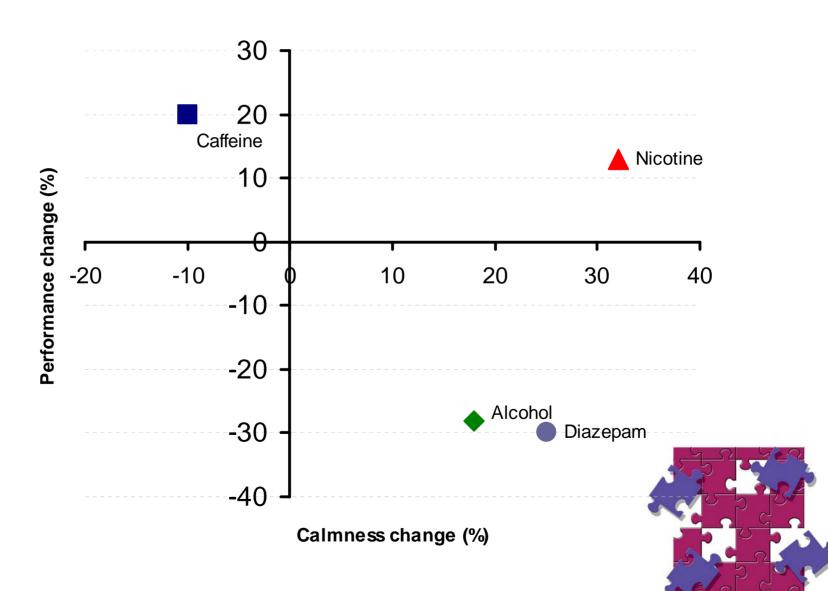
Human Smoking Behavior



- Compensation
 - Change in smoking style with change in cigarette characteristic
 - Commonly nicotine, but also tar, flavor, pressure drop



Nicotine Effect

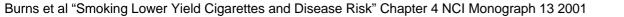


Warburton "The Pleasures of Nicotine" in Advances in Pharmacological Sciences 1991 473 - 483

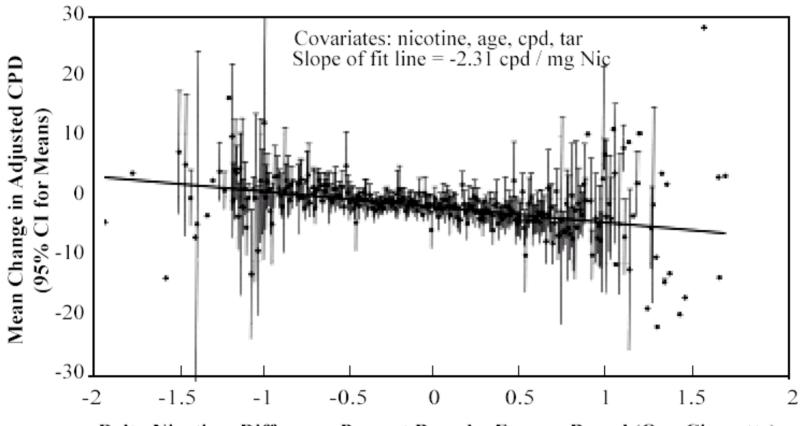
- In general
 - Higher yield less intensively smoked than lower yield
 - Some evidence for partial compensation
 - More complete compensation with higher than lower yield
- Data is weak
 - Few participants, limited time, multiple properties changed
- Human smoking behavior is highly variable



1960 – 1972 CPS I 1.2 12 12 (mg) Nicotine 8.0 4010 0.4 Mean-Adjusted CPD (95% CI) 5 0.2 1968 1973 1978 1983 1988 1993 1998 30Year 20Covariates: Age 10 Slope of fit line: -0.85 cpd/mg Nic 0 0.5 2 2.51.53 Machine-Measured Nicotine Yield (mg) per Cigarette (FTC Method)



Change in smoking with yield



Delta Nicotine, Difference Present Brand—Former Brand (One Cigarette)

~ 10% compensation

Burns et al "Smoking Lower Yield Cigarettes and Disease Risk" Chapter 4 NCI Monograph 13 2001

Note

- Source: ACS CPS-I, White male current cigaretteonly smokers.
- Note: Nicotine and tar levels interpolated by year and brand from Reader's Digest (Miller & Monahan, 1959) and FTC (for years 1967-1973) data, mean CPD by nicotine value using the weighted mean value for each categorical level of CPD. The mean CPD values are adjusted for age and regressed on nicotine yield per cigarette. For the graph, covariate coefficients are calculated in a general regression, then points are graphed as adjusted for the covariate with the regression line shown through the adjusted points.

