



UNIVERSITY of  
**ROCHESTER**  
MEDICAL CENTER



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Julius B. Richmond Center of Excellence

# Second-hand tobacco smoke and children: at the frontlines

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Disclosure:  
In the past 12 months, I have had no relevant financial relationships with the manufacturers of any commercial product or providers of commercial services discussed in this CME activity. I do not intend to discuss an unapproved or investigative use of a commercial product or device in my presentation.

*Illustrated Surgeon General's  
Report on Smoking  
Alfred Gescheidt, 1964*

# Learning objectives

At the end of the lecture, the audience will:

1. Be able to describe the extent of second-hand smoke exposure, and our current knowledge of its consequences
2. Understand the pathophysiology underlying the toxic effects of SHS
3. Know the definition of “third-hand” smoke, and the most recent evidence for harm
4. Be able to help patients’ families reduce children’s exposure to SHS

# Overview

- Case based presentations
  - Epidemiology and evidence of harm
  - Pathophysiology
  - Third-hand smoke
  - How to help families reduce exposure
  - Using the inpatient setting to help families reduce exposure

# Case 1

- Michael, a 14 year old boy, comes in for a well child visit. He was born in 1995.
- Mom reports that Dad smokes, usually in the garage while working on his car.
- After you ask his mom to leave the room, Michael discloses that he has tried smoking a cigarette on two occasions.

# Case 1: the burning question

- What are the statistics behind SHS exposure in children?
- How do we know it's bad?
- How does exposure to SHS, and parental smoking, impact adolescents' willingness to try cigarettes?

# Epidemiology

- 60% of children 3-11 had detectable cotinine levels in the 1999-2002 NHANES (down from 85% in Phase 1 & 2)
  - 22 million children
- 20% of children under 7 are regularly exposed to SHS in the home (NHIS 1998)
- Significant increases in percent of families with smoking bans, and reductions in total cigarettes smoked in the home

# Evidence of harm

- In 1986, 9 years before Michael's birth, the Surgeon General reported:
  - “Children of parents who smoke...have an increased frequency of respiratory infections, increased respiratory symptoms, and slightly smaller rates of increase in lung function as the lung matures”.
  - “The simple separation of smokers and nonsmokers within the same air space may reduce, but does not eliminate, the exposure of nonsmokers to environmental tobacco smoke.”

# Population attributable risks

- Annually:
  - 200,000 cases of childhood asthma
  - 150,000-300,000 cases of lower respiratory illness
  - 800,000 middle ear infections
  - 25,000-72,000 low birth weight or preterm infants
  - 430 cases of SIDS

