



# ***SMOKING CESSATION & HYPERTENSION:***

## **A NEW LOOK AT OLD PROBLEMS**

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# Faculty/Presenter Disclosure

**Andrew Pipe, CM, MD**

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## Relationships with commercial interests:

**Grants/Research Support:**

Pfizer

**Honoraria:**

Pfizer, Johnson & Johnson

**Consulting Fees:**

Pfizer, Johnson & Johnson

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# Disclosure of Commercial Support

- **None**
-



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# Mitigating Potential Bias

**Evidence-based, best practice approaches to addressing nicotine addiction will be presented.**

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OTTAWA MODEL  
FOR SMOKING CESSATION  
MODÈLE D'OTTAWA  
POUR L'ABANDON DU TABAC



# ***Smoking Cessation***

***“The single, most powerful,  
preventive intervention in  
clinical practice.”***

Woolf SH. *JAMA* 1999;282(24):2358-65.



***Smoking Cessation***  
**The Most Important  
CVD Intervention !**

*...and the most neglected*



# Cost Effectiveness



*per life-year saved:*

<b><i>Smoking Cessation</i></b>	<b><i>\$ 2,000 – 6,000</i></b>
<b><i>R<sub>x</sub> of Hypertension</i></b>	<b><i>\$ 9,000 – 26,000</i></b>
<b><i>R<sub>x</sub> of Hyperlipidemia</i></b>	<b><i>\$ 50,000 – 196,000</i></b>



# Smoking diminishes benefit of blood pressure control

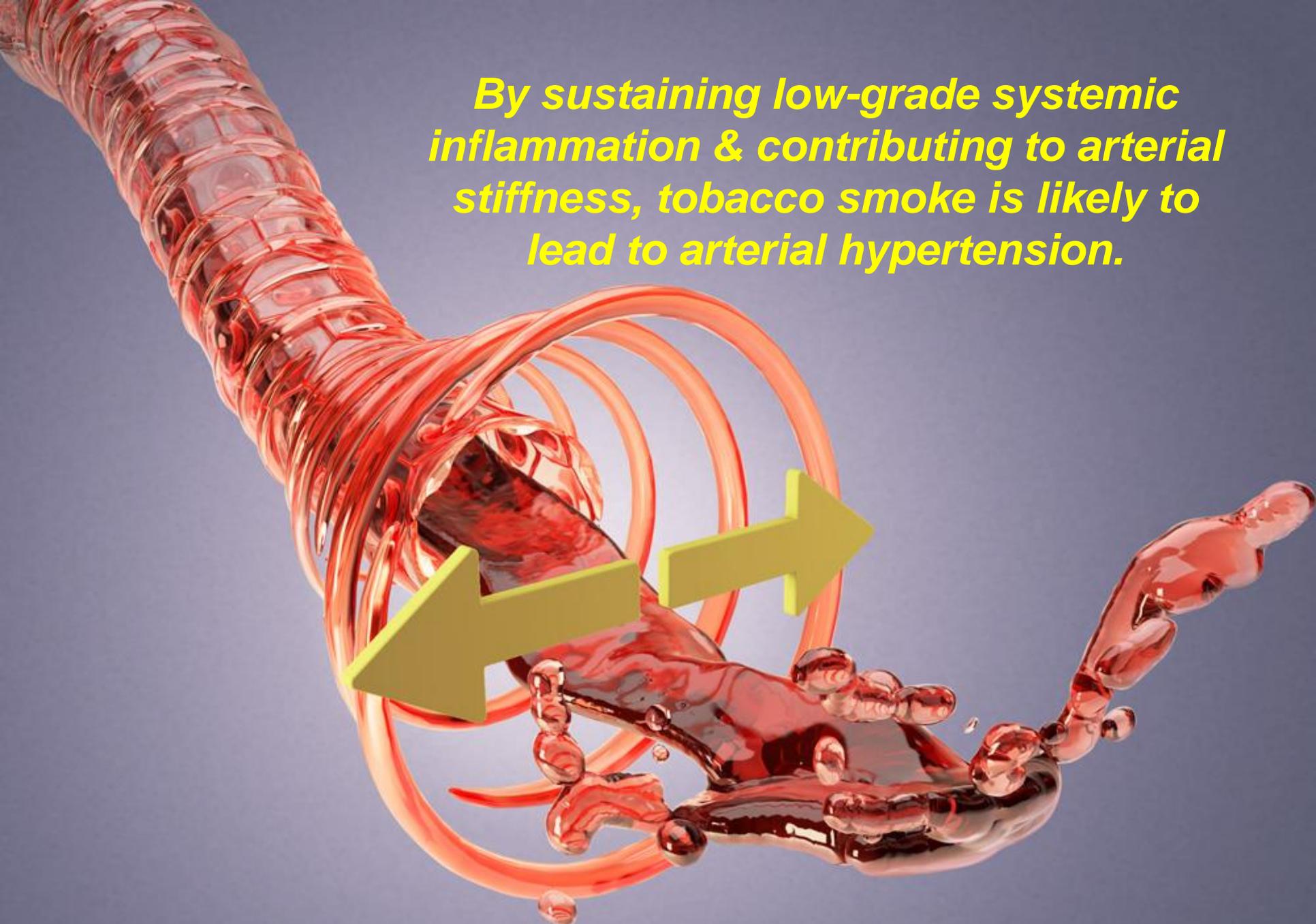
Journath G, et al. Blood Press. 2005; 14(3):144-150.

## Smoking cessation is superior to other proven cardiovascular interventions

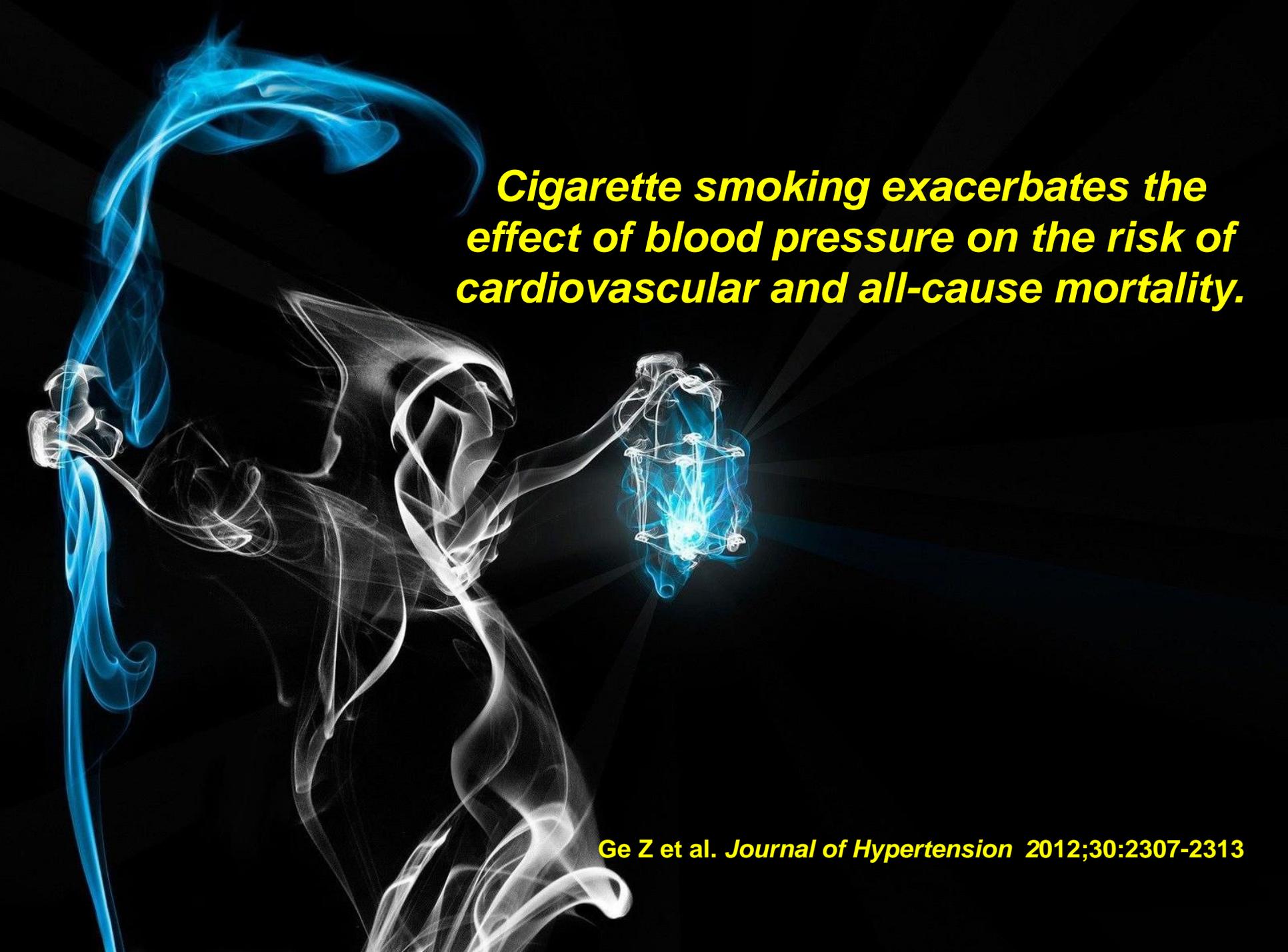
Critchley JA, Capewell S. JAMA. 2003;290(1):86-97.

### Impact of Smoking on Cardiovascular Events in Patients With Coronary Disease Receiving Contemporary Medical Therapy (from the Treating to New Targets [TNT] and the Incremental Decrease in End Points Through Aggressive Lipid Lowering [IDEAL] Trials)

Paul Frey, MD<sup>a</sup>, David D. Waters, MD<sup>a,\*</sup>, David A. DeMicco, PharmD<sup>c</sup>, Andrei Breazna, PhD<sup>c</sup>,  
Larry Samuels, PhD<sup>c</sup>, Andrew Pipe, CM, MD<sup>d</sup>, Chuan-Chuan Wun, PhD<sup>c</sup>, and  
Neal L. Benowitz, MD<sup>b</sup>



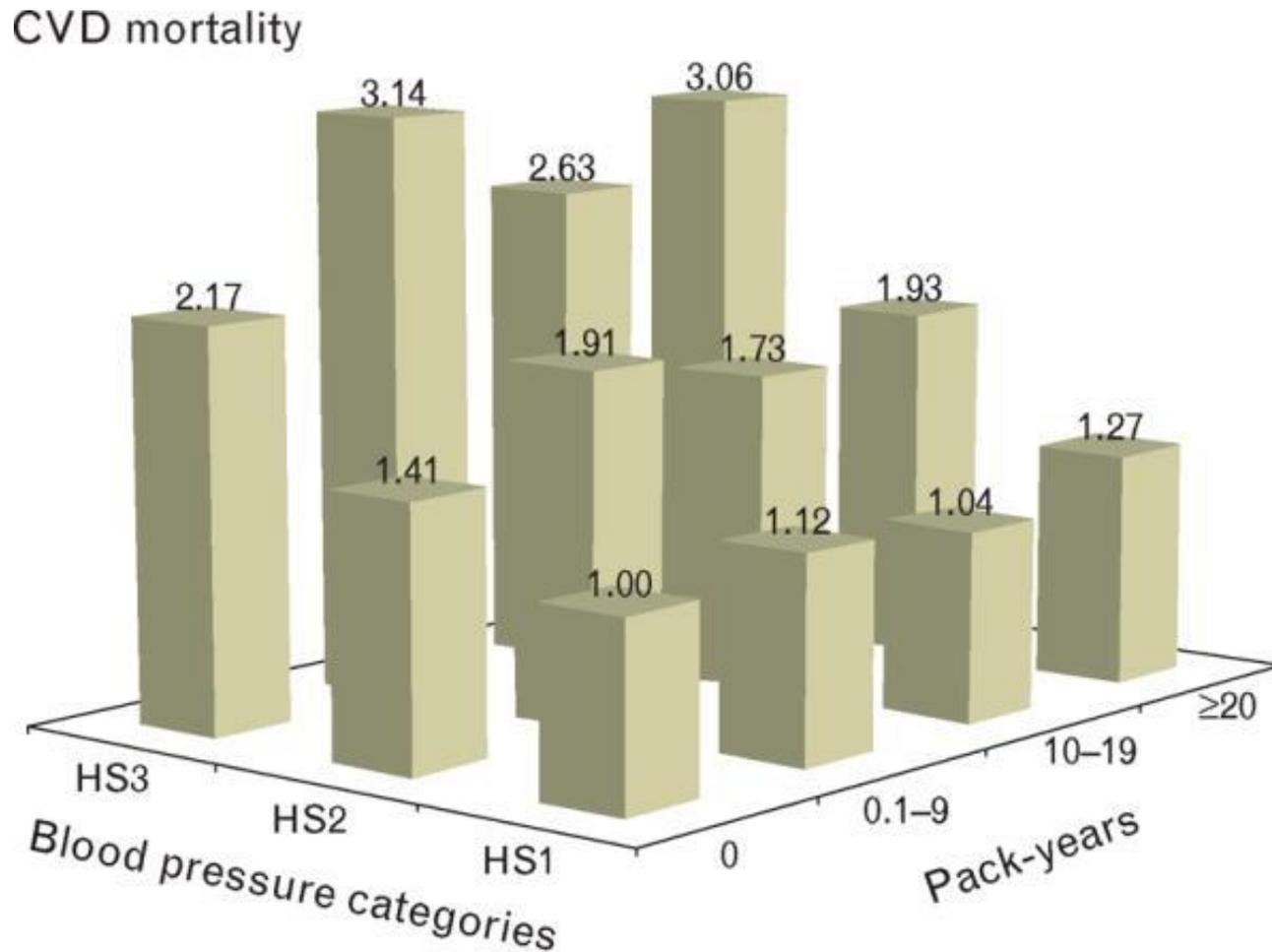
*By sustaining low-grade systemic inflammation & contributing to arterial stiffness, tobacco smoke is likely to lead to arterial hypertension.*