• Modern cigarettes are designed to be elastic

Different yields depending on smoking style
Ventilation holes



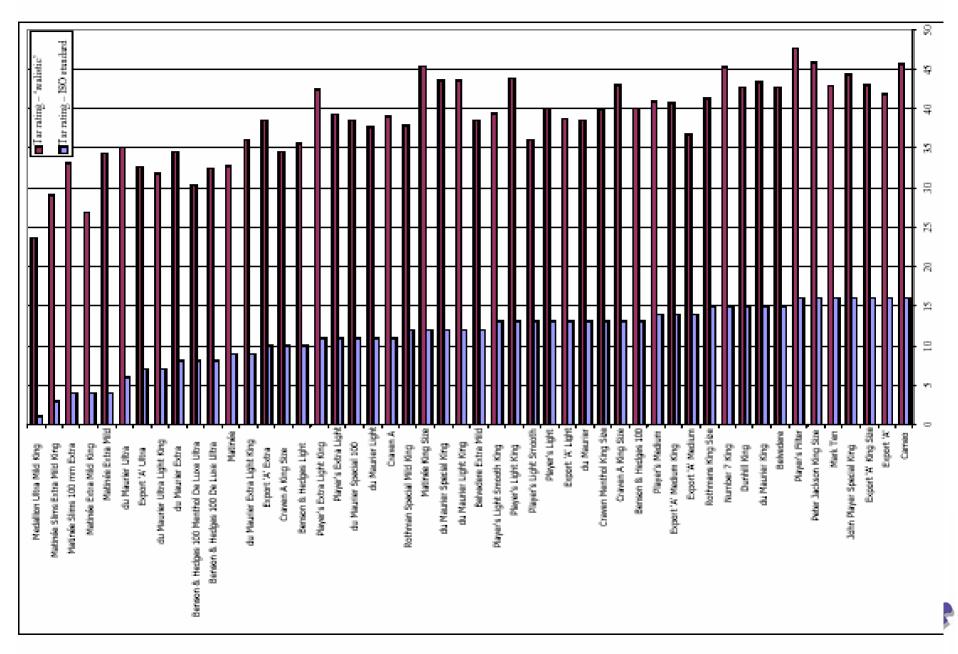
Pollay et al "Marketing Cigarettes with low Machine-Measured Yields" Chapter 7 NCI Monograph 13 2001 Scherer "Smoking behavior and compensation: a review of the literature" Psychopharmacology 145 1 – 20 (1999)

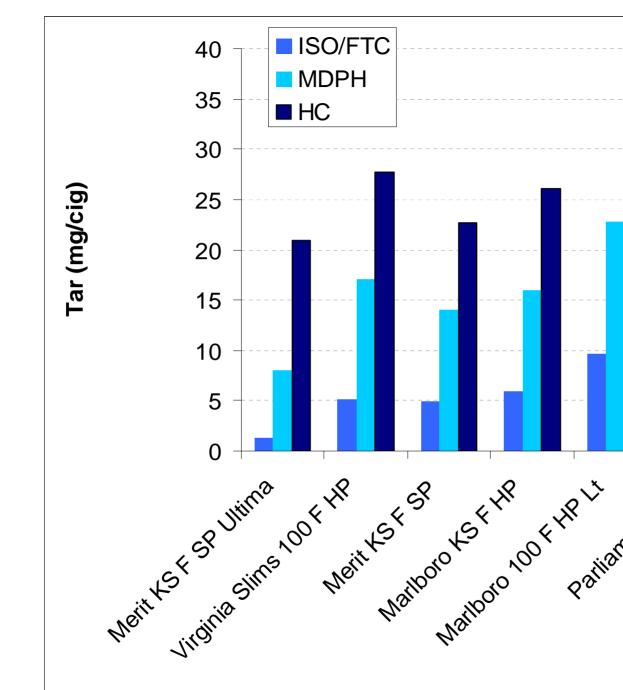
Elasticity on the Bench

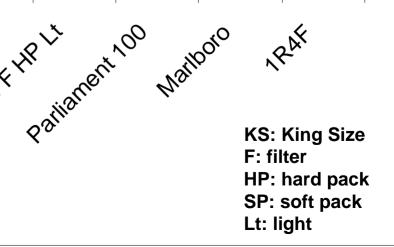
- Measures of yield (tar, nicotine) depend on intensity and blocking
 - -FTC < MDPH < HC
 - MDPH: Massachusetts Department of Public Health
 - HC: Health Canada