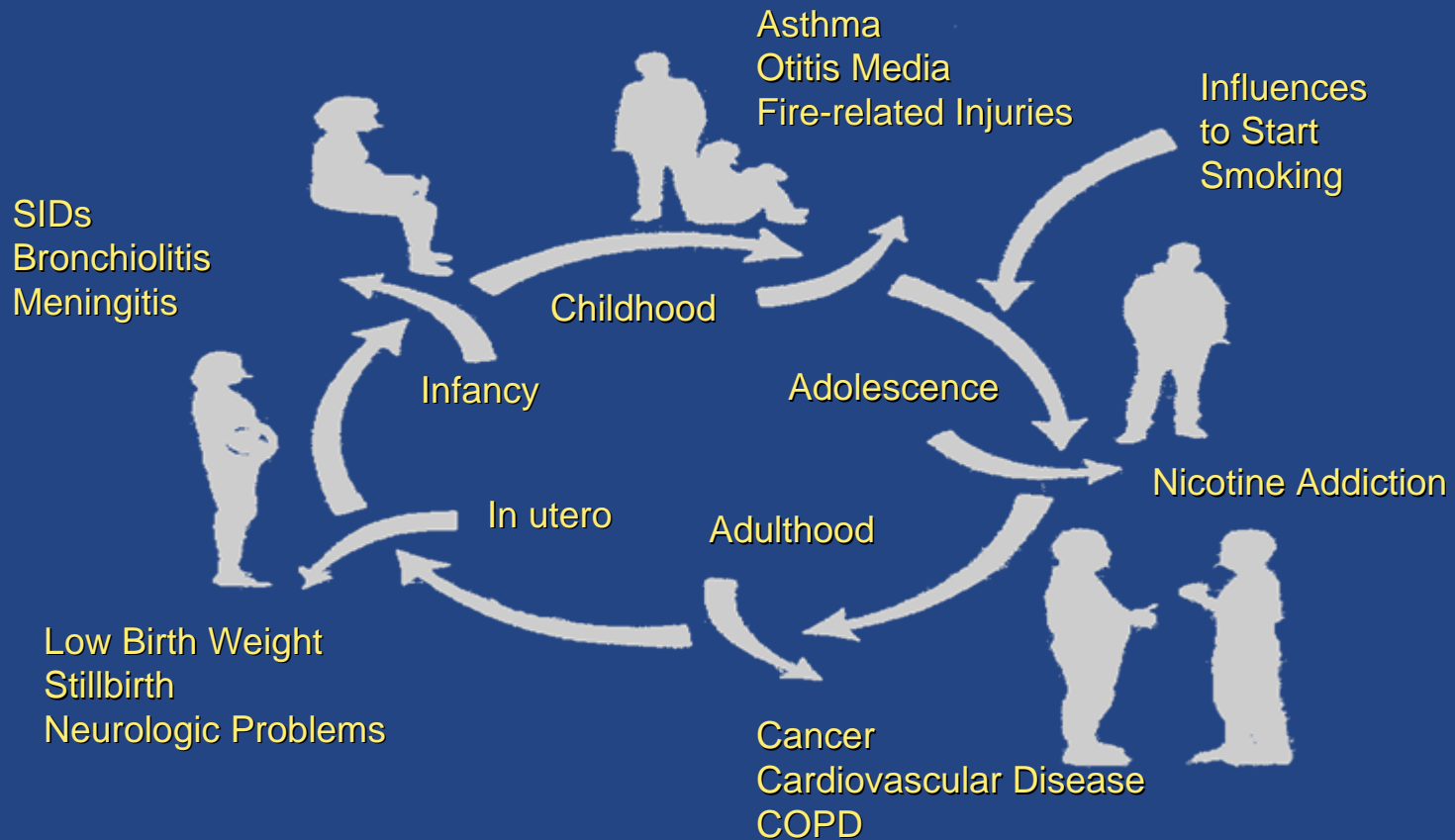
# 2006 Surgeon General's report

- Major findings for children:
  - SHS causes premature death and disease in children
  - Children exposed to SHS are at increased risk for:
    - SIDS
    - Acute respiratory infections
    - Asthma
    - Ear problems
  - ***There is no risk-free level of exposure to SHS***

# 2006 Surgeon General's report

- Major finding for children, continued:
  - Eliminating smoking in indoor spaces fully protects nonsmokers from exposure to SHS. Separating smokers from nonsmokers, cleaning the air, and ventilating buildings cannot eliminate exposures of nonsmokers to SHS.

# The Life Cycle of Smoking



Aligne CA, Stodal JJ. Tobacco and children: An economic evaluation of the medical effects of parental smoking. Arch Pediatr Adolesc Med. 1997;151:652

# Adolescents are special...

- Teens become addicted to tobacco more quickly than adults
  - Dependency can be evident without daily use.
  - Dependency can begin within a day after the first inhalation.
  - Teens have reported craving a cigarette before they have ever actually smoked one.
  - Kids who have parents who smoke are more likely to smoke themselves
  - Kids who have parents who quit, are more likely not to start.

## Case 2

- Ava, a three year old girl with a history of asthma comes in for an acute episode of wheezing.
- Mom reports that she has been giving her the prescribed Flovent twice a day, but she started having increased wheezing and shortness of breath yesterday.
- When asked, she said that Ava's father, who had quit smoking 6 months ago, started again after losing his job.

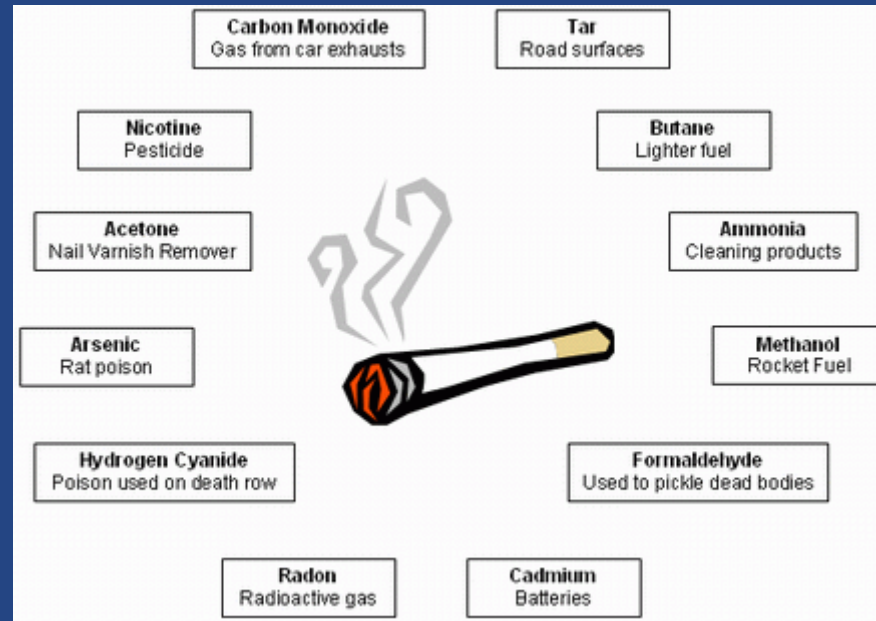
# Case 2: the burning question

- What is the pathophysiology underlying Ava's response to the cigarette smoke?

