The Science for Tobacco Regulation

TTURC

TRANSDISCIPLINARY TOBACCO USE RESEARCH CENTER

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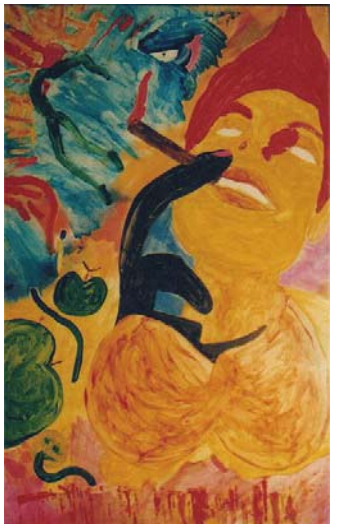
The Questions

- Why is it important to develop the science base?
- Why do we need regulation?
- What are the critical research questions?



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Lessons from the past: Low tar yield cigarettes

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Consumer Perception of Light and Ultra-light cigarettes

- Smokers believed that Lights afforded a 25% reduction in risk compared to Regulars.
- Smokers believed that Ultra Lights afforded a 33% reduction in risk compared to Regulars.
- Over half of smokers believed you needed to smoke 2 Lights and 3-4 Ultra Lights to get as much tar from a single Regular.

Shiffman et al., 2001; Etter et al., 1998

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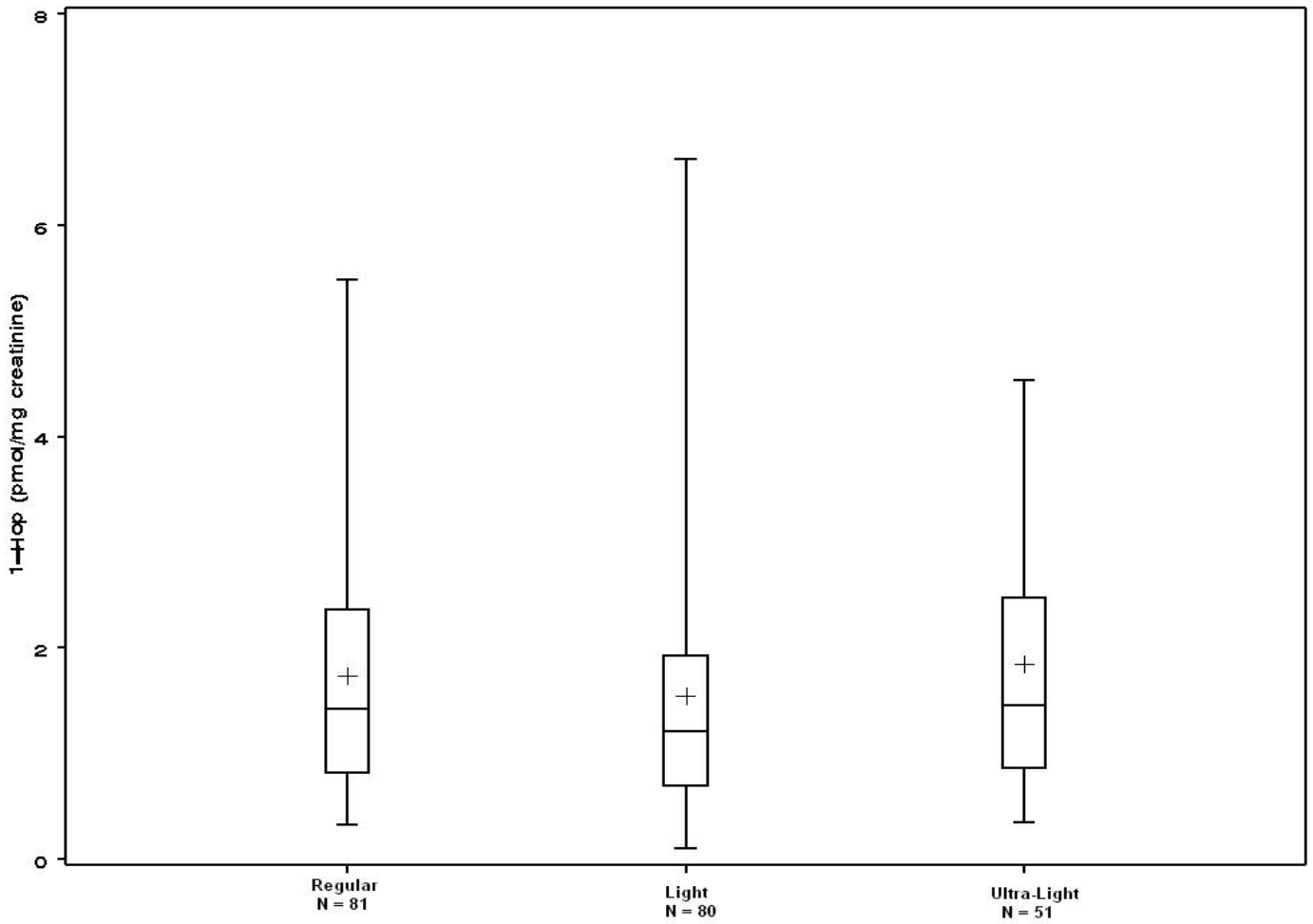
Urinary 1-Hydroxypyrene in Smokers of Regular, Light, and Ultra-light Cigarettes



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Consumer Perception

- 32% of Light and 26% of Ultra Light smokers said they would likely quit if they learned that one Light/Ultra Light equated to one Regular.