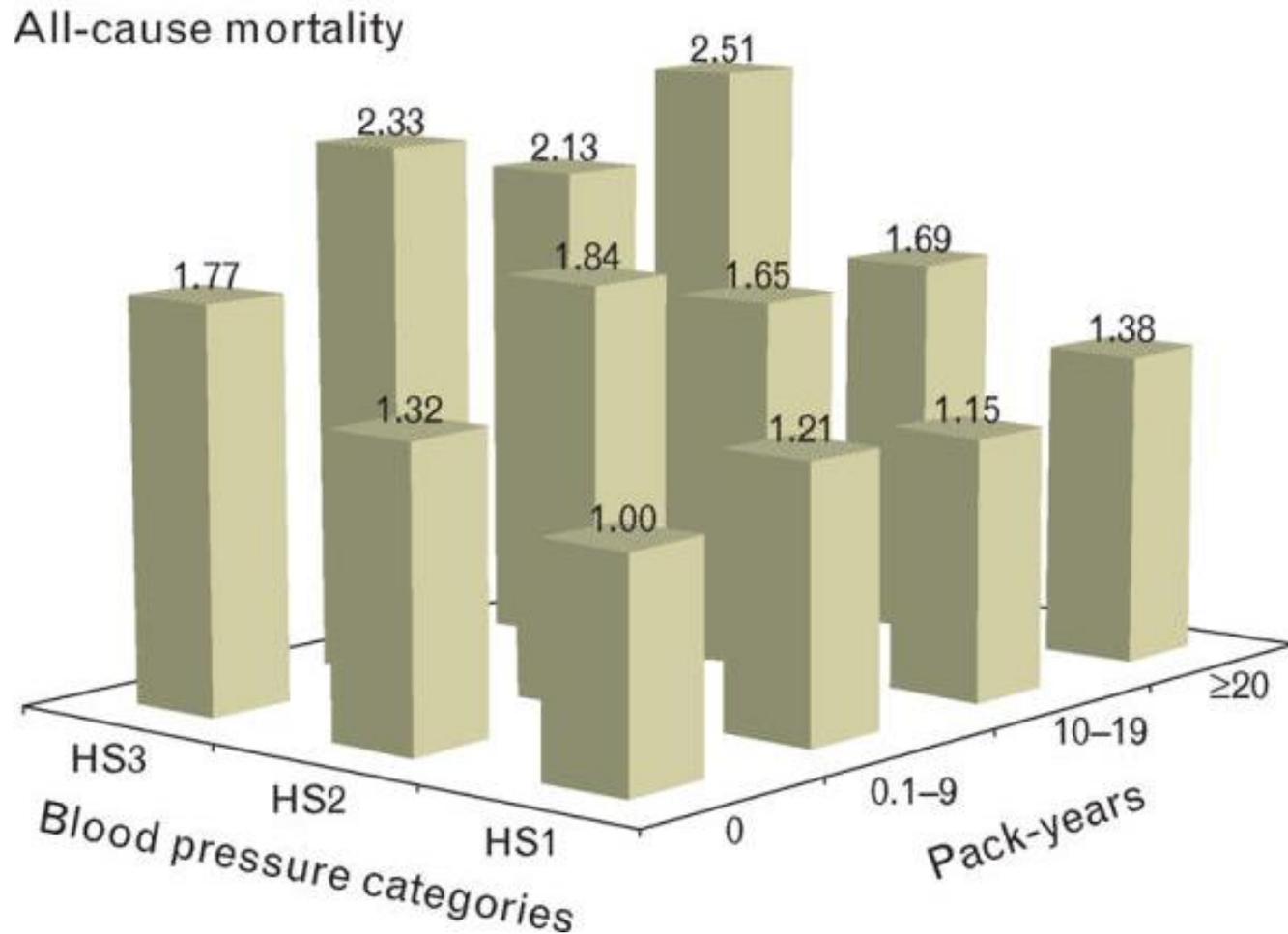
***Cigarette smoking exacerbates the effect of blood pressure on the risk of cardiovascular and all-cause mortality.***

***Ge Z et al. Journal of Hypertension 2012;30:2307-2313***

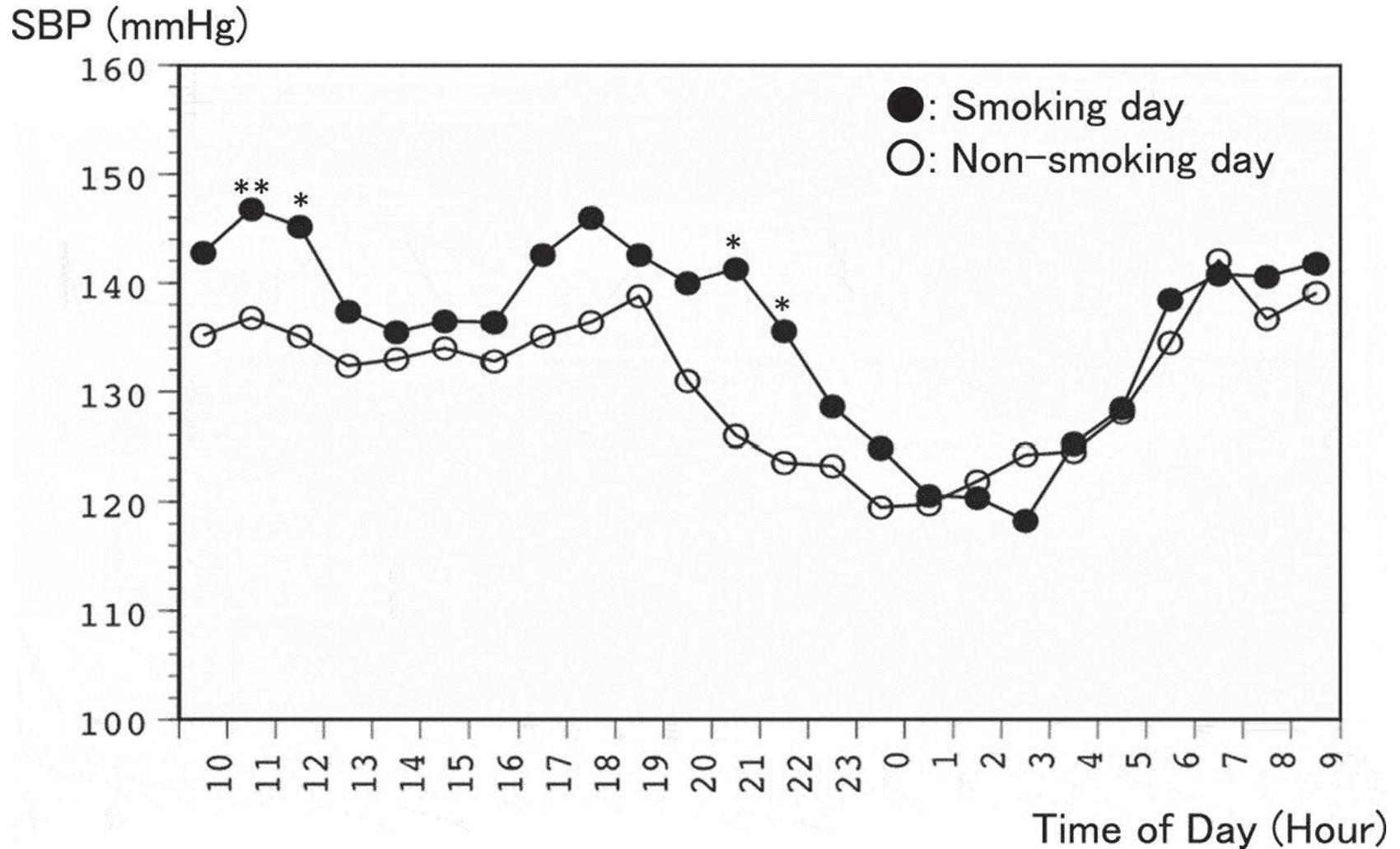
**Multivariate-adjusted relative risk of cardiovascular disease according to the combined categories of SBP and DBP. HS1, stage 1 hypertension; HS2, stage 2 hypertension; HS3, stage 3 hypertension.**



**Multivariate-adjusted relative risk of all-cause according to the combined categories of SBP and DBP. HS1, stage 1 hypertension; HS2, stage 2 hypertension; HS3, stage 3 hypertension.**

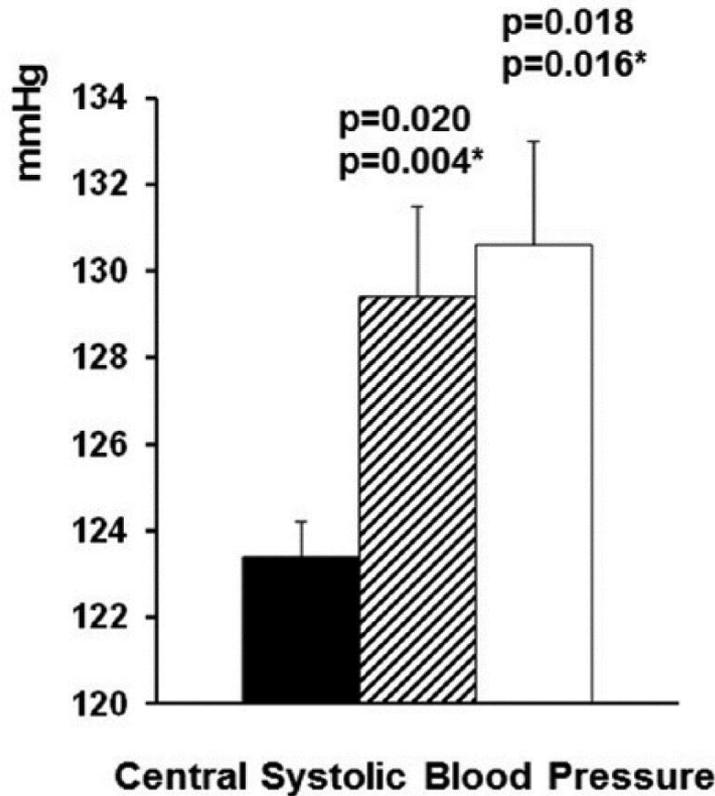


# Profile of ambulatory blood pressure in smoking and nonsmoking periods

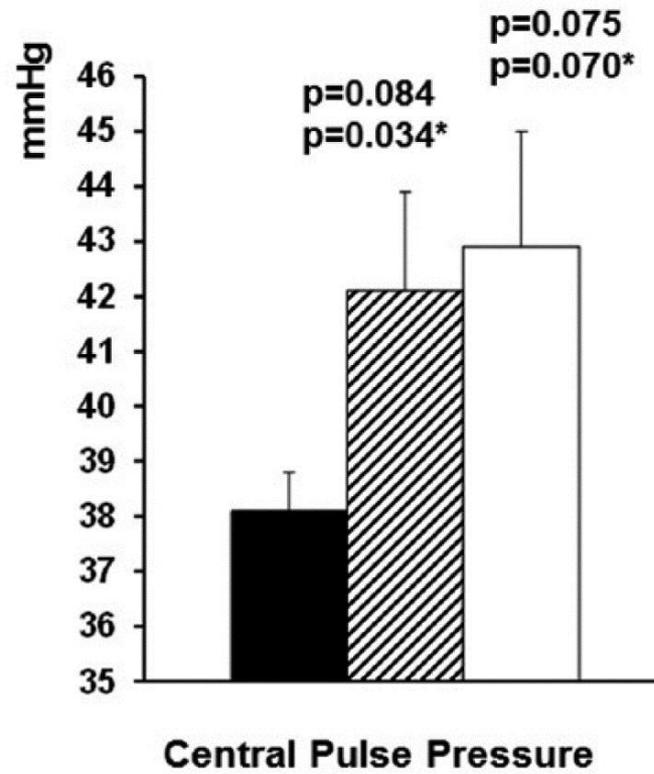


**(a) Central systolic blood pressure according to smoking group**  
**(b) Central pulse pressure according to smoking group**