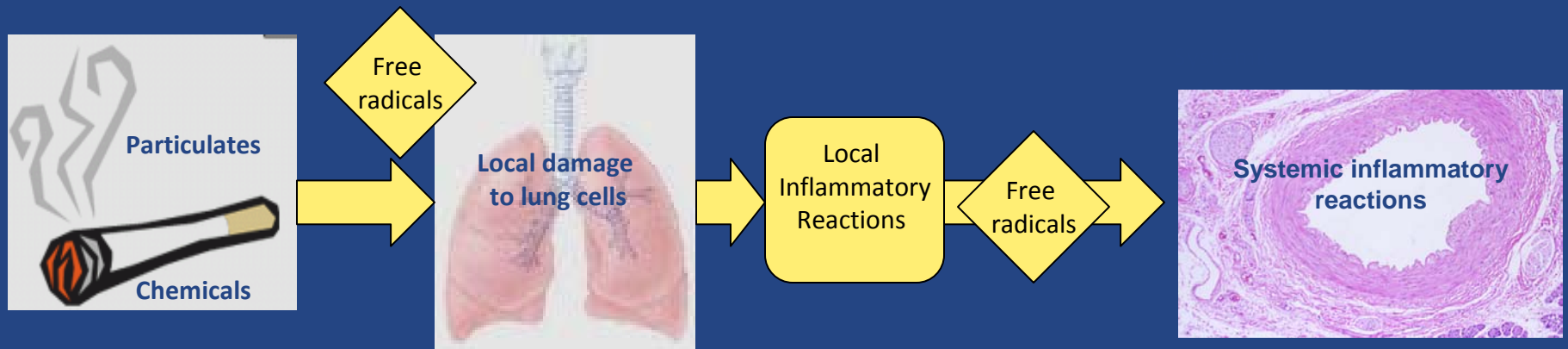
# Back to basics

- Cigarette smoke components
- Effects on lung tissue
- Systemic effects
  - Oxidative stress
  - Inflammation
  - Genetic damage