Kozlowski et al., 1998

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Potential Reduced Exposure Products (PREPs)

- What are they? Tobacco products that reduce exposure to tobacco toxicants and will potentially result in reduction in disease risks.
- Why is there an interest in these products?
  - Public health community is interested in reducing death and disease among smokers who will not or cannot quit.
  - Tobacco companies are concerned about future litigations and maintaining and increasing consumer demand for tobacco products.

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Concerns

- No independent body exist that examines whether or not the claims that are being made on reduced exposure products are valid.
- No independent body exists to examine and monitor the toxicants that are delivered to tobacco users.

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Omni Cigarette

"Significantly reduces carcinogens that are among the major causes of lung cancer"

NNK: 53-66%

BaP: 19-36%

Pyrene: 20-29%

(www.omnicigs.com)

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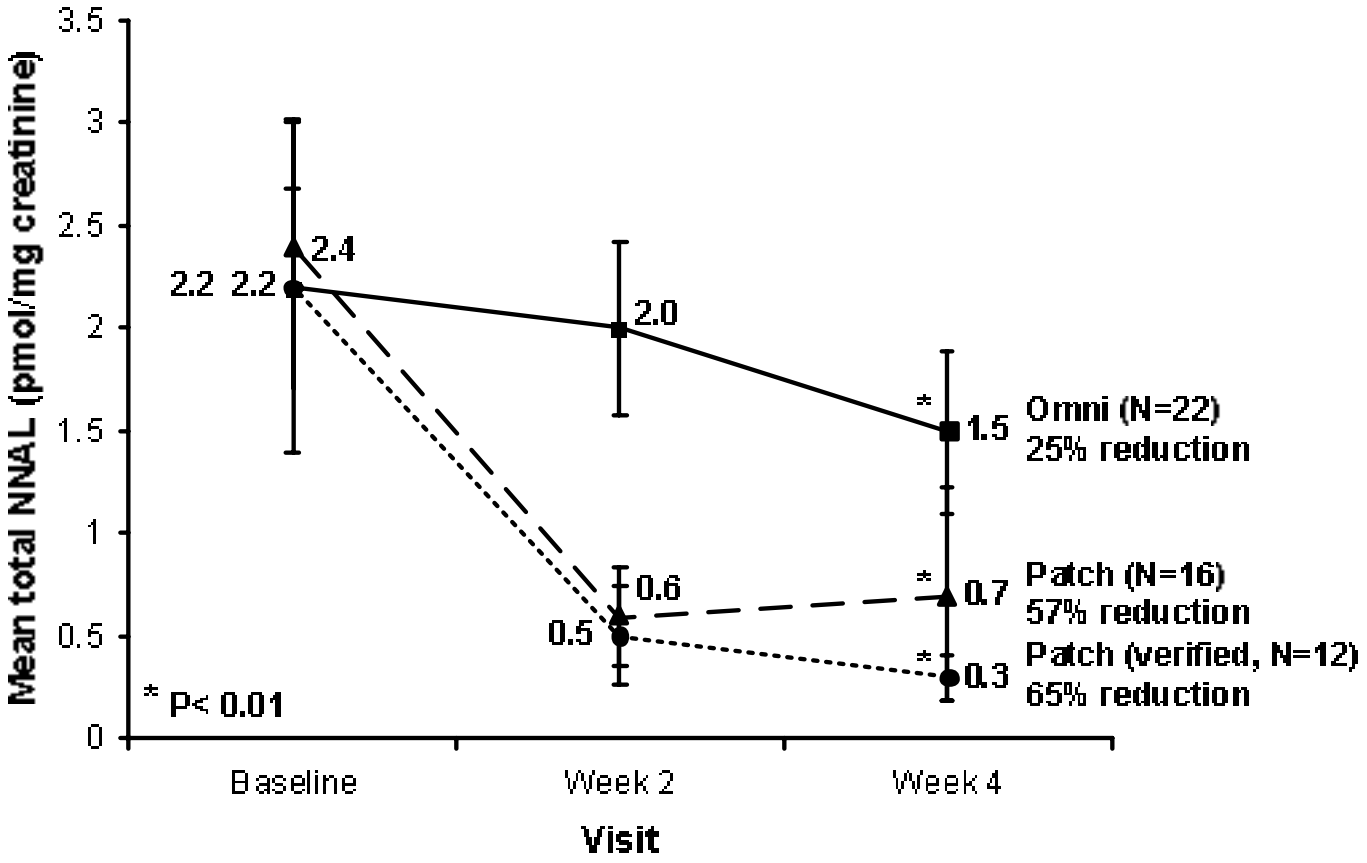
Urinary Total NNAL in Smokers Who Switched to Omni or Nicotine Patch