(a)



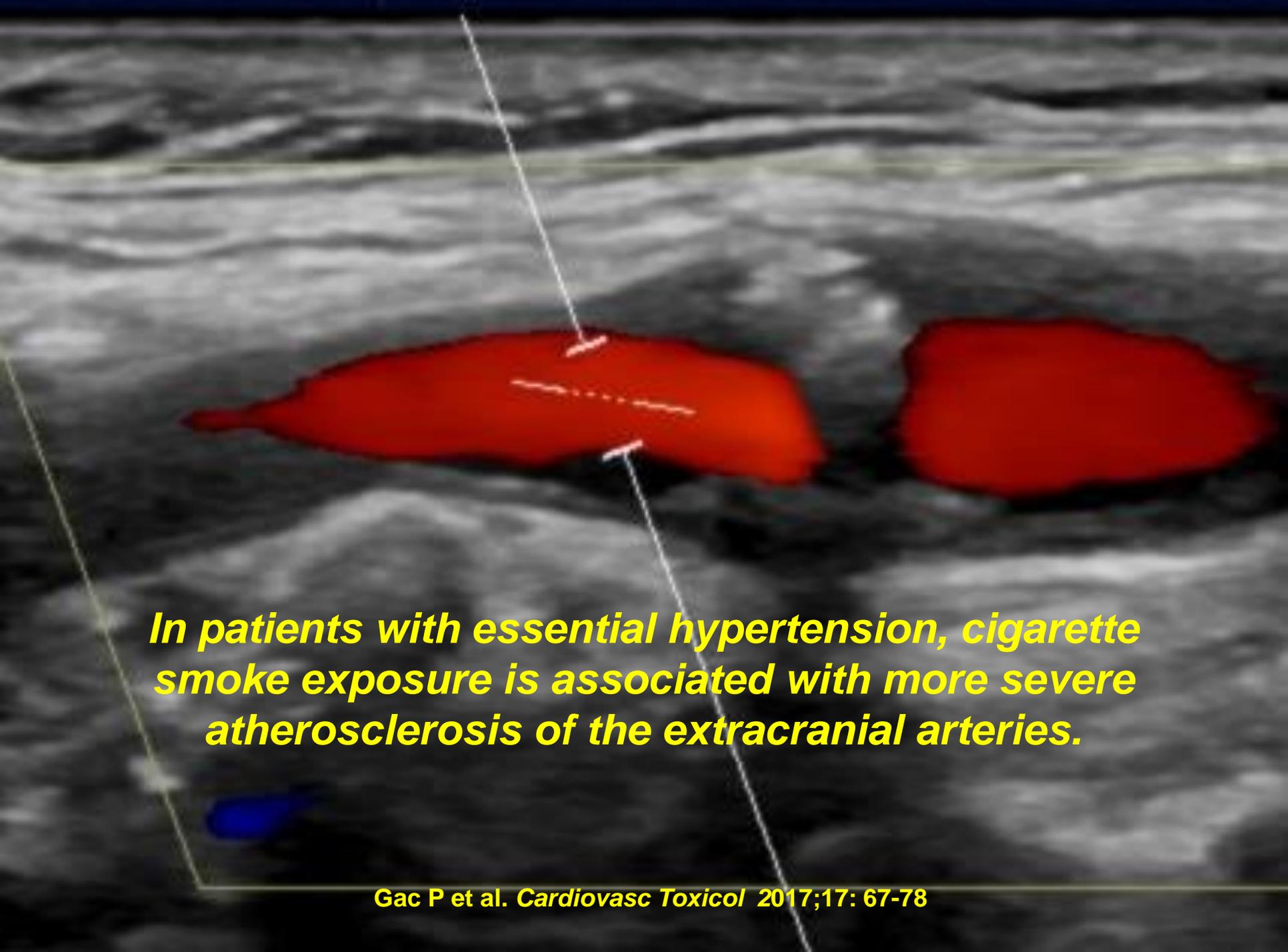
(b)



■ Nonsmokers

▨ ≤ 5 cigarettes/day

□ >5 cigarettes/day

A color Doppler ultrasound image of an artery. The vessel lumen is the dark area on the left. The vessel wall is on the right. A large, bright red area is visible within the vessel lumen, indicating turbulent flow or stenosis. A white arrow points to the area of turbulence. A blue area is visible in the bottom left corner, indicating flow towards the transducer.

***In patients with essential hypertension, cigarette smoke exposure is associated with more severe atherosclerosis of the extracranial arteries.***



***In people who quit smoking, BP and risk of hypertension are similar to those of never smokers and significantly lower than those of current smokers.***

***D'Elia L et al. European Journal of Public Health 2013;24(2):226-230***



The NEW ENGLAND JOURNAL of MEDICINE

SPECIAL ARTICLE

## 21st-Century Hazards of Smoking and Benefits of Cessation in the United States

Prabhat Jha, M.D., Chinthanie Ramasundarahettige, M.Sc.,  
Victoria Landsman, Ph.D., Brian Rostron, Ph.D., Michael Thun, M.D.,  
Robert N. Anderson, Ph.D., Tim McAfee, M.D., and Richard Peto, F.R.S.

### CONCLUSIONS

Smokers lose at least one decade of life expectancy, as compared with those who have never smoked. Cessation before the age of 40 years reduces the risk of death associated with continued smoking by about 90%.

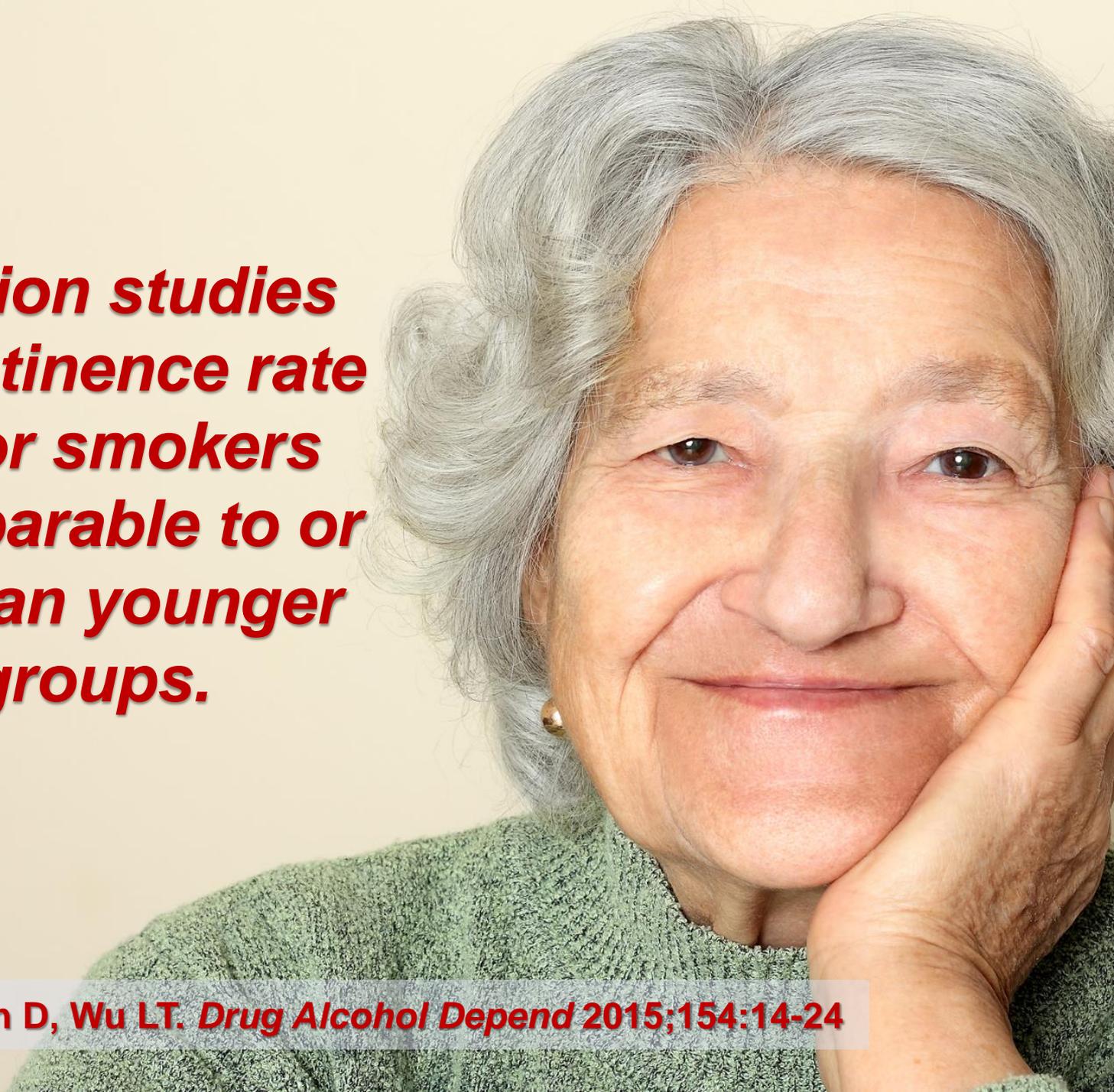
***Smoking cessation at age 60, 50, 40, & 30  
increases life expectancy by 3, 6, 9, 10  
years, respectively***

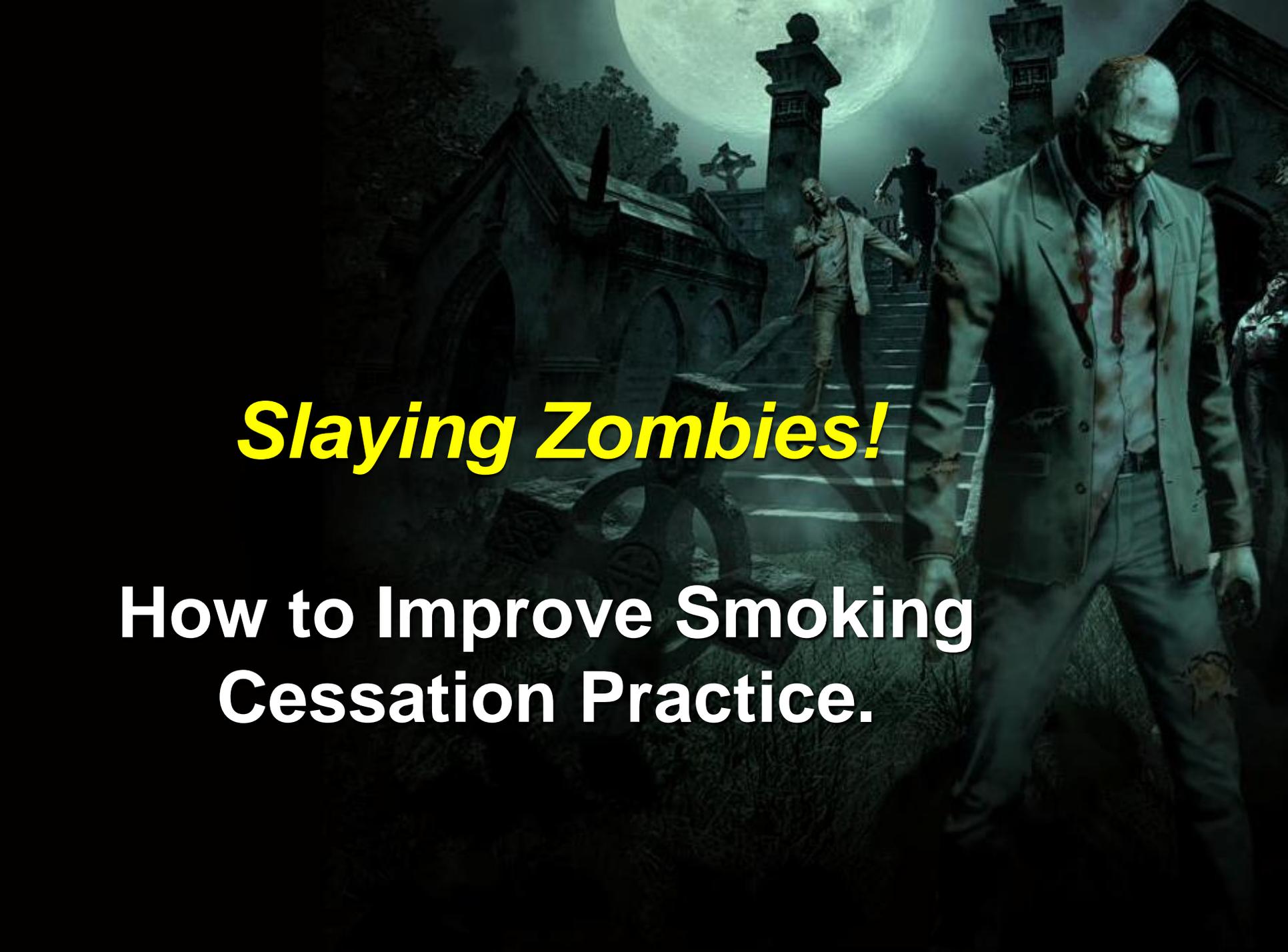


***Chen D, Wu LT. Drug Alcohol Depend 2015;154:14-24***

***Intervention studies  
found abstinence rate  
for senior smokers  
was comparable to or  
higher than younger  
age groups.***

