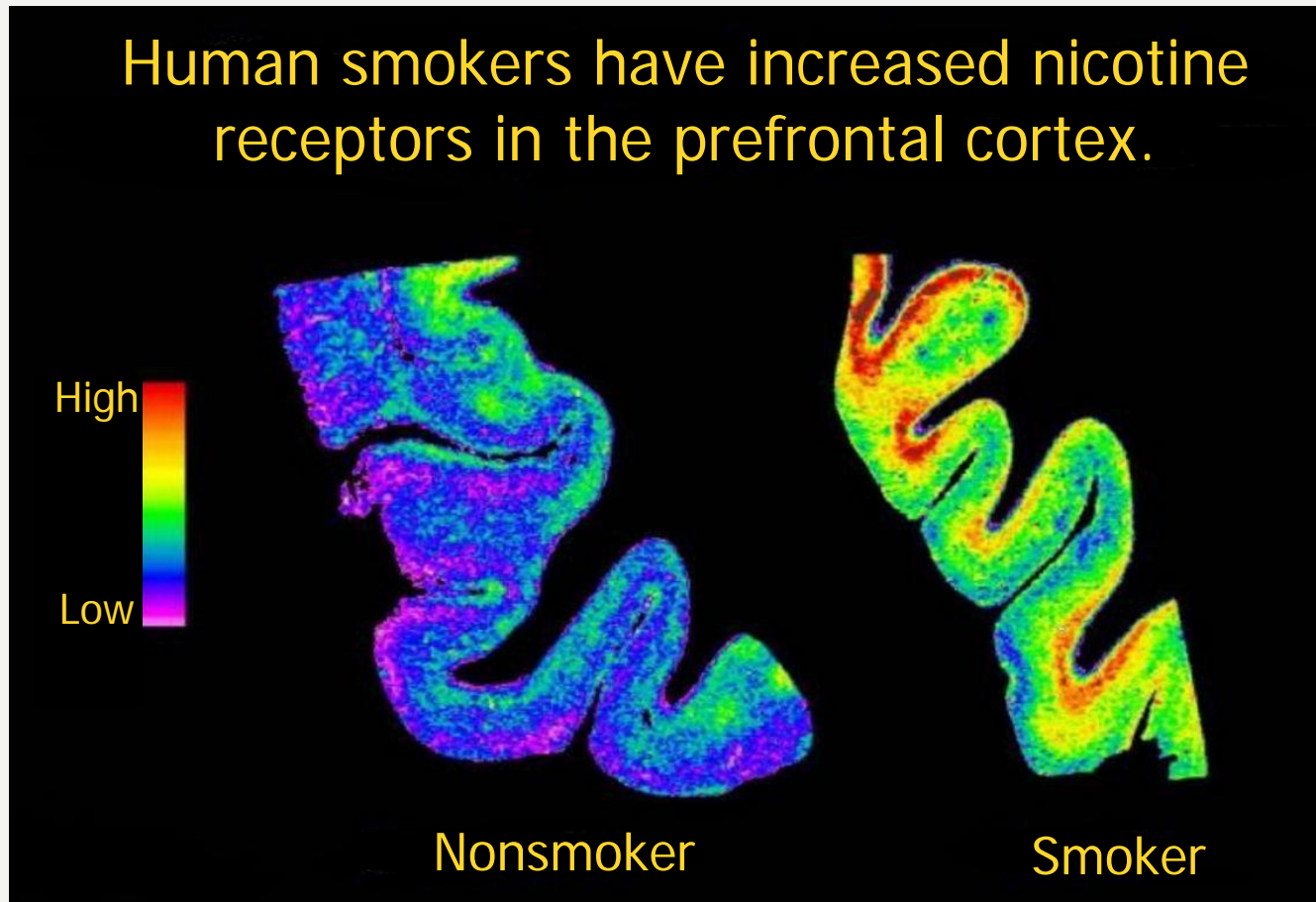


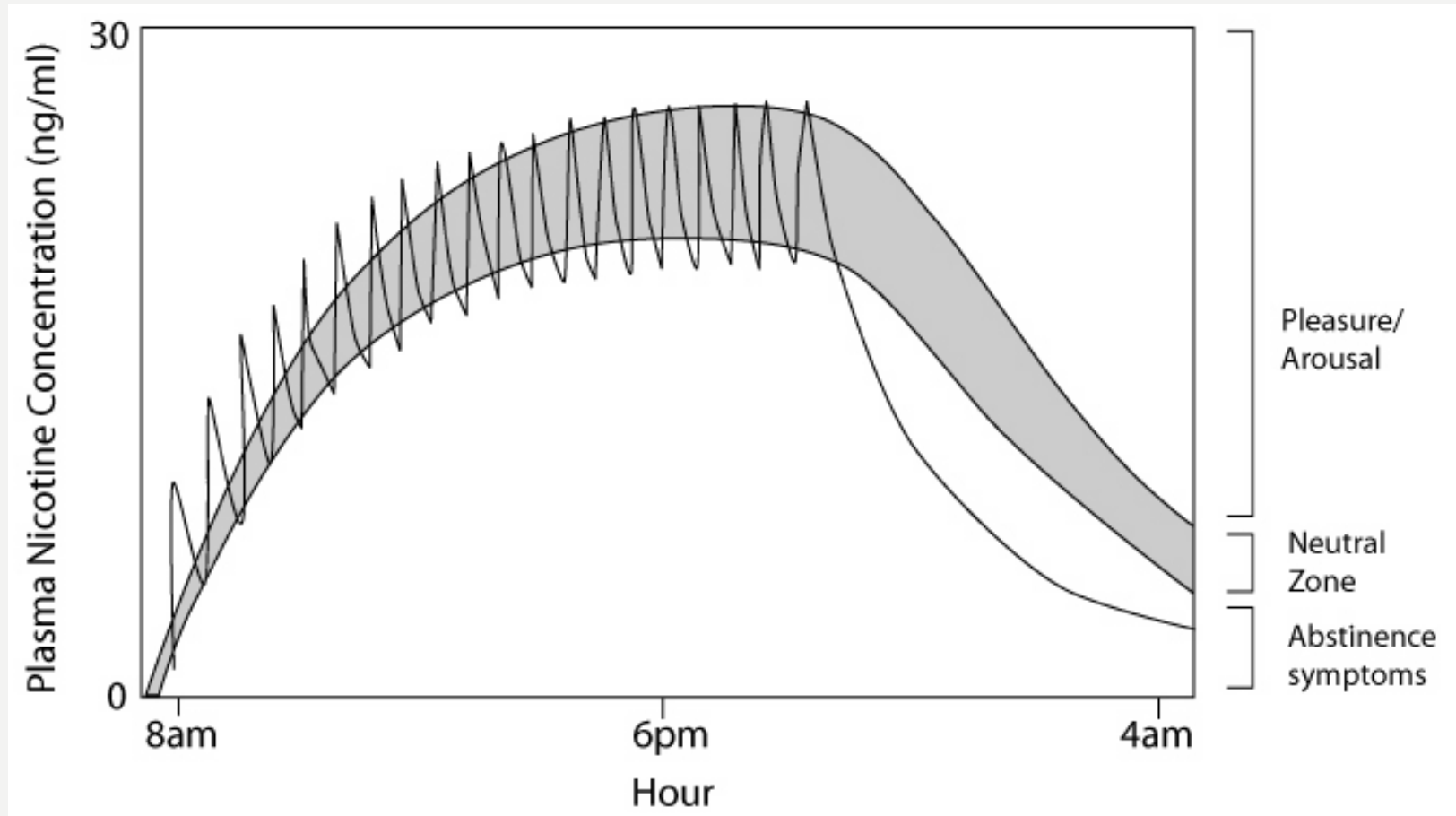
Image courtesy of George Washington University / Dr. David C. Perry