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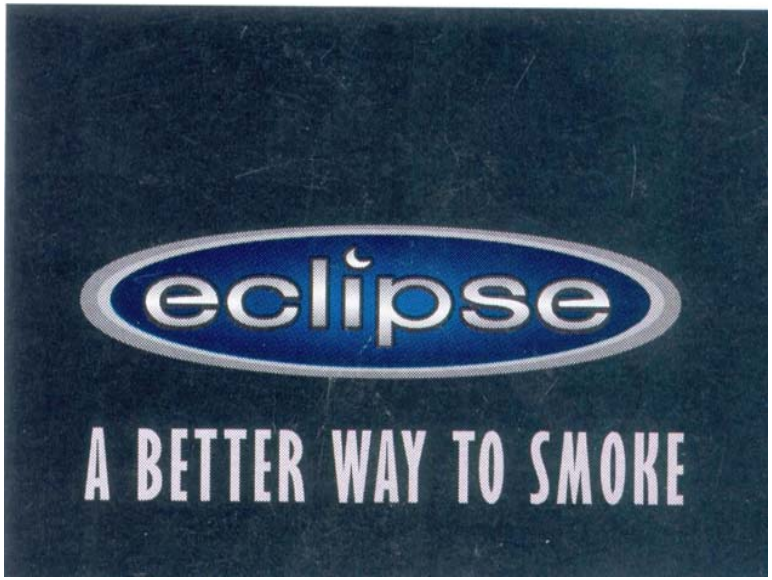
About Eclipse and Your Health

May present less risk of cancer associated with smoking.

Produces less inflammation in the respiratory system, which suggests a lower risk of chronic bronchitis, and possibly emphysema..

Reduces secondhand smoke by 80%.



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Results: Eclipse

- Inadequate study designs and sample sizes to make the claim.
- Results are equivocal
  - Reduction in respiratory tract inflammation and respiratory symptoms
  - Reduction in urine mutagenicity (70-79%)
  - No change in several biomarkers for CVD risk
  - Increase in CO uptake
  - Increase in inflammatory biomarkers

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Consumer Perception of Light and Ultra-light cigarettes

- 91% thought that Eclipse was safer than regular cigarettes
- 24% thought Eclipse was completely safe
- 57.4% of smokers were interested in using Eclipse; interest was greatest in those contemplating quitting

Shiffman et al., 2004

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Questions

- How do we protect the consumer and public health?
  - Individual and population risk
- What research questions need to be addressed?
- What infrastructures do we need to protect the public?

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Principles to Promote Public Health

- Normative view that any tobacco use is not safe.
- Continued reduction in prevalence of all tobacco use.
- Regulation of tobacco products.
  - Most deadly product marketed to people and no one is minding the store.