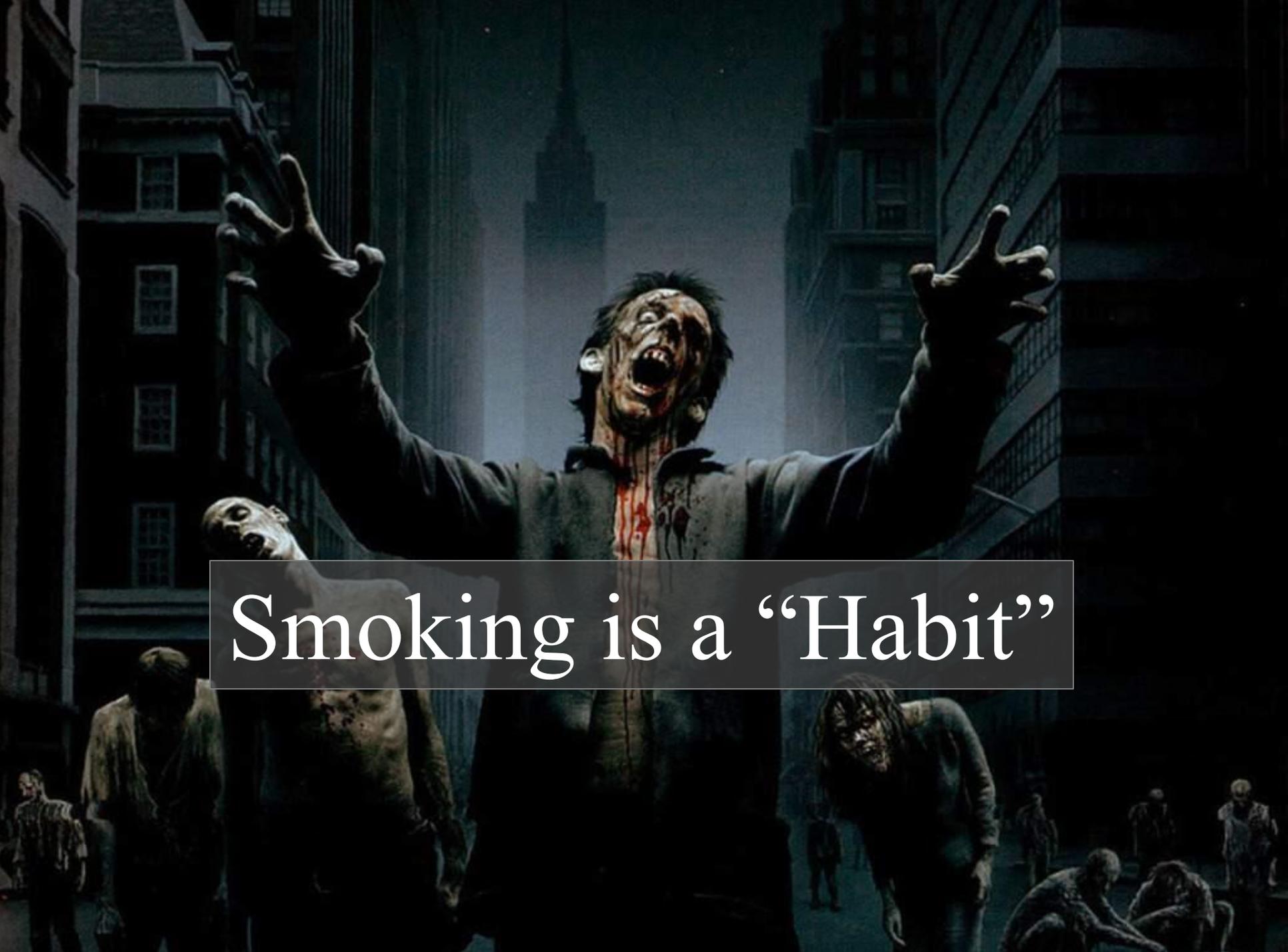
***Chen D, Wu LT. Drug Alcohol Depend 2015;154:14-24***



A zombie in a light-colored suit stands in the foreground of a graveyard at night. The zombie has blood on its chest and a pale, undead appearance. In the background, other zombies are visible near a large, full moon and a gothic-style building. The scene is dark and atmospheric.

***Slaying Zombies!***

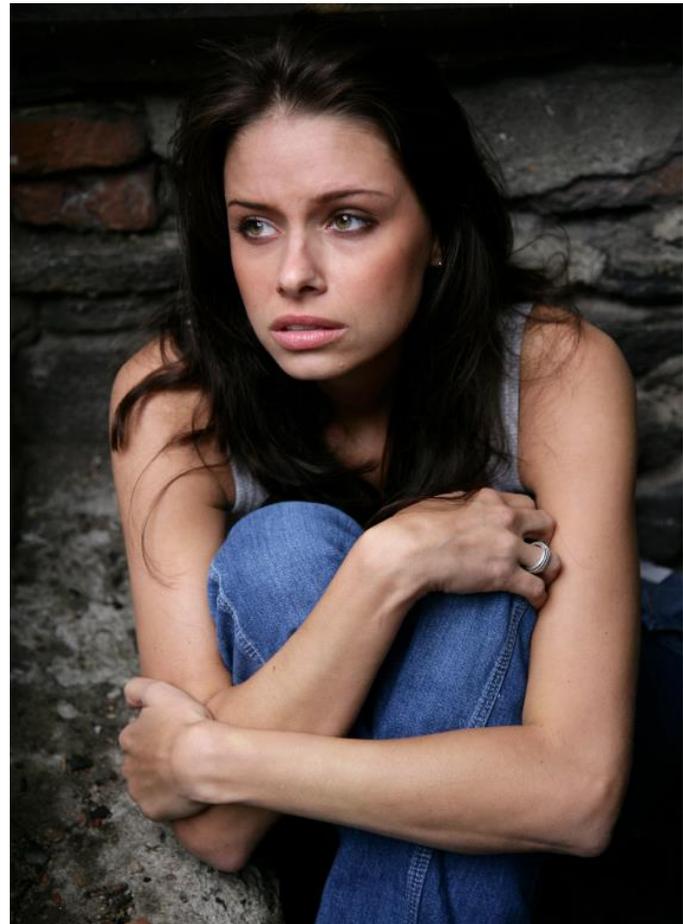
**How to Improve Smoking  
Cessation Practice.**

A dark, atmospheric scene from a zombie movie. In the center, a zombie with a bloody, screaming face and outstretched arms stands prominently. He is wearing a dark jacket with blood on it. The background shows a city street at night with tall buildings and other zombies in various states of decay and movement. A semi-transparent dark box with white text is overlaid on the lower half of the image.

Smoking is a “Habit”

## **Probability of dependence after trying a substance at least once**

<b>Tobacco</b>	<b>32%</b>
<b>Heroin</b>	<b>23%</b>
<b>Cocaine</b>	<b>17%</b>
<b>Alcohol</b>	<b>15%</b>
<b>Stimulants</b>	<b>11%</b>
<b>Anxiolytics</b>	<b>9%</b>
<b>Cannabis</b>	<b>9%</b>
<b>Analgesics</b>	<b>8%</b>
<b>Inhalants</b>	<b>4%</b>





“A Cigarette is just a Cigarette”



A Drug Delivery Device



# Cigarette engineering

## Smoke Manipulation

A review of tobacco industry documents indicates that tobacco companies use additives and other cigarette design technologies to **change** the colour, visibility and smell of sidestream smoke – the smoke produced at the burning end of a cigarette.

Permeable Paper

Tobacco

AIR

AIR

AIR

Smoke

## Front-End Lift

Cigarettes can be designed and packed with tobacco to deliver more nicotine and better taste during the first few puffs.

## Ash

Chemicals added to the cigarette paper can **change** the colour of the ash and how well it holds together.

## Temperature

The temperature of a burning cigarette during inhalation reaches 850-900 degrees Celsius.

## Filter Ventilation

A cigarette filter has tiny holes in it that allows air to be drawn in when a smoker takes a puff.

## "Light" and "Mild"

Filter ventilation is the primary innovation used to achieve lower US FTC smoking machine yields. These lower yield cigarettes are marketed as "light" and "mild", but the numbers do not represent the actual amounts of tar and nicotine that a smoker may inhale.

## Compensation

Smokers of "light" and "mild" brands **change** their smoking behaviour in order to meet their individual nicotine requirements. Smokers compensate by blocking vent holes and by taking more, or bigger puffs.