# Neurochemical and Related Effects of Nicotine

<b>N</b>	→ Dopamine	→ Pleasure, reward
<b>I</b>	→ Norepinephrine	→ Arousal, appetite suppression
<b>C</b>	→ Acetylcholine	→ Arousal, cognitive enhancement
<b>O</b>	→ Glutamate	→ Learning, memory enhancement
<b>T</b>	→ Serotonin	→ Mood modulation, appetite suppression
<b>I</b>	→ $\beta$ -Endorphin	→ Reduction of anxiety and tension
<b>N</b>	→ GABA	→ Reduction of anxiety and tension
<b>E</b>		



# Nicotine Addiction Cycle



# Standard Elements of Dependence

- Context
- Ritual behaviours
- Sensory stimulation
- Reinforcing (nicotine) stimulus

# Context

- **Some places, times and situations are closely associated with smoking and enhance craving:**
  - Morning coffee with breakfast
  - Coffee shop
  - Tea breaks
- **Some places and situations are now negatively associated and cravings can be less severe:**
  - Places of worship
  - Sporting stadiums
  - In aircraft
  - Smoke-free homes
  - Around children



# Ritual Behaviours

- Going to a place where smoking is possible
- Accessing the cigarette – e.g. opening handbag
- Getting match or lighter
- Lighting cigarette

# Sensory Stimuli

- Touch/feel of cigarette
- Light from flame
- Smell of smoke
- Direct airway stimulation from smoke
  - Anaesthetising the airway reduces reported smoking satisfaction
- These all travel to brain at nerve speed preceding the arrival of nicotine

# Addictive Qualities

- Fast absorption of nicotine and short time needed to reach receptor targets (and hence to exert pleasurable effects) are important factors in development of addiction.
- When linked with context/ritual/sensory stimuli they produce a strong reinforcing effect.
- In animals, random boluses of IV nicotine without the context associations cannot establish addiction and self-administration of nicotine does not occur.

# What Is Dependence???

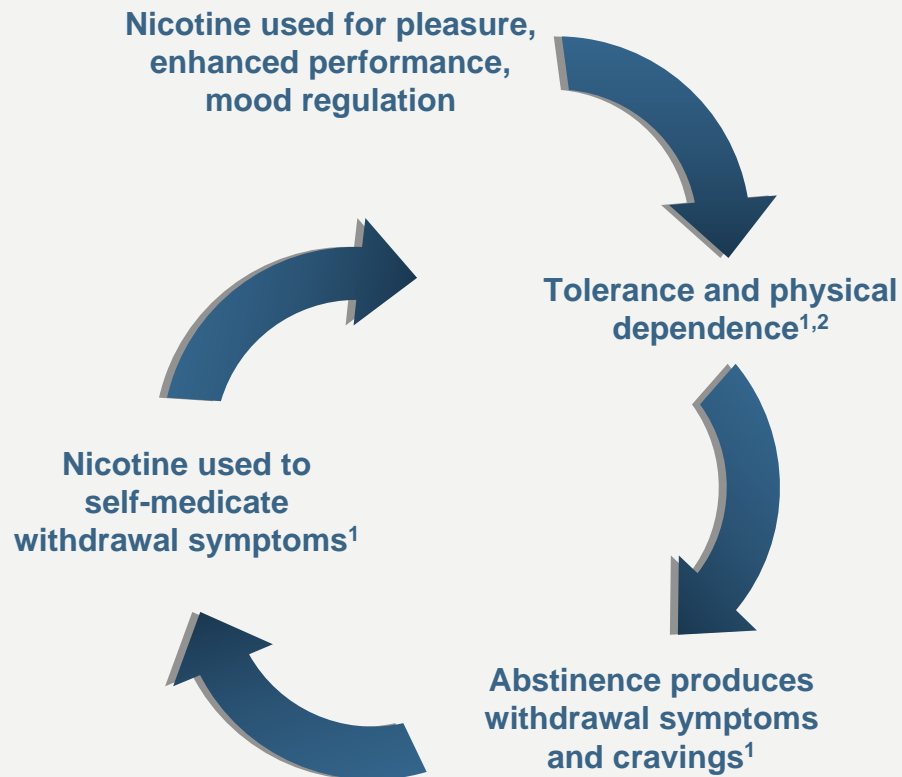
- Tolerance\*
- Withdrawal\*
- Larger amounts/longer period than intended
- Inability to, or persistent desire to, cut down or control
- A great deal of time spent obtaining, using, or recovering
- Important activities given up or reduced
- Use despite problems caused or exacerbated by use