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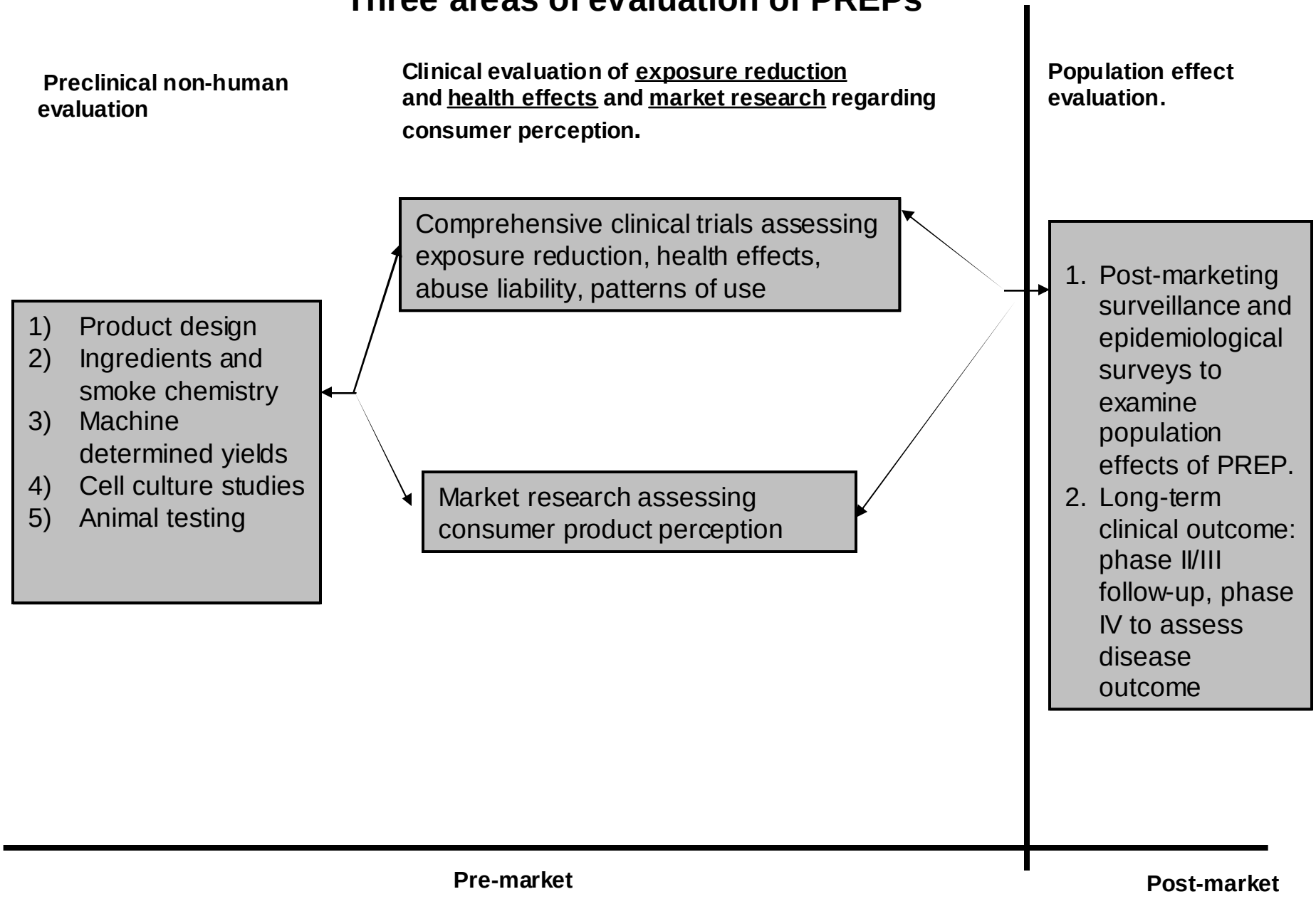
Three areas of evaluation of PREPs



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Critical questions and research needs

- How toxic is the product?
  - Valid measures of tobacco constituents and smoke emission (e.g., Intensive Canadian Smoking method)
  - Valid in vitro (cell culture) and in vivo (animal) methods for assessing toxicity of a product
  - Valid human biomarkers of exposure to toxicants and effects (injury)
  - How are these measures, including product design, are related to one another.

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Valid biomarkers: what does that mean?

- Difference between smokers and non-smokers or former smokers
- Reduction upon cessation of tobacco products
- Dose-response relationship
- Change with reduction in amount
- ***Relationship to disease risk***

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Carcinogens in Tobacco Smoke

Tobacco smoke

Chemical class	No. of compounds	Representative carcinogens
PAH	14	BaP dibenz[*a,h*]anthracene
Nitrosamines	8	NNK NNN
Aromatic amines	12	4-aminobiphenyl 2-naphthylamine
Aldehydes	2	formaldehyde acetaldehyde
Phenols	2	catechol
Volatile hydrocarbons	3	benzene 1,3-butadiene
Nitro compounds	3	nitromethane
Other organics	8	ethylene oxide acrylonitrile
Inorganic compounds	9	cadmium
Total	**61**	

S.S. Hecht, *Nature Rev. Cancer* 3:733-744 (2003)

