

Tobacco Regulatory Science, Epigenetic Biomarkers & Areas of Collaboration

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Family Smoking Prevention and Tobacco Control Act



Specific Authorities

- Tobacco manufacturer registration with FDA
- Listing of products and ingredients
- Reporting levels of harmful and potentially harmful constituents by brand and sub-brand
- Establishing tobacco product standards
- Premarket submissions for new and potentially modified risk tobacco products to protect the public health
- Health warnings on labels and in advertising
- Advertising and promotion restrictions
- Authority to conduct public health education and research to support tobacco product regulation



In general, CTP's regulatory authorities do not extend to:

- Setting tax rates for tobacco products
- Regulating therapeutic products, such as those marketed to treat tobacco dependence (regulated by other parts of FDA)
- Setting clean indoor air policies
- Regulating tobacco growing
- Requiring the reduction of nicotine yields to zero
- Provision of cessation services
- Banning all cigarettes, smokeless tobacco products, little cigars, other cigars, pipe tobacco, or roll-your-own tobacco products



FDA Tobacco Regulation Uses a Public Health/Population Health Standard

The Tobacco Control Act mandates tobacco product regulation using a population health standard that takes into account both users and non-users of tobacco products



Regulatory Science Decision Making

Product Science

- Chemistry
- Engineering
- Microbiology

Nonclinical Science

- Toxicology
- Pharmacology
- Biology
- Environmental Science

Health Science

- Medicine
- Behavioral Pharmacology
- Psychology
- Neuroscience

Population Science

- Epidemiology
- Social science
- Statistics, modeling
- Evaluation



- FDA/CTP collaborating with Federal agencies:
 - National Institutes of Health
 - Centers for Disease Control and Prevention
 - FDA National Center for Toxicological Research
- FDA/CTP contracting with non-HHS organizations that have particular expertise





CTP Funded Projects that Include Epigenetic Biomarker Aims

- **NIH Extramural Grants**
 - *Overlapping Airway Basal Cell Transcriptome Reprogramming in COPD and Lung* (Crystal; 3R01HL107882-02S1). Comparing DNA methylation patterns and telomere length in shisha smokers matched to nonsmokers & cigarette smokers.
 - *MicroRNAs as Biomarkers for Tobacco Exposure and Heart Disease* (Li; 1R21HL120050-01A1). miRNAs as blood-based biomarkers for heart disease related to tobacco exposure.
- **TCORS**
 - *The Impact of Tobacco Exposure on the Lung's Innate Defense System* (Tarran; 1P50HL120100-01). New and emerging tobacco product exposure and mRNA & miRNA expression in rodent and cell culture models.

Note: This is not a complete list all epigenetic biomarker research funded by CTP.



CTP Funded Projects that Include Epigenetic Biomarker Aims

- **NIH Intramural**
 - *Epigenetic Biomarkers of Tobacco Smoke Exposure* (Bell; 251945). Profiles of DNA methylation related to tobacco use (cigarettes & e-cigarette users).
- **NCTR**
 - *MicroRNAs as Noninvasive Biomarkers for Tobacco Smoke Associated Bladder Cancer* (Yang; E0751801). MicroRNA expression patterns associated with cigarette smoking.
 - *Use of New Technologies to Develop Biomarkers of Harm for New Tobacco Products* (E0744711; Yang). Omics technologies, including DNA methylation to identify potential biomarkers of tobacco exposure (combustible and smokeless products).



FDA Center for Tobacco Products Research Interest Areas

1. Nicotine dependence threshold among youth and adults and impact of nicotine reduction on tobacco product use behavior (e.g., topography, compensation, switching, multiple use, initiation, cessation, relapse)
2. Cigar (small, large, cigarillos) initiation, use (including transitions to other tobacco products and multiple use), perceptions, dependence and toxicity
3. Smokeless tobacco initiation, use (including transitions to other tobacco products and multiple use), perceptions, dependence and toxicity
4. E-cigarettes initiation, use (including transitions to other tobacco products and multiple use), perceptions, dependence, toxicity
5. Other tobacco product (e.g., hookah, pipes, dissolvables) initiation, use (including transitions to other tobacco products and multiple use), perceptions, dependence, toxicity
6. The impact of tobacco product characteristics, (e.g., ingredients, constituents, components, additives such as flavors, and labeling and marketing) on initiation, especially among youth and other vulnerable populations
7. Toxicity thresholds for each of the 20 harmful and potentially harmful constituents identified in the March 2012 Guidance for Industry
8. Computational/mathematical modeling and simulation and/or statistical modeling of the public health impact of FDA/CTP regulation of potential modified risk tobacco products, e.g., product standards, communications regarding risks of tobacco products
9. Consumer perceptions of tobacco products including the impact of labeling and marketing
10. Effective communication strategies regarding harmful and potentially harmful constituents and risks of tobacco products