Air Vents

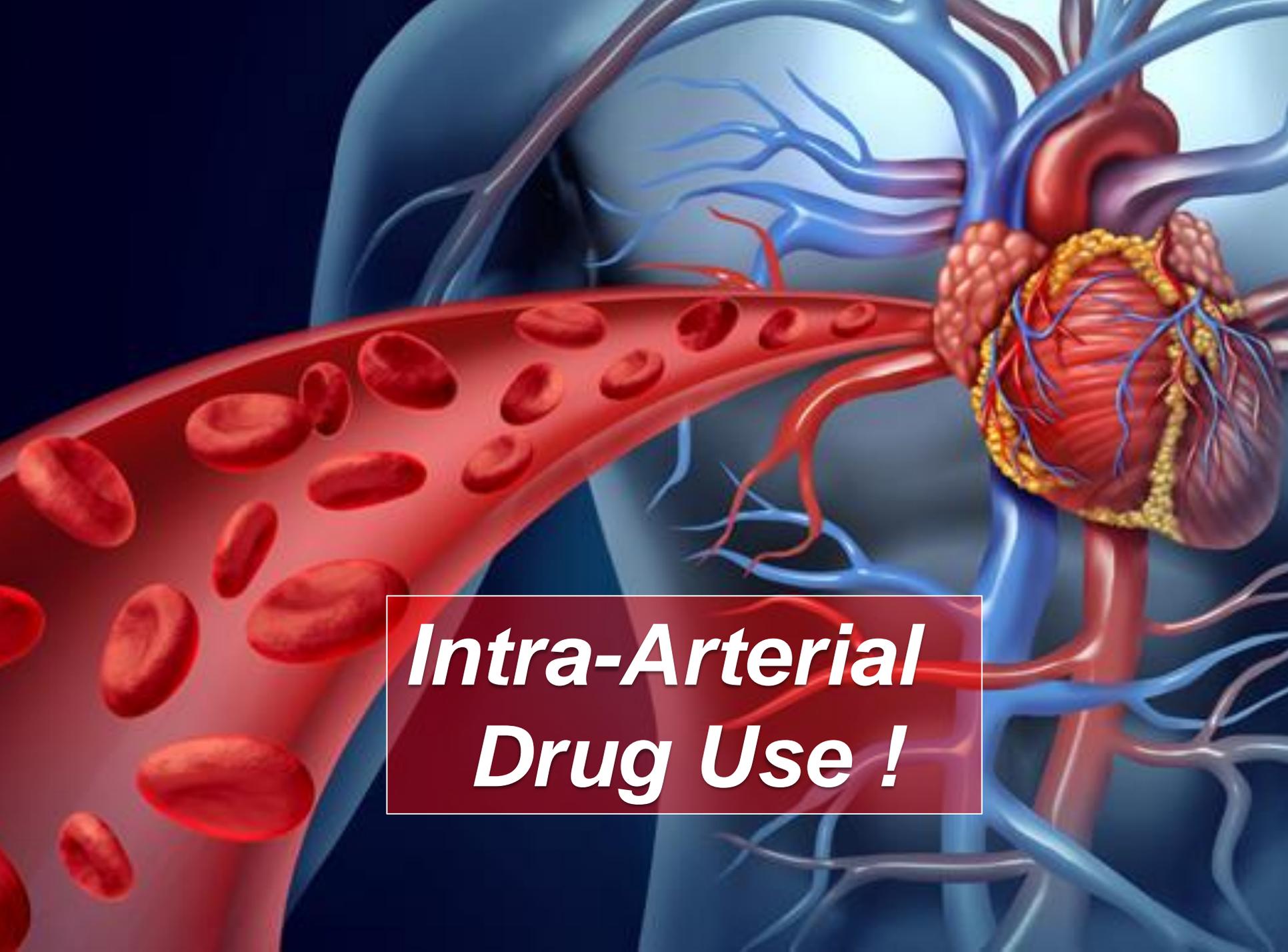
AIR

Smoke filtered and diluted with air

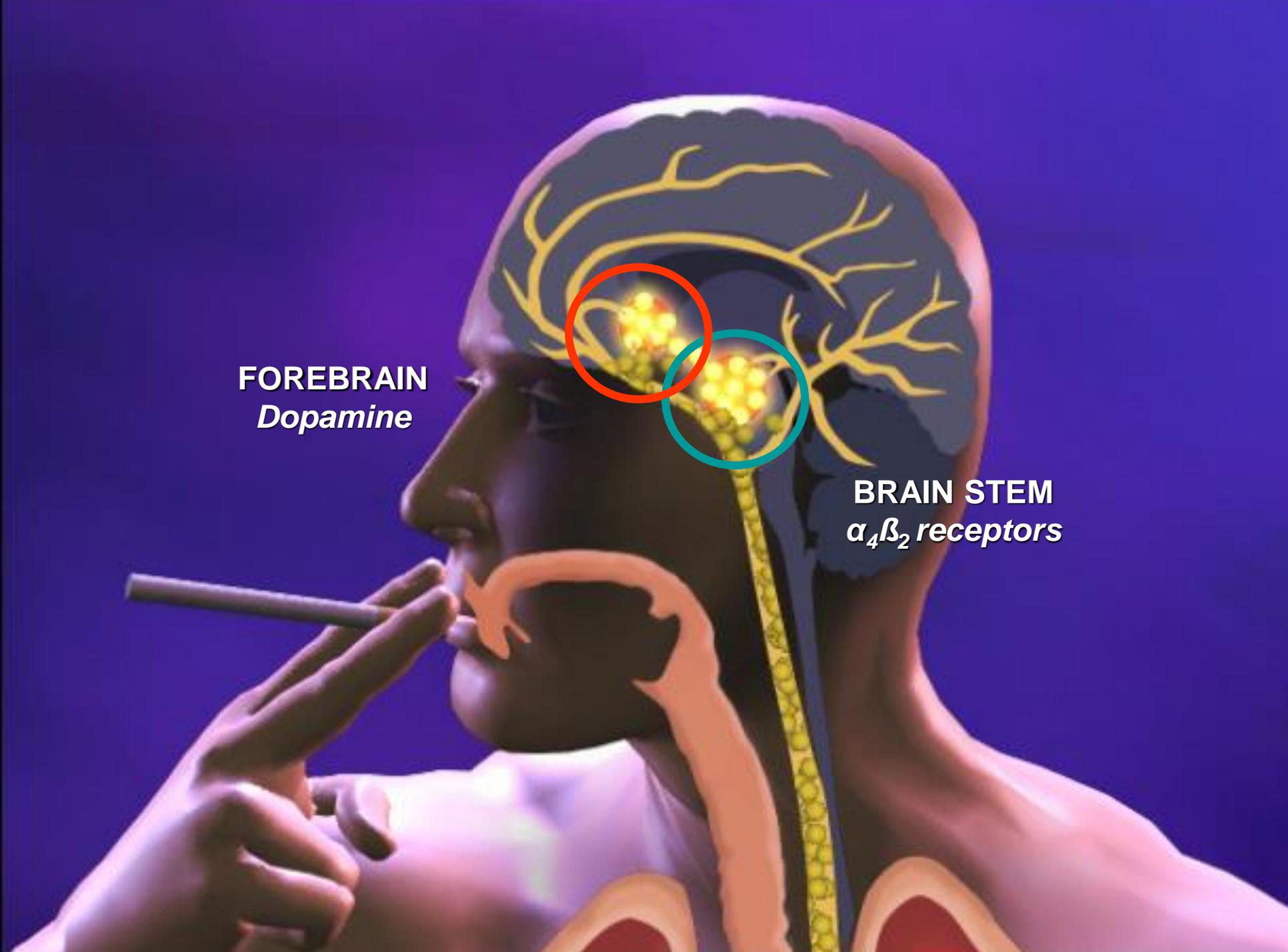
Filter

## Ventilation Methods

There are three different ways to ventilate a filter – electrostatic perforation, mechanical perforation, or laser perforation. Different ventilation methods can **change** the amount of tar and nicotine delivered to the smoker.