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Range of biomarkers

- Cancer
- Cardiovascular disease
- Pulmonary disease
- Fetal toxicity

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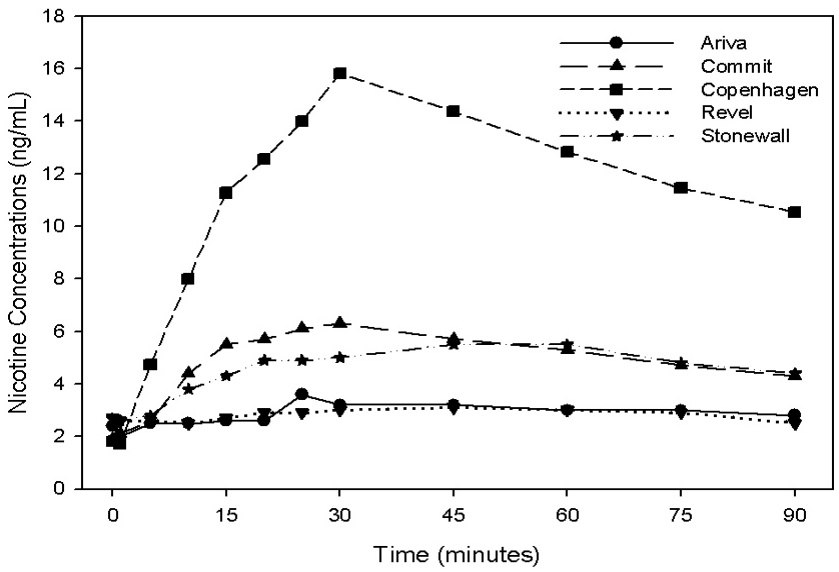
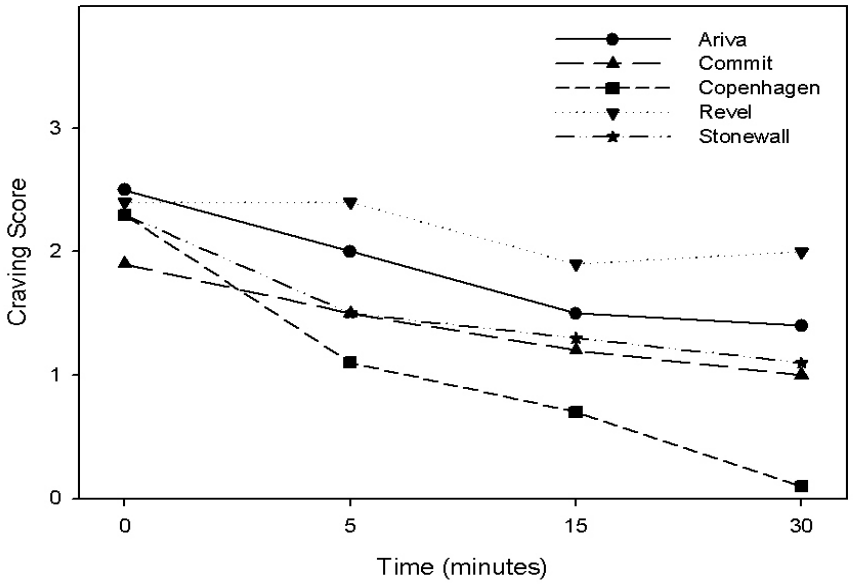
Critical questions and research needs

- How addictive is the product?
  - Pharmacokinetics
  - Subjective responses
  - Withdrawal relief





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Critical questions and research needs

- How will the product be used and what is the resulting toxicity?
  - Use with usual brands of cigarettes

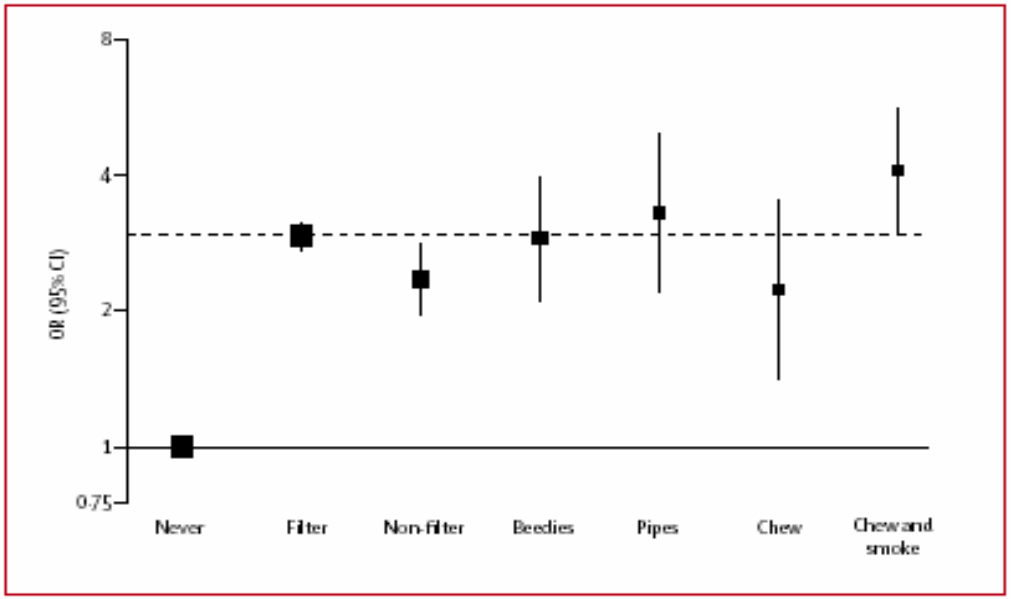

Figure 3: Risk of AMI associated with type of tobacco used
OR for current smokers=2·95 (95% CI 2·77–3·14) indicated by broken horizontal line. Never=never smokers. Filter=filter cigarettes. Non-filter=non-filter cigarettes. Beedies=smoking beedies alone. Pipes=smoking pipes/cigars. Chew=chewing tobacco alone. Chew and smoke=both chewing and smoking tobacco.