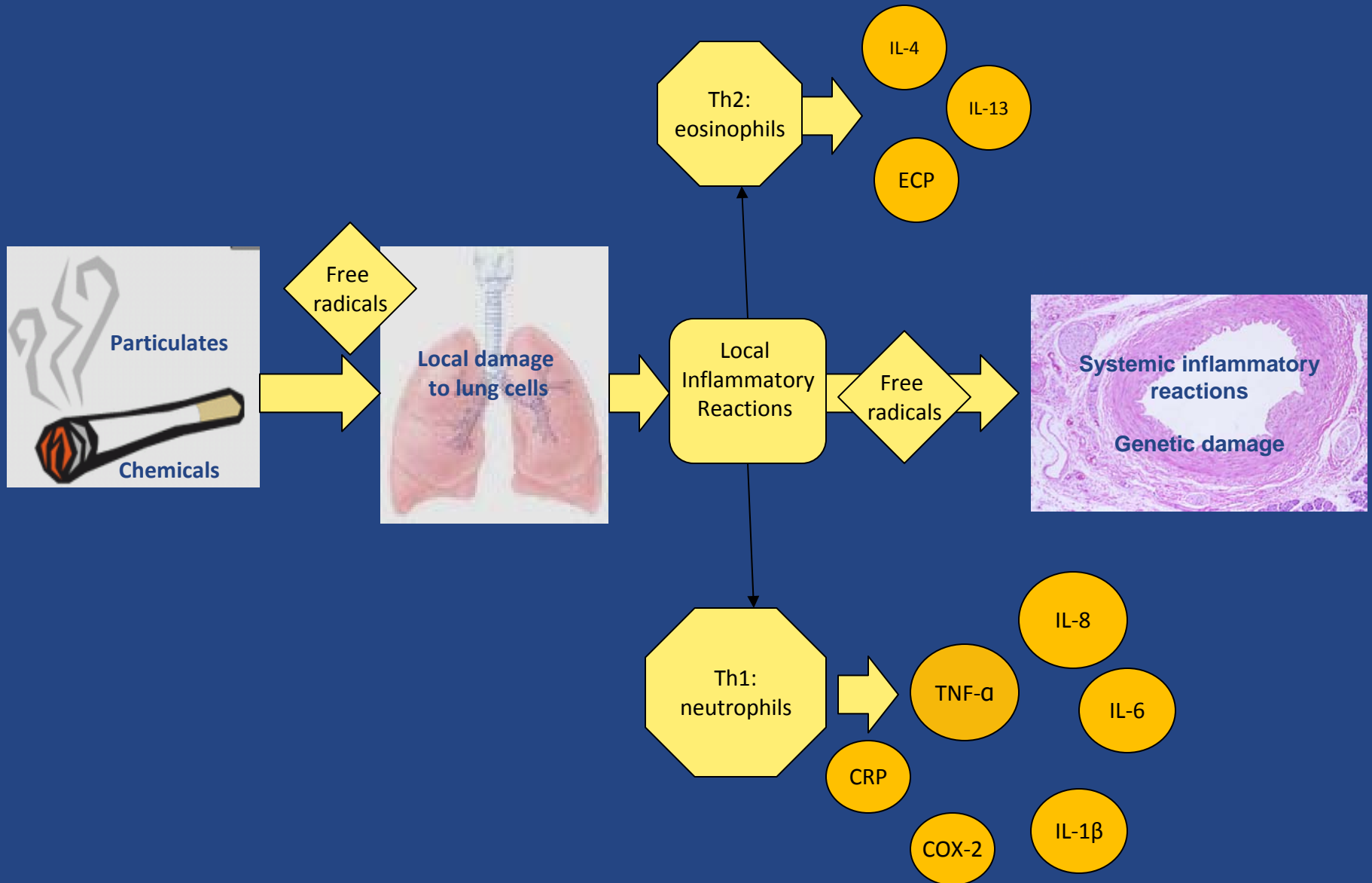
# Cigarette smoke components



# Biochemical effects of SHS



# Biochemical effects of SHS



# Clinical evidence

- Several studies have found an association between SHS exposure and decreased levels of antioxidant vitamins in children
  - Recommendations for supplementation for smoke-exposed children
- Studies have found increased levels of Eosinophilic Cationic Protein (ECP), CRP, and IL-13 in smoke-exposed children.

# Animal evidence

- SHS downregulates Th1 responses
- SHS exposure causes increased IL-6, TNF- $\alpha$ , and IL-1 $\beta$ , and lower levels of vitamin E
  - In a separate study, IL-6 monoclonal antibodies can reduce SHS induced lung inflammation
- SHS exposure increases COX-2 related IBD, which is reversed with COX-2 inhibitors



# Case 3

- David is a 6 month old boy here for his well child visit.
- His parents are both at the visit, and they admit to smoking, but never around him, and always outside if he is in the house.
- David is now crawling, and putting everything in his mouth.

# Case 3: the burning question

- What is the evidence behind third-hand smoke?

# Third-hand smoke

- According to the Surgeon General's report, there is no "safe" level of SHS exposure.
- The home is still the predominant site of exposure to SHS for children.
- 65% of non-smokers, and 27% of smokers agreed that third-hand smoke harms children.
- This belief was associated with household smoking bans.

# Third-hand smoke

- Tobacco smoke leaves toxic residues that persist long after the cigarette is extinguished.
  - Particulate matter on surfaces
  - Loose household dust
  - Volatile “off-gassing”
- Cars of smokers have higher levels of dust and surface contamination, even if they report a ban on smoking in the car.

# Third-hand smoke: effect on children

- Urine cotinine levels of children with a parent who only smokes outside were 8 times higher than that of non-smoking parents (3.5 ng/mL vs. 0.33 ng/mL).
  - Mean cotinine level for children with smoke exposure in the home was 15.5 ng/mL
- Levels of nicotine in the air, and in household dust, were significantly higher in households with a family member smoking outside, than with no smokers.
- Significant amounts of nicotine were detected on the fingers of smoking mothers.

# Case 4

- Lisa is a 17 year old young lady who is at your office for her newborn's 4 day old weight check. Both children are your patients.
- Lisa and her baby are both living with her mother while she finished high school. Her mother will be the primary caregiver while Lisa is at school.
- Lisa's mother smokes in the house, and Lisa is afraid she will be kicked out if she presses her mom to quit, or even smoke outside.

# Case 4: the burning question

- How can I help reduce children's exposure to SHS?

# Addressing cessation in the office

- Parents, even those who smoke, want and expect providers to bring up second-hand smoke exposure.
- It's important to address smoking in a non-judgmental manner.

# Ask the right question!

- You don't smoke in front of her, do you?

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- No one smokes in the home, right?
- Does anyone smoke in the home?
- Is your child ever exposed to cigarette smoke?
- Is there anyone in your household that uses tobacco? Who is that? Where do they smoke? Is that inside the house?

# Ask the right question!

- Don't forget other sources of exposure:
  - Other homes the child may stay at:
    - Divorced parents
    - Grandparents
    - Daycare providers
  - Cars
  - Seepage from other apartments

# Ask the right question!

- Explore:
  - You say no one smokes around your son. Can you tell me what that means?
  - You say you always smoke outside, but I know it's hard when it's cold outside- are there ever times when you smoke in the house?

