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# Use and misuse of analytical data on tobacco products in a regulated environment

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# Outline of presentation

- Background
- Objectives for presentation
- Use and misuse of chemical data on tobacco products
- Suggestions for improved data quality
- Conclusions

# Background – 1

- Life Sciences Research Office (LSRO) just issued report, “Scientific Methods to Evaluate Potential Reduced-Risk Tobacco Products”
  - LSRO placed emphasis on smoke chemistry to show a Potential Reduced-Risk Tobacco Product (PRRTP) differs from conventional cigarettes
  - For cigarette PRRTP, smoke chemistry studies
    - Must be accurate, thorough, and precise enough for statistical analyses to be used
    - Must measure real differences in toxicant yields
    - Must be able to guide *in vitro* and *in vivo* studies

# Background – 2

- Why smoke chemistry?
  - Compared with *in vitro* and *in vivo* assays, it is relatively inexpensive and fast
  - Generally reflective of underlying tobacco blend, additives, and cigarette design
  - Already available for conventional products
- While it is easy to say chemistry, it is much harder to do chemistry right and get results
  - That are repeatable in your own lab
  - That are reproducible by other laboratories

# Background – 3

- If proper procedures and controls are not in place, bad things can happen to good chemists in and out of the smoke laboratory
  - Improper sampling and sample handling
  - Improper methods and equipment calibration
  - Improper use of data (often by outsiders)
- Consequences could be minor or major
  - Error found – analyses rerun
  - Error not found – incorrect data used in subsequent work

# Objectives for this presentation

- Educate regulators, policy makers, and scientists outside the industry about the potential pitfalls in applying chemical assessments to PRRTTP and conventional smoking products
- Suggest steps that could be taken to
  - Increase understanding among scientists from all parties involved in testing of product
  - Minimize generation of less than correct data
  - Minimize misuse of data for assessing PRRTTP and conventional smoking products

# Are industry scientists a bad influence?

- There is an apparent fear that knowledgeable scientists who have worked in the industry are a bad influence
  - One US agency has forbidden scientists to bid on reduced-risk tobacco research contracts if they worked for the industry within five years
  - Apparently some associated with FCTC and similar organizations have wanted to set up laboratories without help from those who know the most about analyzing the product
  - What is the problem with getting the best scientific advice?

# Testing is more than standard methods

- It takes more than an ISO 17025 accredited laboratory and education in analytical chemistry to get good results
  - Smoking machines, room HVAC and related lab processes (e.g., conditioning) and analytical determinations can be problematic
  - Control of some smoke-related analyses can be challenging when the usual reference cigarettes are not appropriate
  - It can be difficult to spot erroneous results without a good knowledge of the product

# Some examples of misuse of data – 1

- In 2005, Celebucki and colleagues reported a new method for in-cigarette menthol determinations (*Nicotine Tob. Res.* 4:523-31)
  - Relatively complicated GC/MS-based analysis using extraction in Waring blender
  - No validation against AOAC method or other methods using control menthol cigarettes
  - Values for commercial product declared low versus data reported in industry documents but apparently no follow-up to find cause
- Less than correct data and problematic method now in the literature

## Some examples of misuse of data – 2

- In 2003, Massachusetts proposed additional testing requirements for cigarettes
  - Proposed regulations 660.104 and 660.200 (D) called for reporting percentage of free nicotine in smoke by procedure reported by Pankow *et al.* in *Chemical Research in Toxicology*
- Review of the procedure showed that it
  - Was not measuring free nicotine in smoke
  - Used nonstandard instrumentation
  - Had not been validated by the usual inter-laboratory studies for regulatory methods
- As a result, proposed regulations withdrawn

## Some examples of misuse of data – 3

- Risk assessment techniques have been used to help understand smoke toxicity
  - Help identify smoke toxicants that should be measured to estimate smoke toxicity
  - Are based on toxicant potency values established for use in estimating environmental hazards for cancer and other serious diseases
  - Values not available for some smoke toxicants and physical/chemical interactions that could change potency are not considered
- Use with cigarettes requires knowledge of deliveries and smoking behavior

# Some examples of misuse of data – 3 con't

- Recently, risk assessment approaches have been used to estimate reductions in smoke toxicity provided by PR RTP
  - Laugesen and Fowles, *Tob. Control* 2006
  - Pankow *et al.*, *Cancer Epidemiol. Biomarkers Prevention* 2007
  - Both articles concluded PR RTP ineffective
- However, likely misuse of chemical data
  - Inconsistent/incomplete data sets
  - Smoking conditions for yield measurements not based on smoking behavior studies
  - No bioassays used to support conclusions

# Collaboration not confrontation

- Best data quality for regulatory purposes requires meaningful scientific collaboration
  - Focus must be on the analytical chemistry not the on the politics of the product
  - Regulatory needs may require the use of laboratories not familiar with tobacco analyses
  - Standard methods need to be supplemented with helpful hints and caveats for the inexperienced
  - Additional reference products need to be made available so that laboratories can keep methods in control

# Conclusions

- Use of chemical data for the toxicological assessment of tobacco products continues to be technically effective and efficient
- The generation of accurate, precise, and timely chemical data for such assessments involves complexity, equipment, and skills not normally found outside the major tobacco company laboratories
- Attempts to analyze of tobacco products without sufficient knowledge and resources often results in incorrect or misused data.

# Conclusions con't

- There appears to be fear that knowledgeable scientists who have worked in the industry are a bad influence on regulatory chemists assessing tobacco products
- Getting the best data quality for regulatory purposes requires meaningful scientific collaboration
- Standard methods need to include operational information and relevant reference products need to be available for method control