***Intra-Arterial  
Drug Use !***

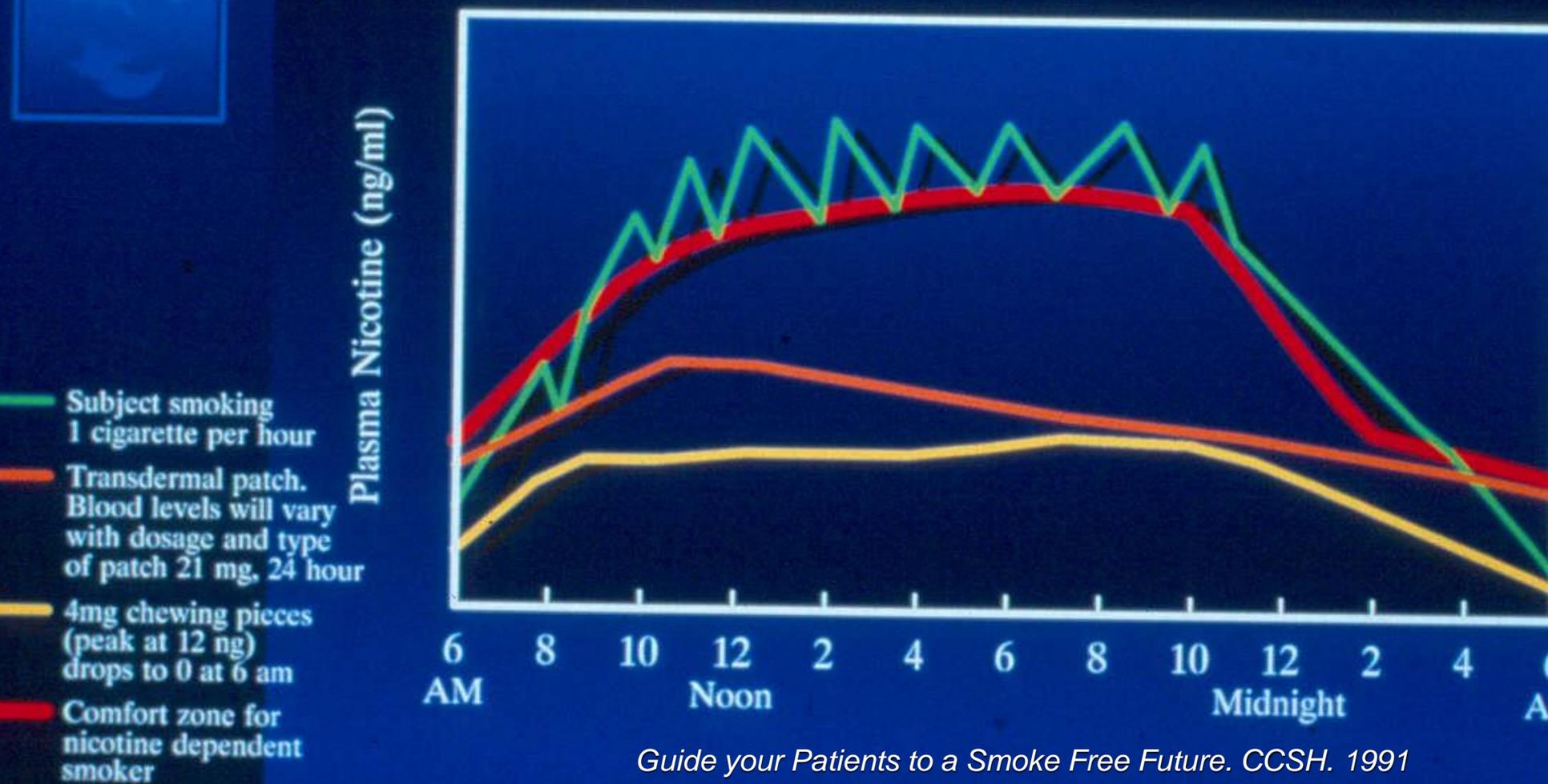


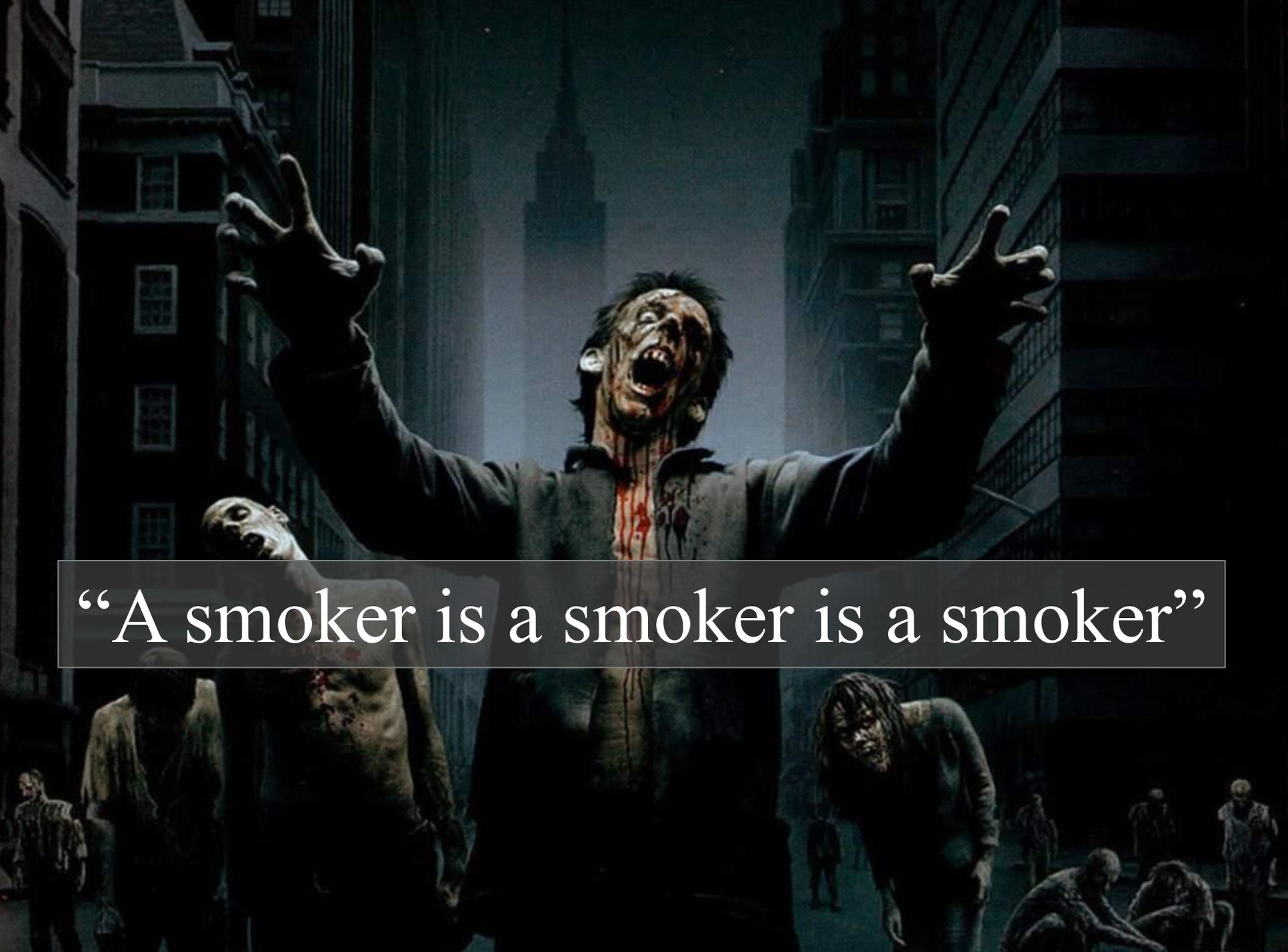
**FOREBRAIN**  
*Dopamine*

**BRAIN STEM**  
 *$\alpha_4\beta_2$  receptors*

A  
SMOKE  
FREE  
FUTURE

# A Day in the Life of Blood Nicotine



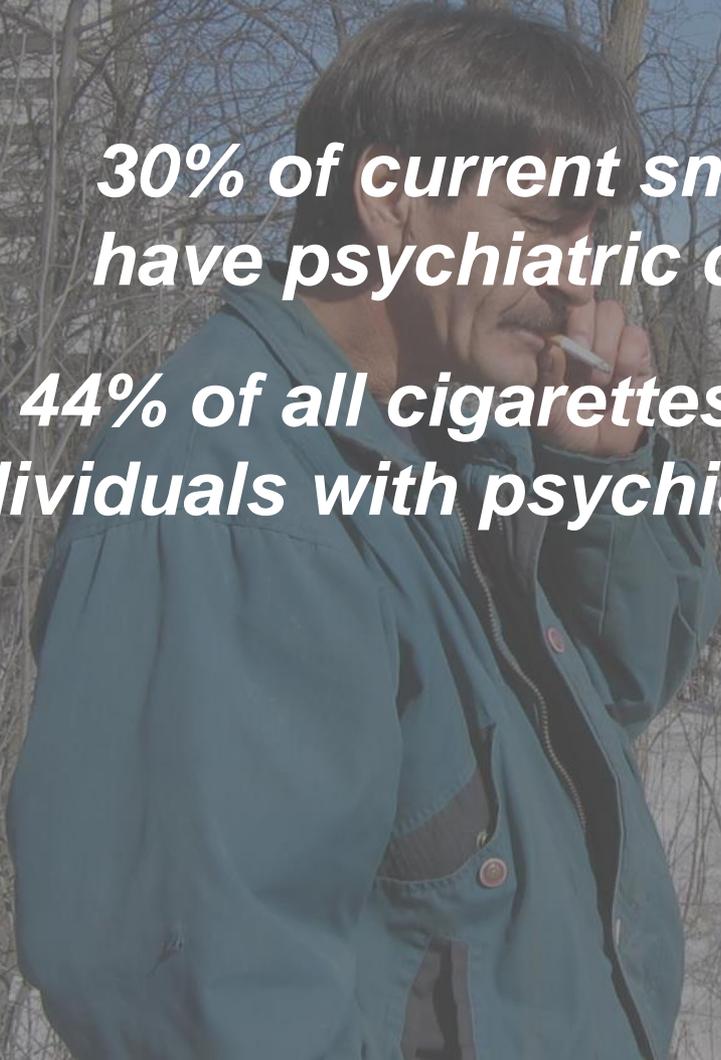
A dark, atmospheric scene from a zombie movie. In the center, a zombie with a bloody, screaming face and arms raised in a 'V' sign stands prominently. He is wearing a dark jacket with blood on it. The background shows a city street at night with tall buildings and other zombies in various states of decay and movement. A semi-transparent white box with a dark border is overlaid across the middle of the image, containing a quote in white serif font.

“A smoker is a smoker is a smoker”

# ***“The Hardened Smoker”***

***30% of current smokers are said to have psychiatric co-morbidities!***

***44% of all cigarettes are consumed by individuals with psychiatric co-morbidities!***



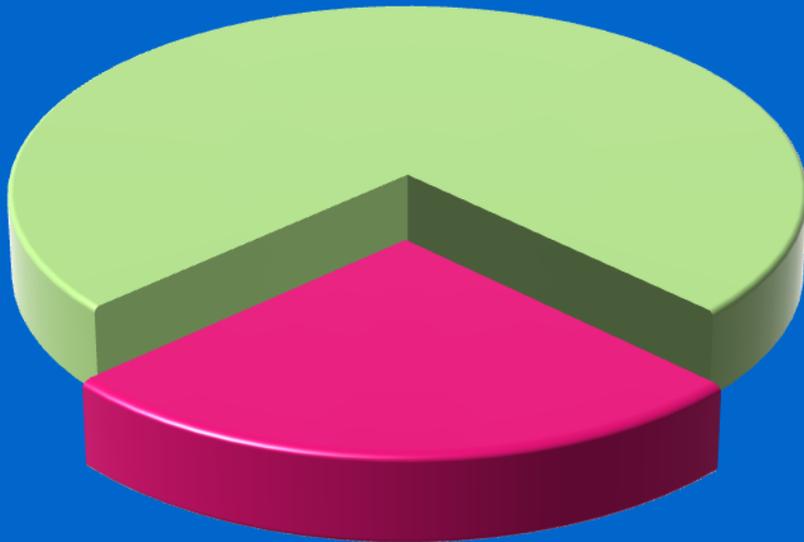
***Persons with chronic mental illness die  
25 years earlier than others ...***



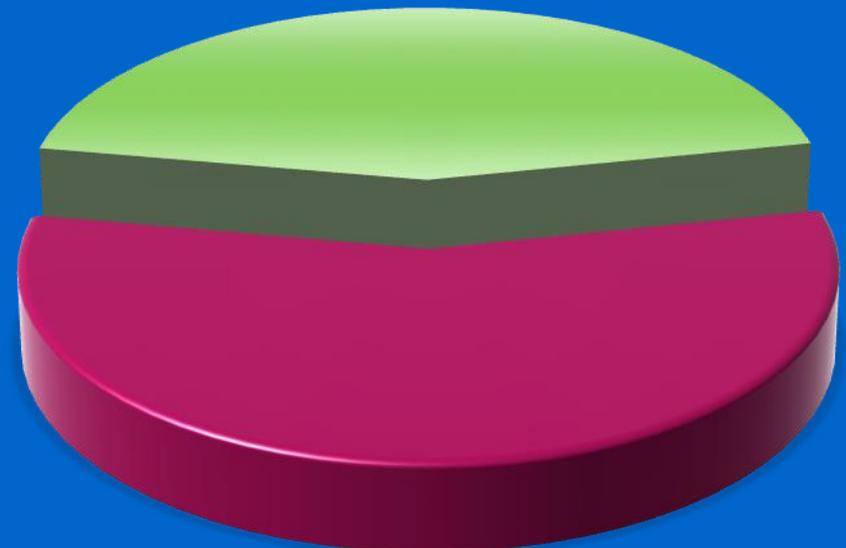
***... Tobacco addiction is the major  
contributor to that premature mortality.***

# Depression and Smoking

General Population



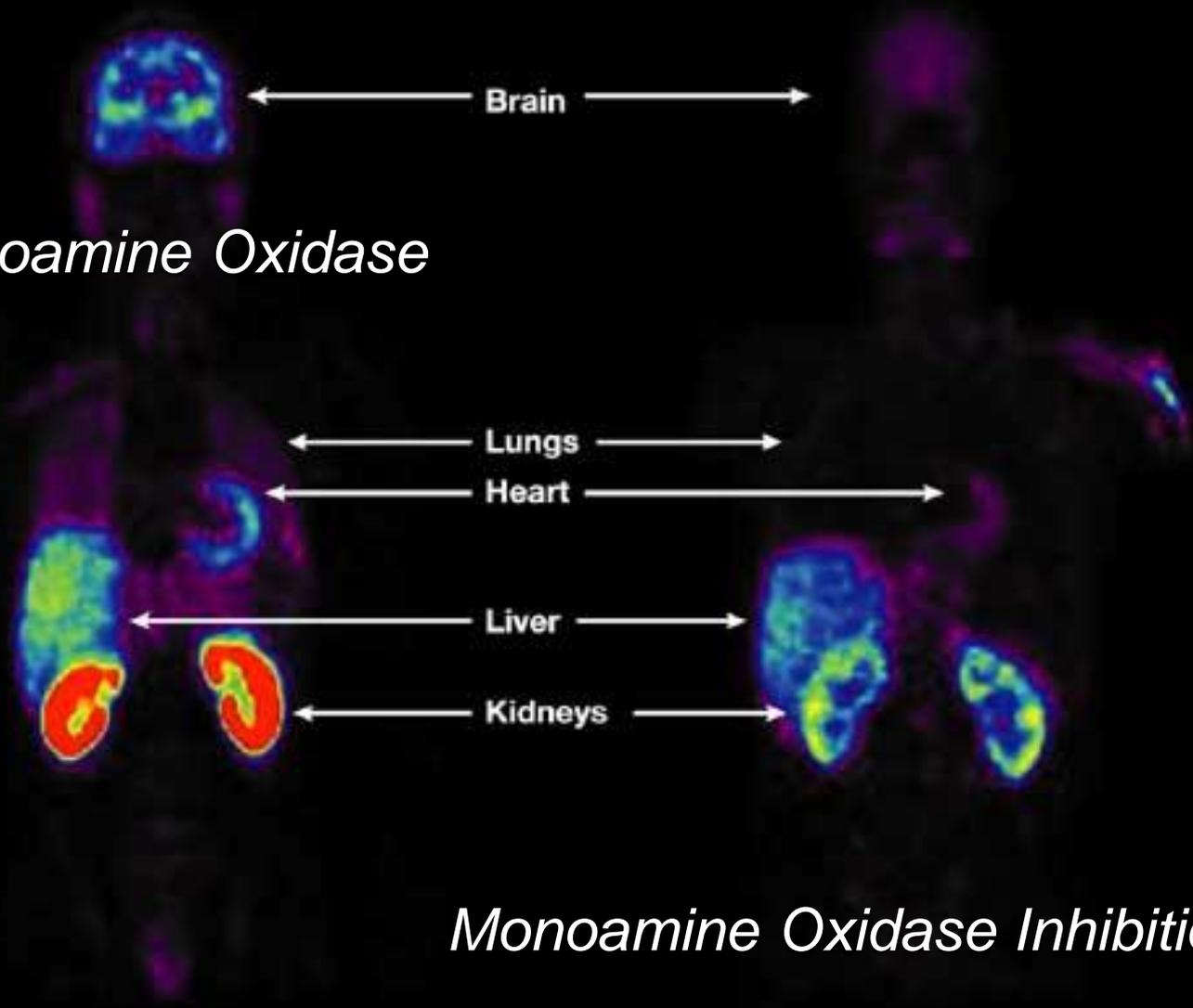
Depressed Population



■ Non-Smokers ■ Smokers

Farrell et al. *Int Rev Psychiatry*. 2003;15:43-49; Mackay et al. *The Tobacco Atlas*. 2nd ed. 2006.