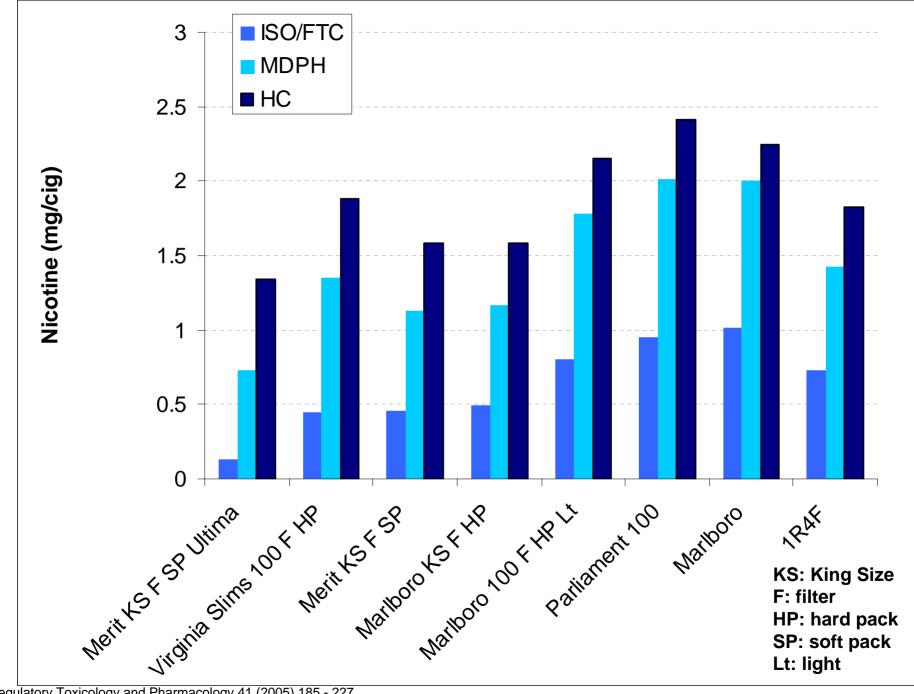


From "International Expert Panel on Cigarette Descriptors"