# Be specific

- Having a smoke free home means no smoking ***ANYWHERE***- home or car.
- It does ***NOT*** mean smoking:
  - Near a window or exhaust fan
  - In a basement, garage, or screen porch
  - In the car with the windows open
  - Inside only when the weather is bad
  - Cigars, pipes, or hookahs
  - On the other side of the room

# The bacon analogy



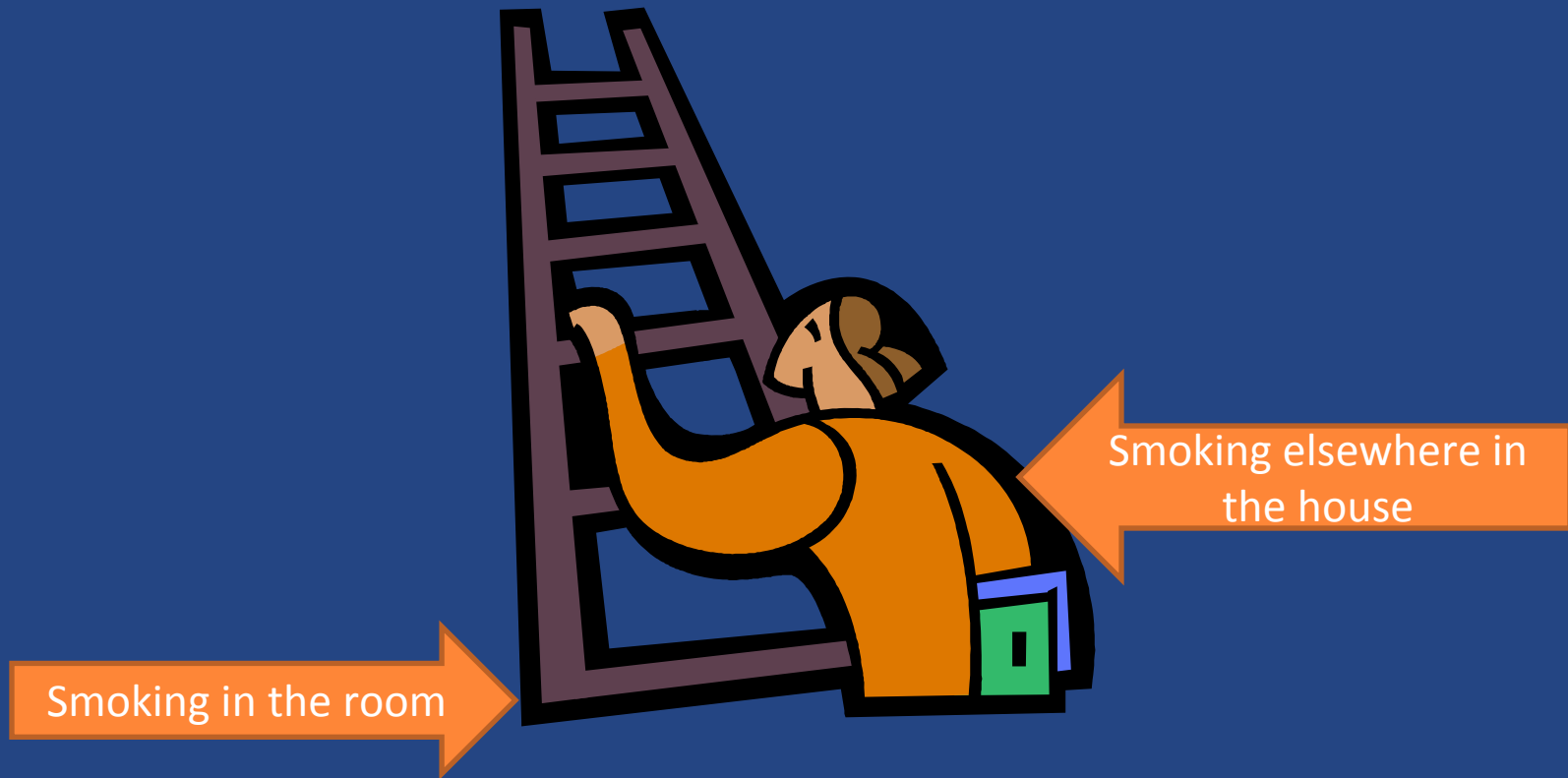
# Office based counseling

- Even small doses of counseling can add up over time.
- A complete ban may not be a reasonable first step for some smoking parents:
  - Negotiate small, acceptable steps with the parent
  - Reinforce health benefits to the child of reducing smoke exposure