Teo et al., Lancet, 2006

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Critical questions and research needs

- How will consumers perceive the products and how will that influence use?
- What is the population impact of the product?
  - Initiation
  - Sustained tobacco use in individuals who would have otherwise quit
  - Resumption of tobacco use among abstainers

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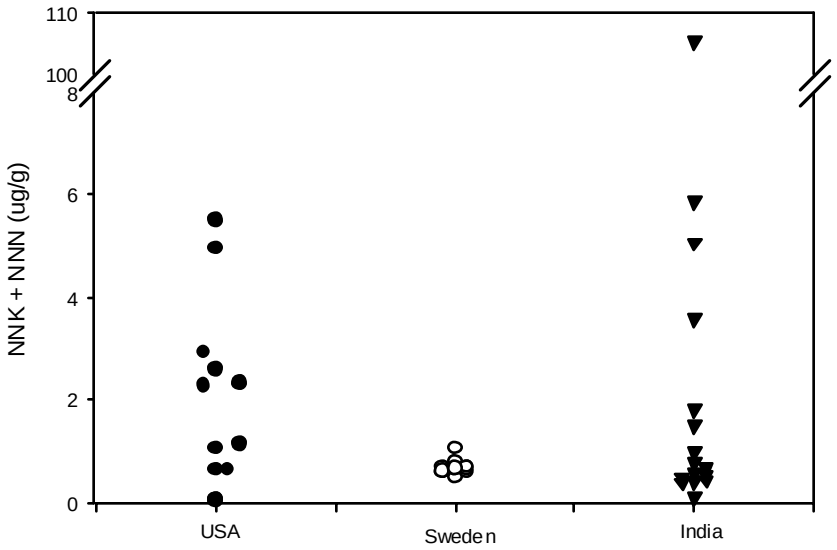
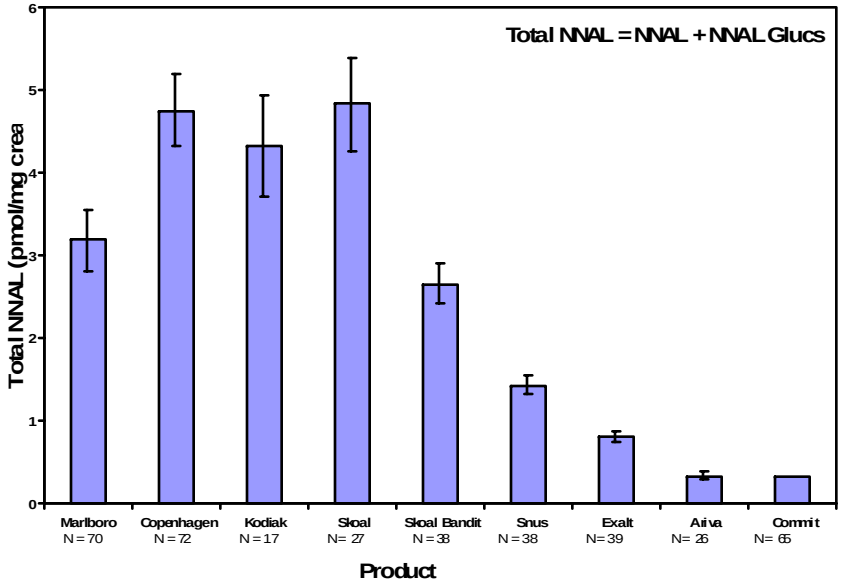
Proactive research needs

- How do we significantly reduce the toxicity across all tobacco products?





- Stepanov et al., Nicotine Tobacco Research, 2006, 8, 309-313
- Osterdahl et al., Journal of Agricultural and Food Chemistry, 2004, 52, 5084-5088
- Stepanov et al., International Journal of Cancer, 2005, 116

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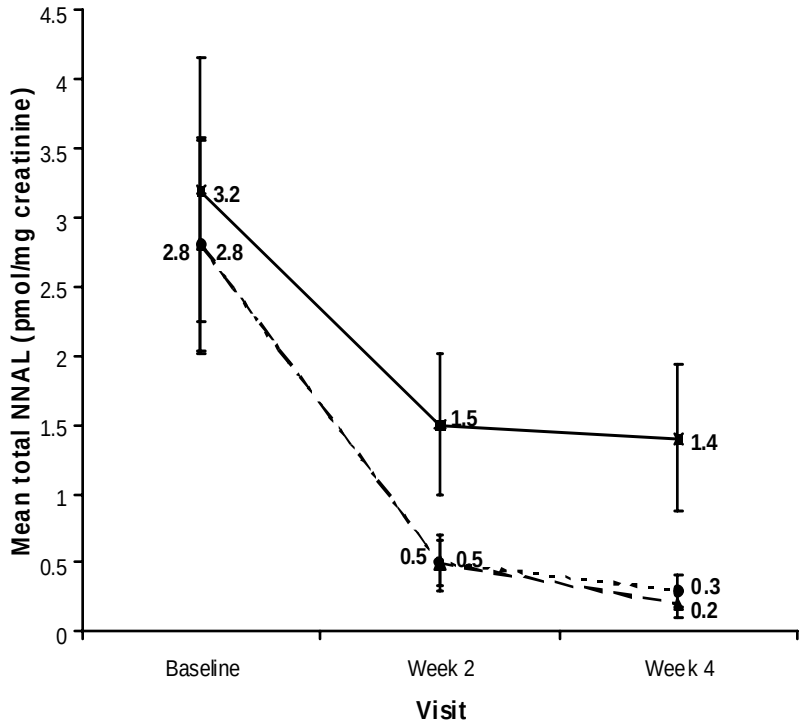
Proactive research needs



- Can tobacco users reduce their levels of toxicant exposure?
- What level of reduction will lead to reduced health risks?