*Monoamine Oxidase*

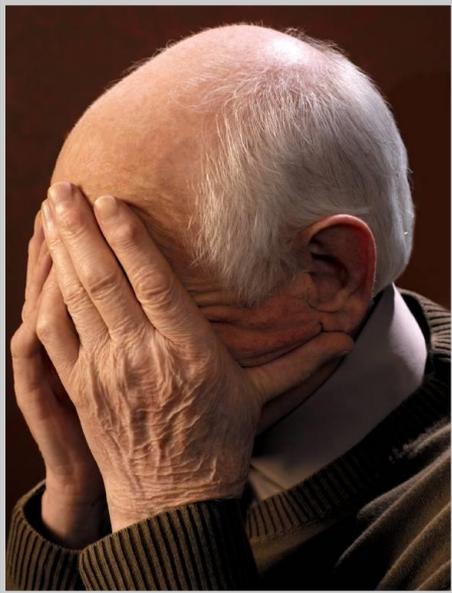


*Monoamine Oxidase Inhibition*

Non-smoker

Smoker

# ***Smoking & Symptomatology***



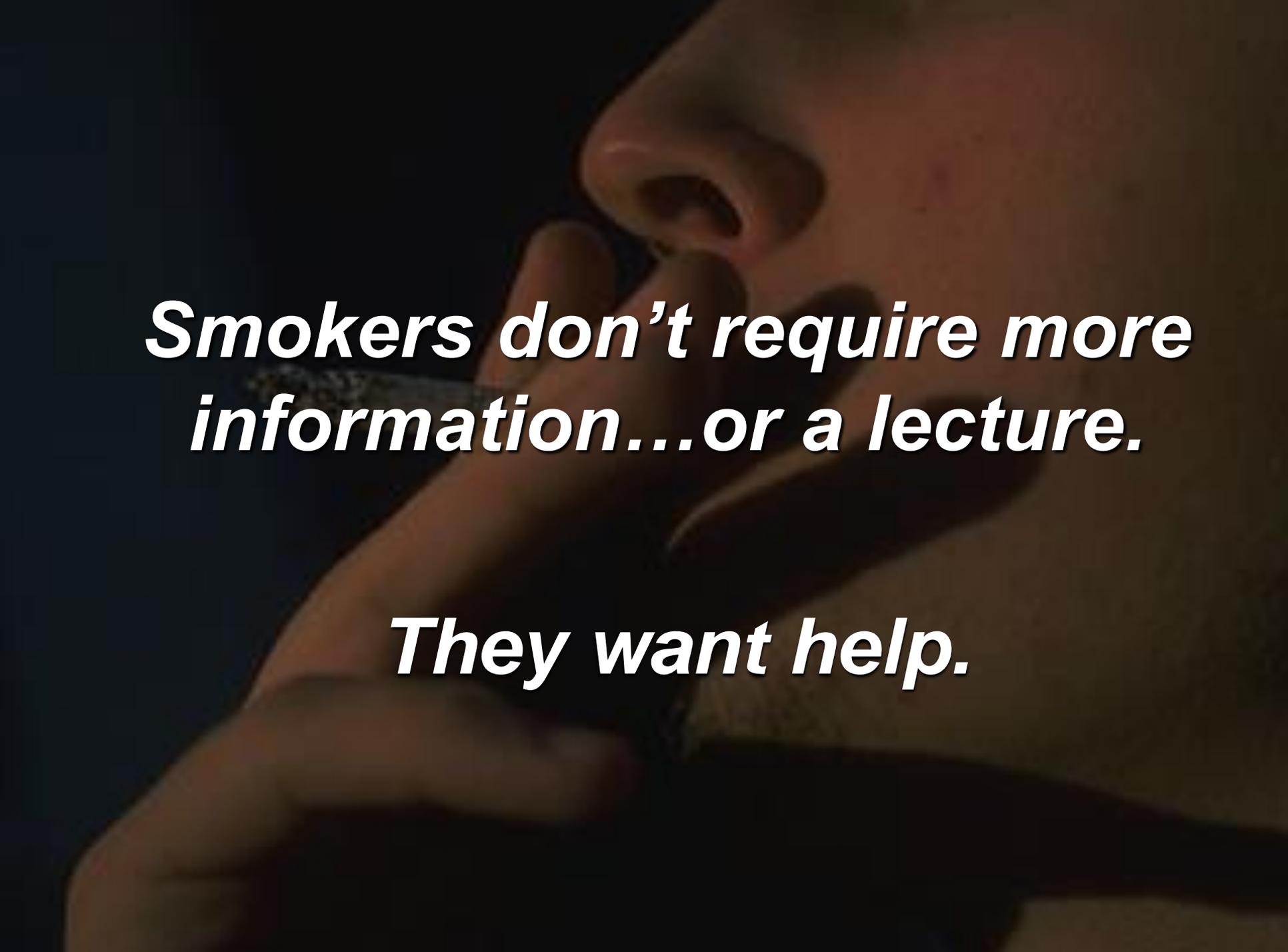
In patients with schizophrenia, smoking may be associated with improvements in specific symptoms and cognitive measures ...

Compton et al. *Harv Rev Psychiatry*. 2006;14(4):212-222



## ***Caffeine Ingestion***

- *Caffeine metabolism altered by cessation*
- *Caffeine levels may rise: 2-3 x higher !*
- *Consider reducing caffeine intake*
- *Consider substituting de-caffeinated drinks*
- *Be aware of similarities between 'caffeinism' and withdrawal symptoms*



***Smokers don't require more  
information...or a lecture.***

***They want help.***



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OTTAWA MODEL  
FOR SMOKING CESSATION  
MODÈLE D'OTTAWA  
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# *Clinician's Advice*



***Clear***  
***Strong***  
***Personalized***

*“unambiguous and non-judgmental”*

**Matched by an institutional  
commitment to “best practice” !**



# ***Pharmacotherapy***

## **3 “First Line Therapies”**

**NRT**

**bupropion**

**varenicline**



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***Sometimes the doorway has to be opened wider, or held open longer...***

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***Titrate Therapy:***  
***Dose***  
***Duration***  
***Combination***

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# ***Nicotine Replacement Therapy***

***Rationale***

***Products***

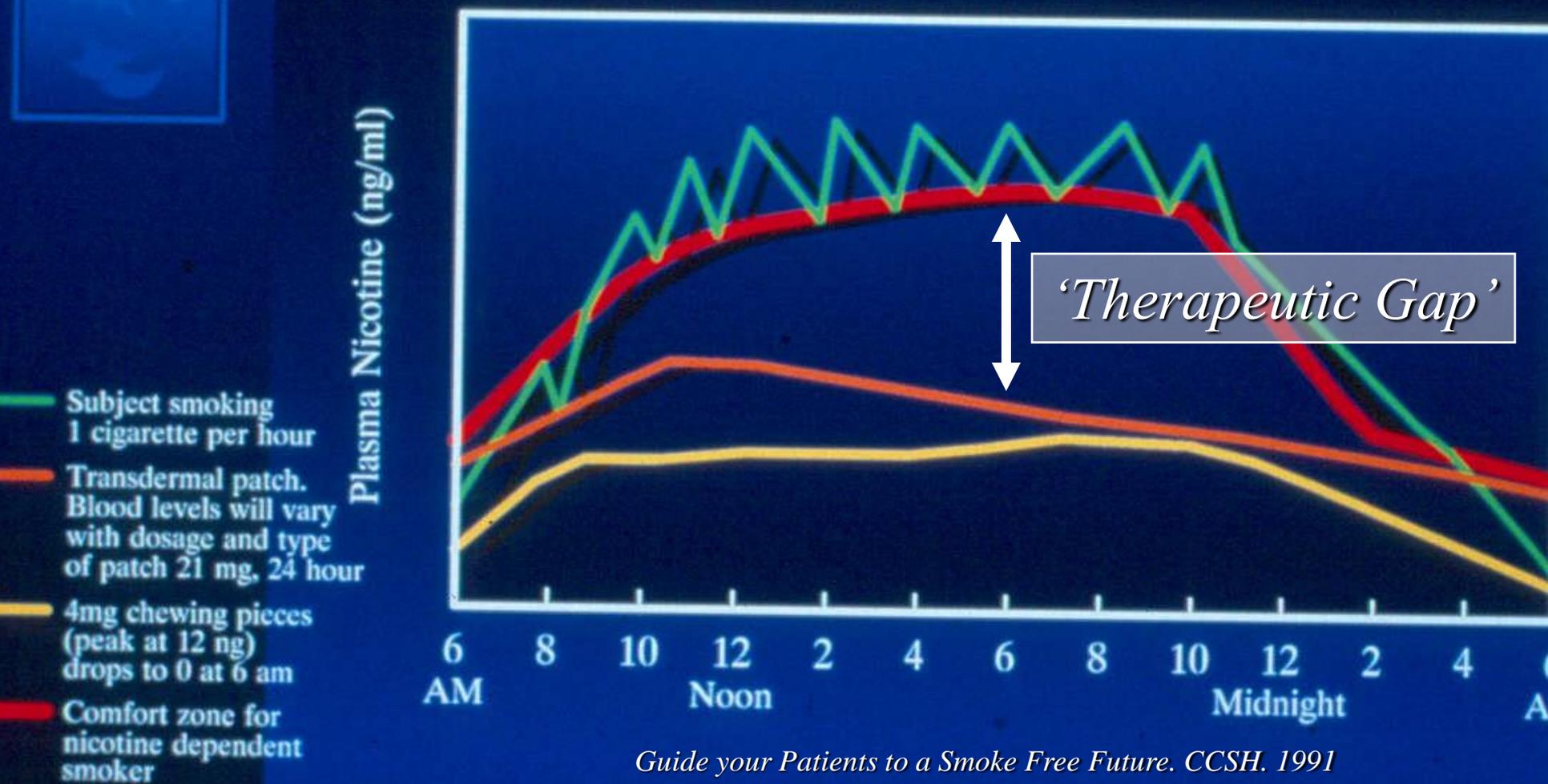
- The ‘Patch’***
- Chewing Pieces***
- Lozenges***
- Nicotine ‘Inhaler’***
- Nicotine Spray***

***Advantages***

***Shortcomings***

A  
SMOKE  
FREE  
FUTURE

# A Day in the Life of Blood Nicotine





# *Standard Orders*

*1 pack a day*

*21 mg + and Inhaler*

*2 packs a day*

*42 mg + and Inhaler*

*3 packs a day*

*further titration prn*

*In every case recognize the need for titration*

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A dark, atmospheric scene from a zombie movie. In the center, a zombie with a bloody, screaming face and arms raised in a 'V' sign stands prominently. He is wearing a dark jacket with blood splatters. The background shows a city street at night with tall buildings and other zombies in various states of decay and movement. The lighting is low and moody, with a blueish-grey tint.

You can't use NRT in cardiac patients!



***There are no significant clinical changes in blood pressure during the use of NRT, varenicline and/or bupropion.***



# ***“Zombie Concepts”***

***“The safety of nicotine-replacement therapy in cardiovascular disease patients is supported by data from randomized trials, efficacy studies, observational data and physiologic studies.”***

Joseph AM, Fu, *Progress in Cardiovascular Diseases* 2003;45:429-441



## ***NRT and CV Risk***

***“Clinical trials of NRT in patients with underlying, stable cardiovascular disease suggest that nicotine does not increase cardiovascular risk.”***

Benowitz NL, Gourlay SG. *J Am Coll Cardiol* 1997;29:1422-31.



## ***NRT and CV Risk***

***“High-dose nicotine treatment, even with concomitant smoking, caused no short-term adverse effects on the cardiovascular system.”***

Zevin S, Peyton J, Benowitz NL. *Clin Pharmacol Ther* 1998;64:87-95.



## ***NRT and CV Risk***

***“The use of nicotine patches did not cause aggravation of myocardial ischemia or arrhythmia in coronary patients and therefore can be used as a method to promote smoking cessation in this high-risk group.”***

Tzivoni D, Keren A, Meyler et al. *Cardiovasc Drugs Ther* 1998;12:239-244.