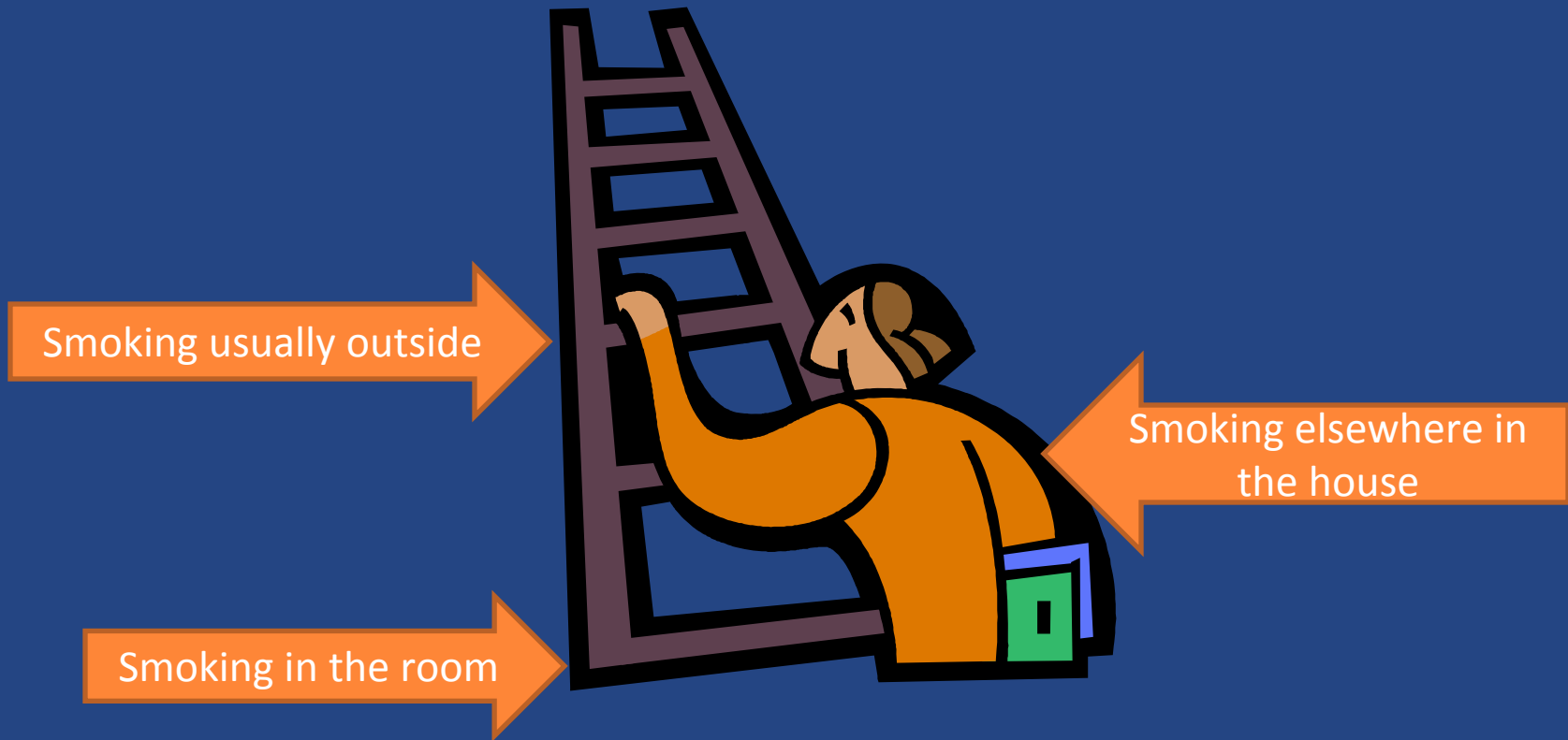
# The exposure ladder



# The exposure ladder



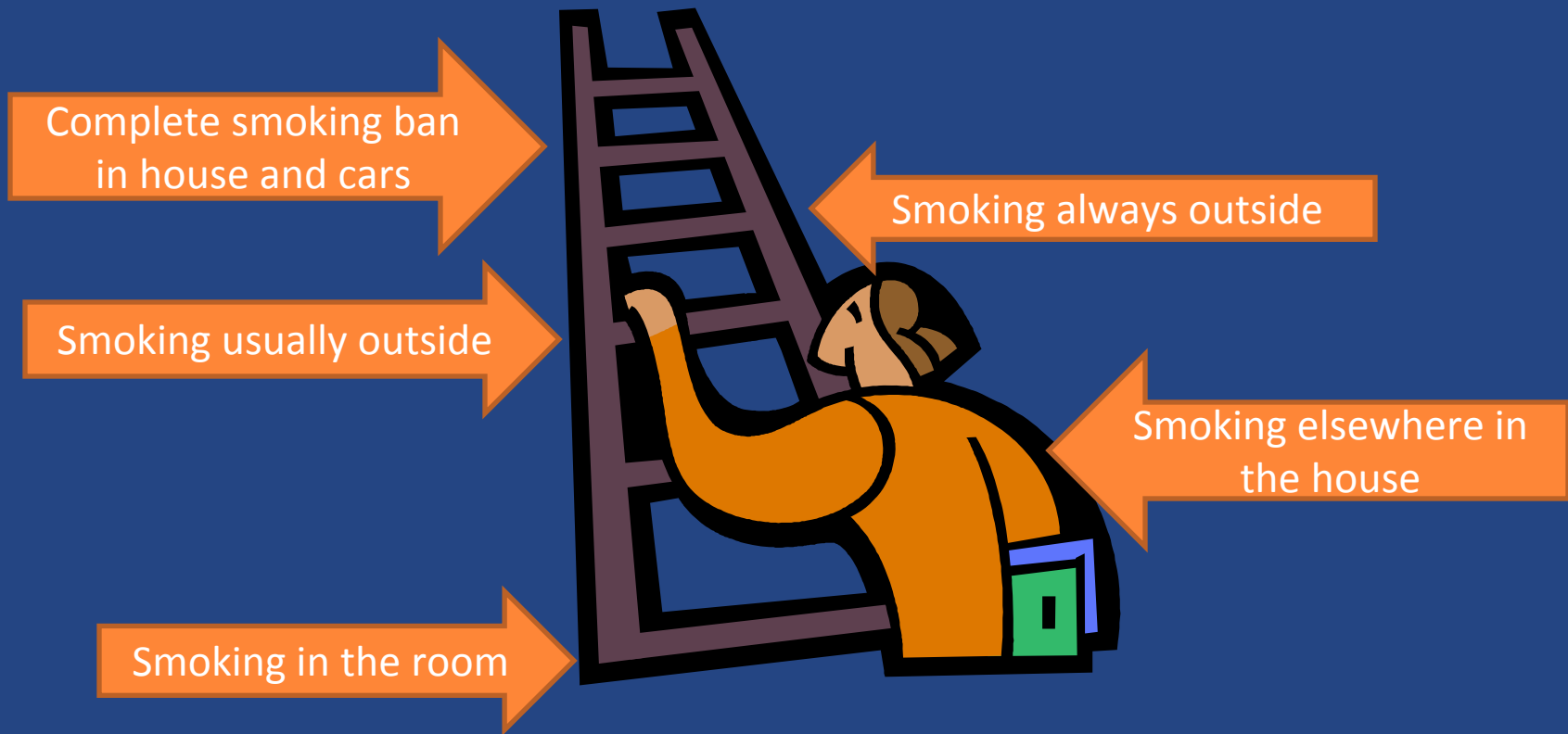
# The exposure ladder



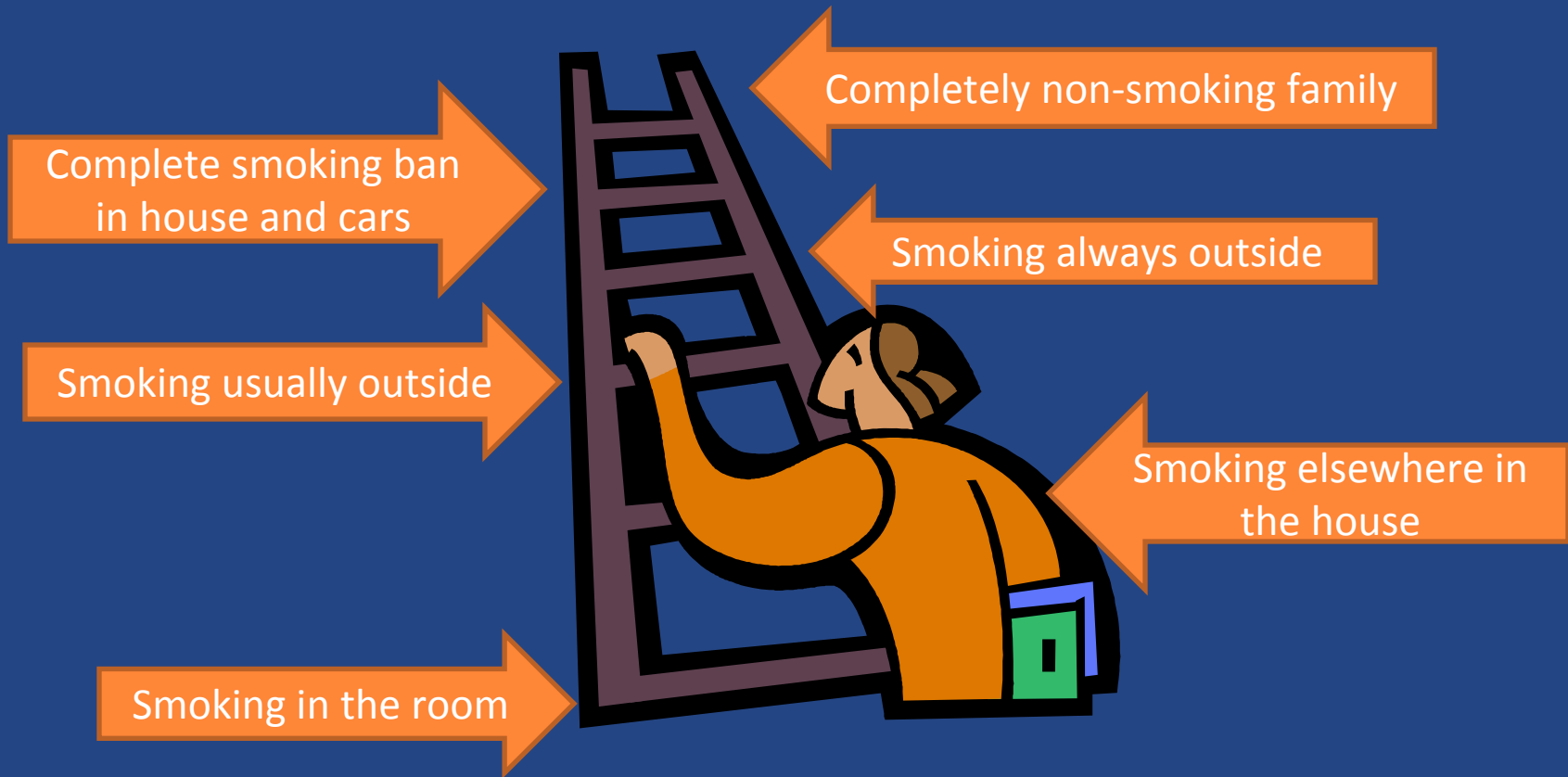
# The exposure ladder



# The exposure ladder



# The exposure ladder



# Office based counseling

- Other family members can be even more challenging:
  - Teen parents may not feel empowered to take a stand
  - Financial dependence
  - Dependence on child care
  - Domestic abuse situations

# Office based counseling

- Potential ways to mediate:
  - Write a letter to the child's family stating that cigarette smoke exposure could make the child more likely to be sick, and that you are recommending that no one smoke inside the house.
  - Ask that the smoking family member come to the next appointment, so they can be a part of the discussion.
  - Give the parent information, handouts, etc that support their position that SHS is bad for their child.
  - Work with social work and local agencies to try to find alternate child care or housing for the child.

# Case 5

- Julia is a 2 month old girl with no significant medical history, who is admitted to the hospital with RSV bronchiolitis.
- Her 3 year old brother has asthma.
- In the “Social History” section of the admission note, there is a quick notation:
  - “no smoking”

# Case 5

- When you ask mom for more details, she says she does smoke, usually outside on the porch, but now that it's winter she has been smoking inside a couple of times a day. She tries not to smoke in the same room.