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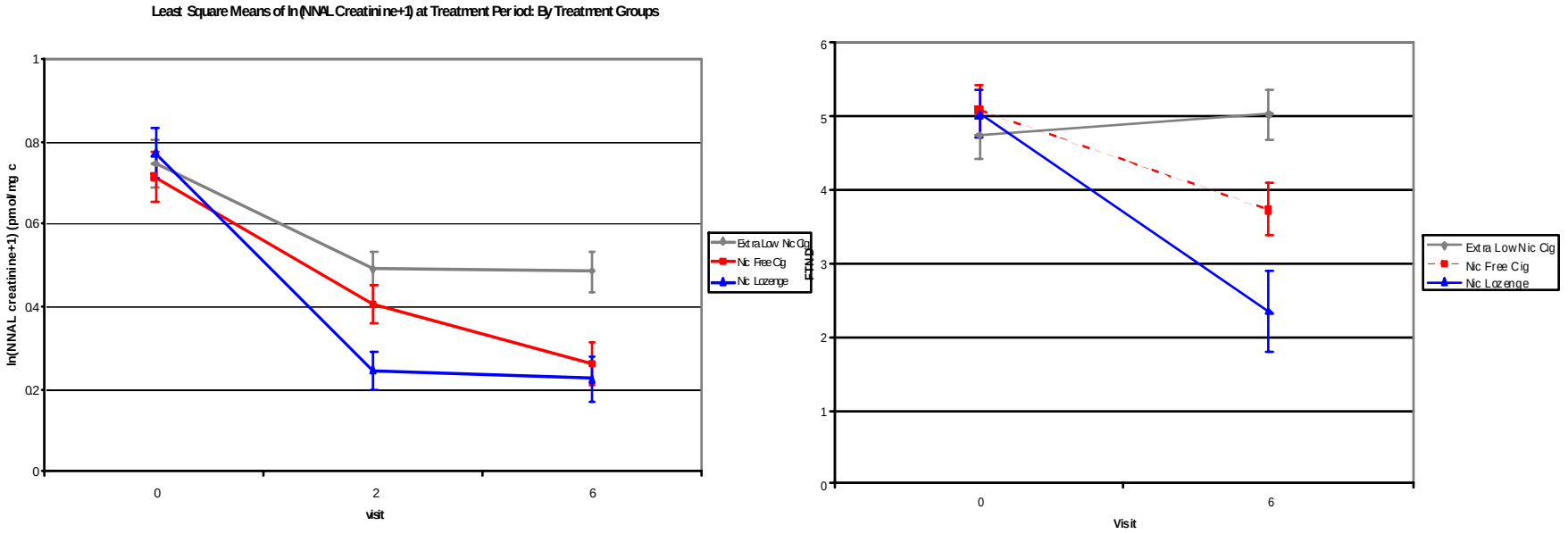
Proactive research needs

- Is it feasible to reduce nicotine in tobacco products to render them non-addictive as a public health measure?



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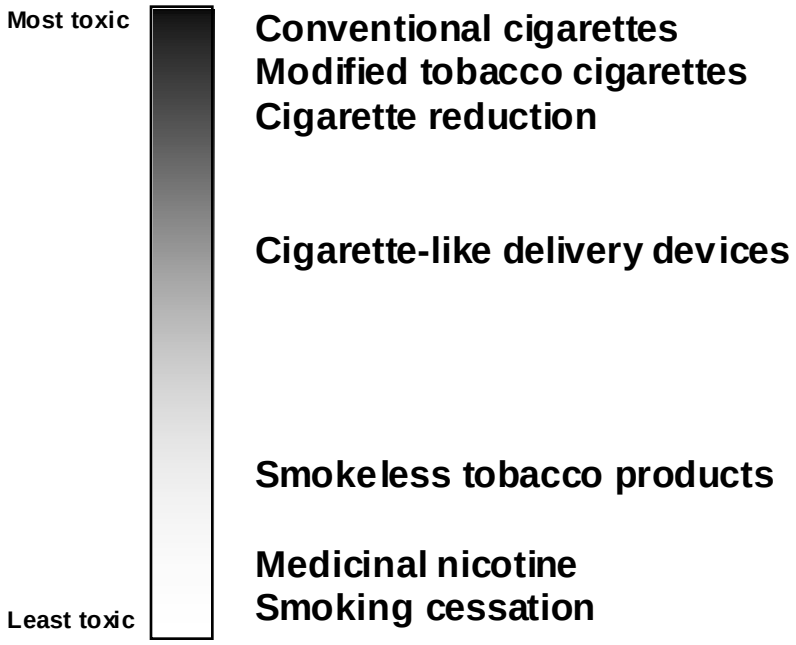
Proactive research needs

- How do we shift the use of products from the most toxic to least toxic products?