**To summarize.....**



# Cycles of Pleasure and Withdrawal



<sup>1</sup>Jarvis MJ. (2004) BMJ, 328:277-279.

<sup>2</sup>Pidoplichko VI (1997) Nature, 390:401-404.

# Tobacco Dependence: 2-part Problem

## Tobacco Dependence

Physiological



Behavioral

The addiction to nicotine



Treatment

Medications for cessation

The habit of using tobacco



Treatment

Behavior change program

Treatment should address the physiological **and** the behavioral aspects of dependence.

# Wisdom Pearls...

- Even brief advice to quit offered by a physician can produce abstinence rates of 5-10%, which would have a significant public health impact if it were provided routinely.
- Unfortunately, surveys of smokers indicate that they receive such advice from their physicians less than half the time.
- Physicians hesitate to advise smoking cessation is that they have become demoralized because so few of their patients follow this advice.

# Wisdom Pearls...

- Successful cessation may take a number of attempts.
- Most former smokers report a history of several relapses.
- The most effective cessation interventions combine behavioural support with drug treatment.

# Brief Intervention + Pharmacotherapy

- **Ask** about tobacco use
- **Advise** to stop smoking
- **Assess** willingness to quit
- **Assist** with quit plan
- **Arrange** follow up

*Clinical Practice Guidelines :Treating Tobacco Use and Dependence, U.S. Dept of Health and Human Services , Public Health Service 2000*

# How to Approach

## THOSE UNWILLING TO QUIT

- “5 R’s” motivational intervention
- **R**elevance,
- **R**isks,
- **R**ewards,
- **R**oadblocks,
- **R**epetition

## THOSE READY TO QUIT

STAR recommendations

- **S**- setting date to quit
  - **T**-tell friend, family, coworker
  - **A**- anticipate challenges\*\*
- \*\*Cognitive/behavioural strategies
- **R**- remove tobacco from environment

# Cognitive Strategies

- Keeping a diary for one or several days prior to the Quit Day
  - More aware of their smoking pattern and risk situations
- Consider benefits of quitting
- Challenge the perceived benefits of smoking
- Coping with cravings
  - Thought stopping
    - Conscious decision not to think about smoking
  - Thought substitution
    - Deciding to think about something else

# Behavioural Strategies

## Suggest 4Ds

- **Delay** acting on the urge to smoke. After five minutes the urge to smoke weakens and your resolve to quit will come back.
- **Deep breathe.** Take a long slow breath in and slowly release it out again. Repeat three times.
- **Drink** water slowly holding it in your mouth a little longer to savour the taste.
- **Do something else** to take your mind off smoking. Doing some exercise is a good alternative.



# Behavioural Strategies

- Suggest removing environmental cues where possible (e.g. ashtrays)
- Ask to remember that thinking "I can have just one" can lead to relapse

# Essential Components- Tobacco Free Society

- **Public Education Efforts**
- **Community-Based Programs**
- **Helping Smokers Quit (Cessation)**
- **School-Based Programs**
- **Enforcement**
- **Monitoring and Evaluation**
- **Related Policy Efforts**



**Thank you**

**Practice what you preach**