## ***NRT and CV Risk***

***“The use of NRT is not associated with any increase in the risk of myocardial infarction, stroke, or death.”***

**N = 33,247**

Hubbard R, Lewis S, et al. *Tobacco Control* 2005;14:416-421

# UOHI Smoking Cessation Programme

## Use of NRT in the Cardiac Setting

	<b>Smoking Patients</b>	<b>NRT</b>	<b>Male NRT</b>	<b>Female NRT</b>	<b>ACS</b>	<b>% ACS NRT</b>
<b>2004-2005</b>	<b>1,016</b> <i>(23%)</i>	<b>194</b> <i>(19%)</i>	<b>149</b> <i>(20%)</i>	<b>45</b> <i>(17%)</i>	<b>176</b>	<b>68</b> <i>(39%)</i>
<b>2005-2006</b>	<b>1,489</b>	<b>657</b> <i>(44%)</i>	<b>477</b> <i>(46%)</i>	<b>180</b> <i>(41%)</i>	<b>501</b>	<b>318</b> <i>(63%)</i>
<b>2006-2007</b>	<b>1,065</b>	<b>638</b> <i>(60%)</i>	<b>453</b> <i>(60%)</i>	<b>185</b> <i>(60%)</i>	<b>342</b>	<b>240</b> <i>(70%)</i>



## ***NRT and CV Risk***

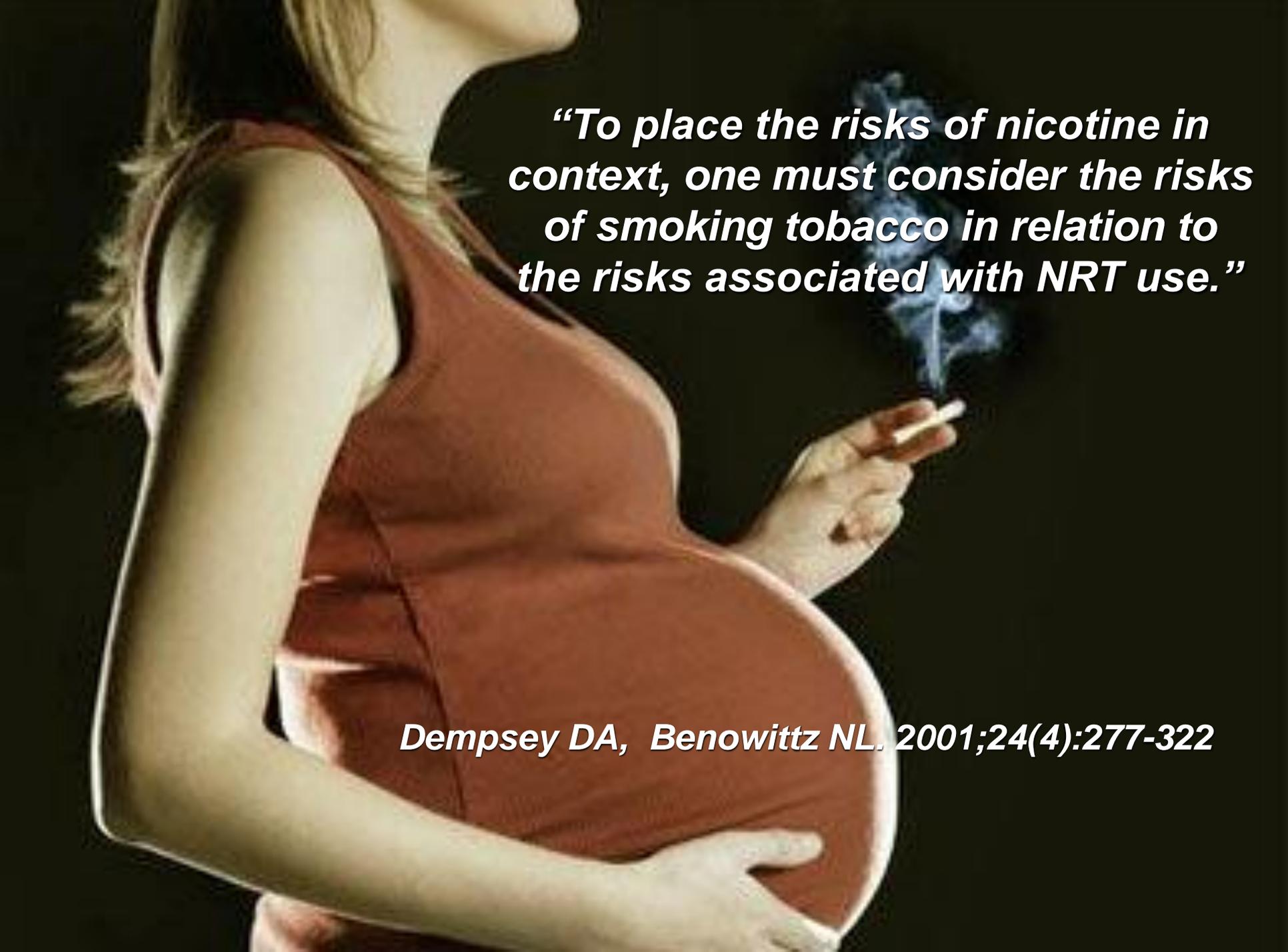
***“Patients with pre-existing cardiovascular disease represent one of the groups most likely to benefit from smoking cessation and our results should encourage the use of NRT in these individuals.”***

Hubbard R, Lewis S, et al. *Tobacco Control* 2005;14:416-421

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You can't use NRT in pregnancy!

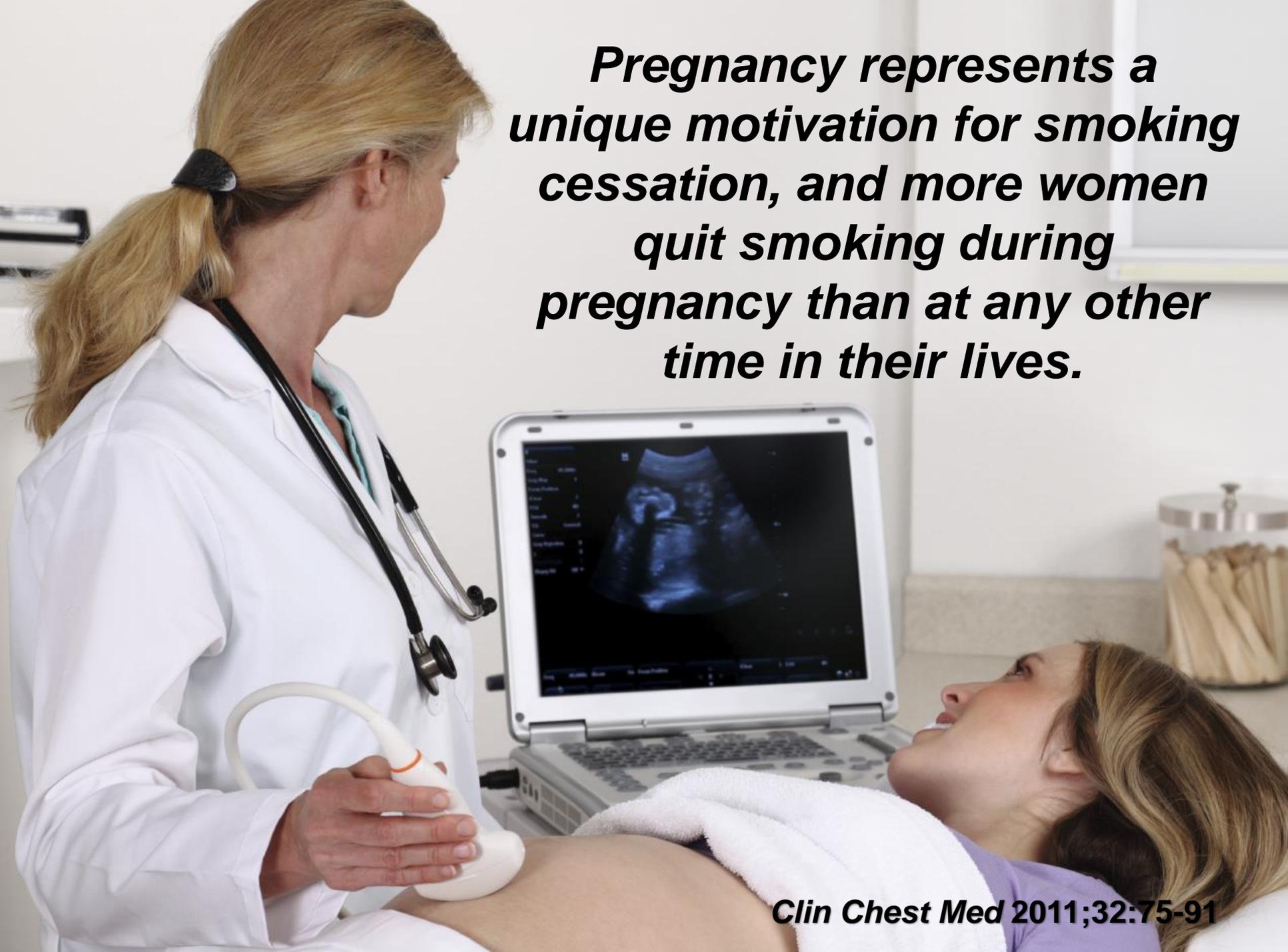


A pregnant woman is shown in profile, wearing a red tank top. She is holding a lit cigarette in her right hand, and a plume of white smoke is rising from the cigarette. The background is dark. The text is overlaid on the right side of the image.

***“To place the risks of nicotine in context, one must consider the risks of smoking tobacco in relation to the risks associated with NRT use.”***

***Dempsey DA, Benowitz NL. 2001;24(4):277-322***

***Pregnancy represents a unique motivation for smoking cessation, and more women quit smoking during pregnancy than at any other time in their lives.***



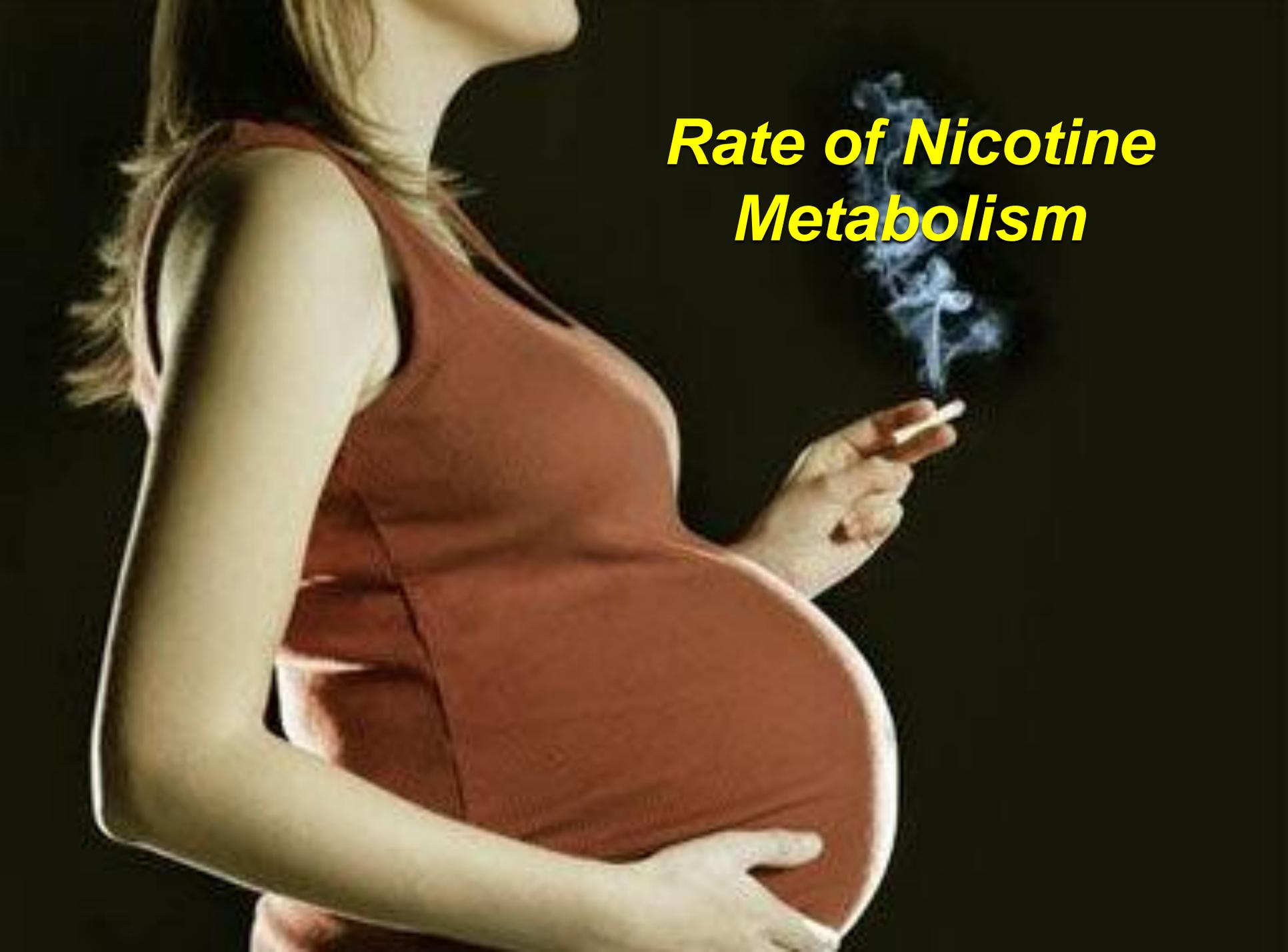


***Smoking during pregnancy increases the risk of placental problems (praevia and/or abruptio), chronic hypertensive disorders, and fetal death***



***Smoking increases the risk  
of low birth weight infants***

***Obstet Gynecol Clin N Am 2014;41:255-266***



***Rate of Nicotine  
Metabolism***



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Woolf SH. *JAMA* 1999;282(24):2358-65.