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Proactive research needs

- What can we do to make least toxic products (e.g., medicinal nicotine) more palatable, accessible and with wider indications for use?

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Infrastructure Needs

- Network of scientists and policymakers
- Collaboration among Centers for Disease Control and Prevention, Food and Drug Administration and National Institutes on Health, DHHS
- Independent testing facilities

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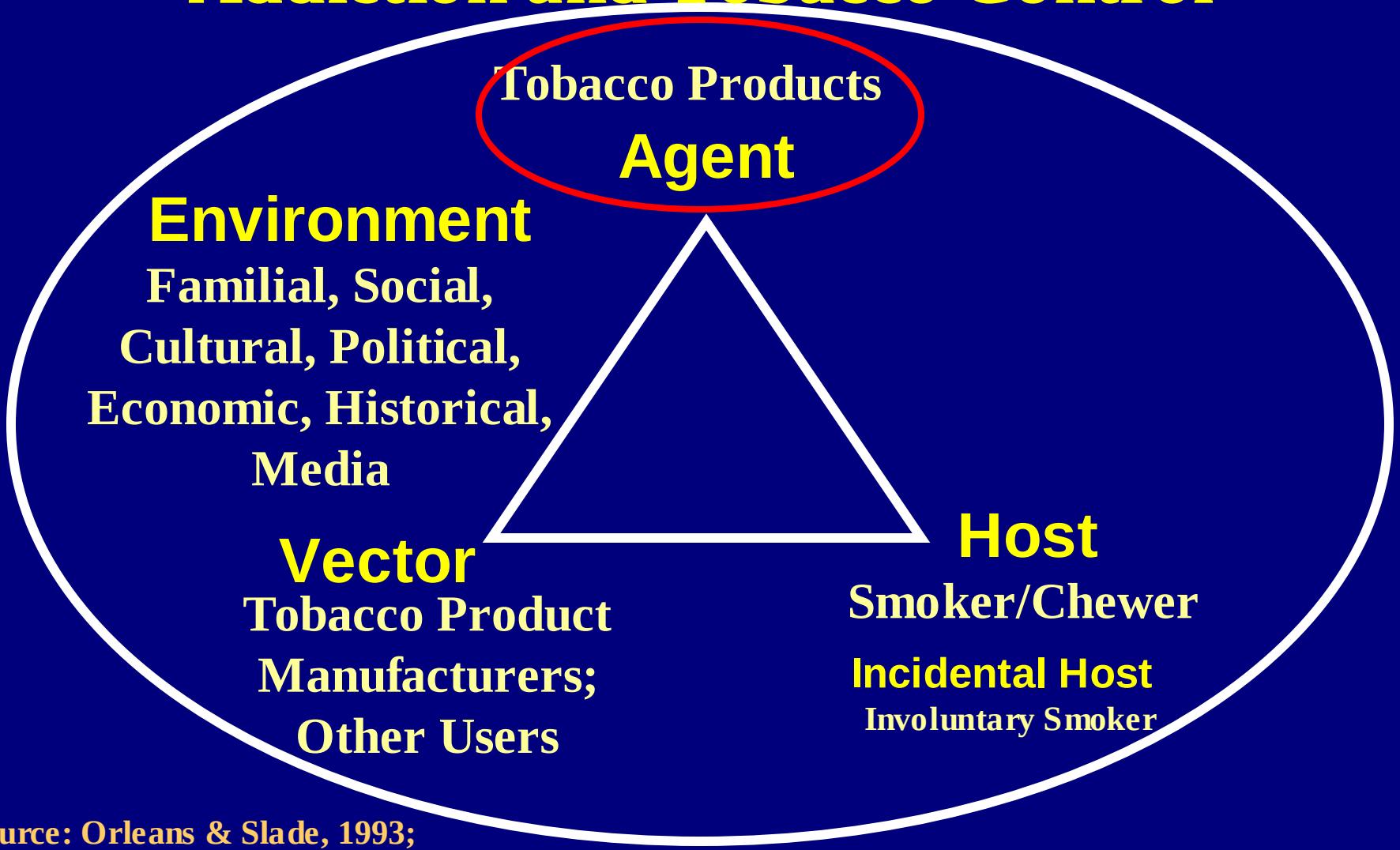
Epidemiologic Model of Nicotine Addiction and Tobacco Control



Source: Orleans & Slade, 1993; Giovino 2002.

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