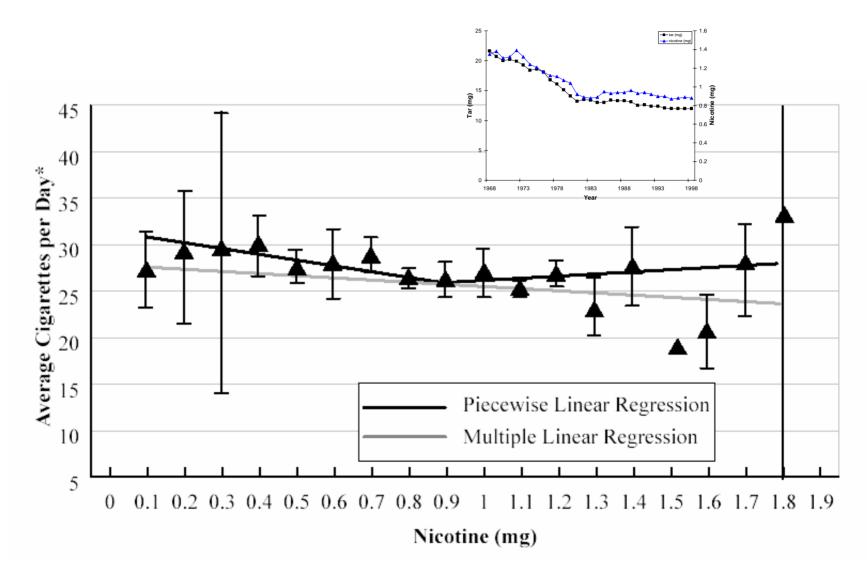




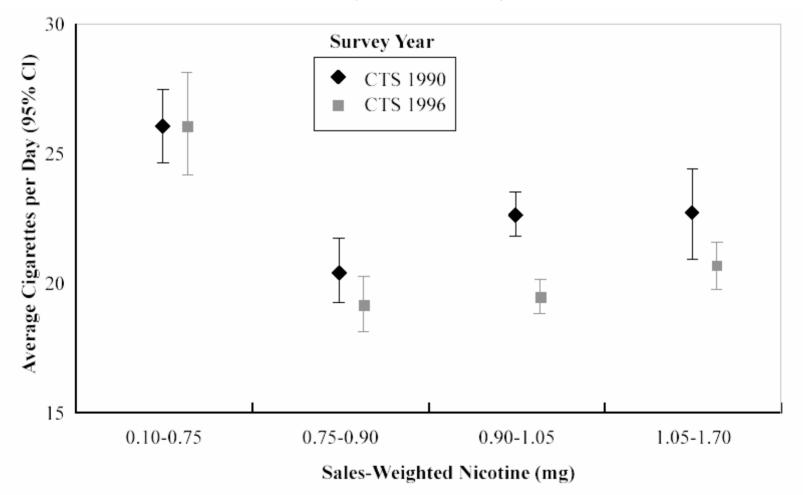


Regulatory Toxicology and Pharmacology 41 (2005) 185 - 227

1996 – California (CTS)



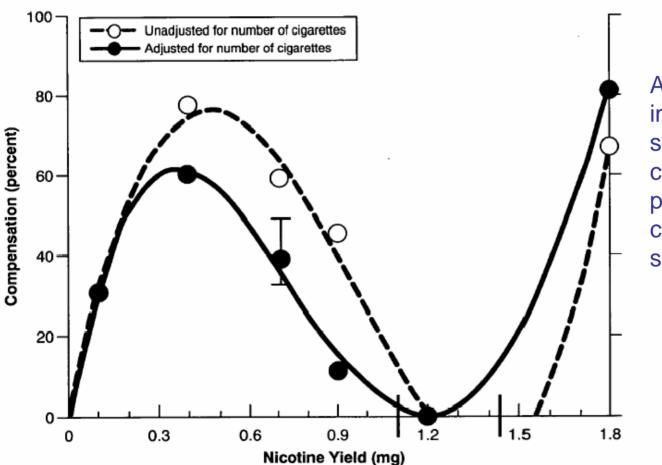
1990, 1996 – California (CTS)



- Vent blocking
 - ~ 50% block, 50 % don't
 - 14 people
- Other studies
 - 12 % to 62 % compensation
 - -12 to 28 people



Kozlowski et al "Compensation for Nicotine by Smokers of Lower Yield Cigarettes" Chapter 12, Monograph 7 NCI 1996

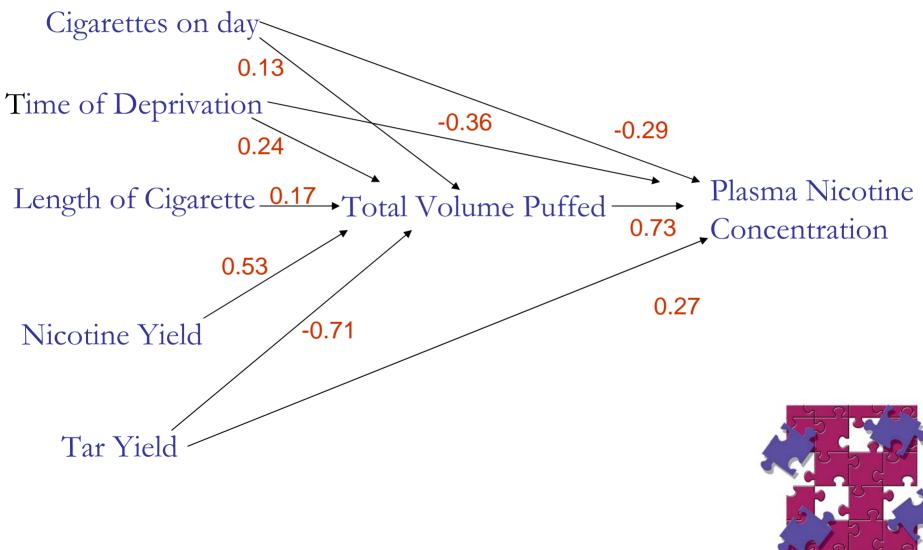


After adjusting for changes in number of cigarettes smoked, any remaining compensation is presumably due to changes in style of smoking.



Kozlowski et al "Compensation for Nicotine by Smokers of Lower Yield Cigarettes" Chapter 12, Monograph 7 NCI 1996

Coefficients of Effect



- In general
 - Higher yield less intensively smoked than lower yield
 - Some evidence for partial compensation
 - More complete compensation with higher than lower yield
- Data is weak
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