# Case 5: the burning question

- Can we use the inpatient setting to help families reduce their children's second-hand smoke exposure?

# Smoking cessation in the hospital

- Parents of children hospitalized with respiratory illnesses want to hear about smoking cessation interventions.
- Hospitalization may offer a time of increased receptivity to cessation:
  - Difficulty leaving the child to smoke
  - “Teachable moment” around admissions for smoking sensitive conditions
- However screening is usually not standardized.

# Smoking cessation in the hospital

- Hospitalization allows for more intensive interventions:
  - Motivational interviewing
  - Repeat visits
  - Trials of NRT
  - Referral to quitlines
- But has challenges:
  - STRESS

# Smoking cessation in the hospital

- Offer nicotine replacement therapy for parents
- Find a person who can take responsibility for interventions
  - Nursing staff and residents are often too busy
    - But a “champion” can make all the difference!
  - Social work
  - Lactation consultant model
- Use resources such as Quitlines

# Summary

- Many children are still exposed to SHS.
- SHS causes biological changes in children, and increases their risk of many illnesses.
- Third-hand smoke causes elevation in cotinine levels in children.
- Both the office and the inpatient setting offer opportunities for the kinds of brief interventions that have been shown to reduce second-hand smoke exposure in children.

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# Resources

- Smoke Free Homes Project: A great resource for providers, with links about cessation and smokefree homes. [www.kidslivesmokefree.org](http://www.kidslivesmokefree.org)
- EPA: Another great source of information, and where to order the Smoke Free Homes trifold brochures. [www.epa.gov/smokefree](http://www.epa.gov/smokefree)
- AAP/Julius B. Richmond Center of Excellence: The AAP's Center for pediatric SHS research. [www.aap.org/richmondcenter](http://www.aap.org/richmondcenter)
- National Quitlines: The phone number connects callers with the local quitline: 1-800-QUITNOW, or <http://1800quitnow.cancer.gov>.
- Surgeon General's report on the health consequences of SHS: <http://www.surgeongeneral.gov/library/secondhandsmoke/index.html>.
- CEASE Program: A program for healthcare providers to help families quit smoking. [www.ceasetobacco.org](http://www.ceasetobacco.org)
- Clean Air For Healthy Children: [www.cleanairforhealthychildren.org](http://www.cleanairforhealthychildren.org)
- Campaign for Tobacco Free Kids: [www.tobaccofreekids.org](http://www.tobaccofreekids.org)
- A guide to getting reimbursement for tobacco cessation counseling: <http://www.kidslivesmokefree.org/toolbox/PACTReimbursementforSmokingCessation.pdf>

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