## Contents

Preface ......................................................... .1  
Acknowledgements ............................................. .iii  
Contents ....................................................... .ix

### Chapter 1: Public Health Implications of Changes in Cigarette Design and Marketing ....................................................... .1

- Introduction ................................................. .1  
- How Did It Happen? .......................................... .1  
- Compensation in Smokers ...................................... .3  
- Elasticity of Demand in the Cigarette ....................... .4  
- Marketing of Low-Yield Cigarettes ......................... .5  
- Disease Risks ............................................... .6  
- Conclusions ................................................... .9  
- References .................................................... .10

### Chapter 2: Cigarette Design ............................................. .13

- Cigarette-Yield Testing by Smoking Machine Using the FTC Protocol ......................................................... .13  
- Changes in FTC Machine-Smoked Yields Over Time ........ .13  
- Design Changes That Reduce Standard Yields ............... .14  
- Compensation and Cigarette Design: Difference in Yield with Different Smoking Patterns ......................... .18  
- More Evidence from Industry Documents Related to Compensation, Cigarette Design, and the FTC Testing Method ..... .33  
- Summary ....................................................... .34  
- Conclusions .................................................... .34  
- References ..................................................... .35

### Chapter 3: Compensatory Smoking of Low-Yield Cigarettes .......... .39

- Introduction ................................................... .39  
- Role of Nicotine in Maintaining Tobacco Addiction ........ .39  
- Biomarkers of Tobacco Smoke Exposure ..................... .41  
- Nicotine Absorption from Cigarette Smoking ............... .42  
- Estimating the Extent of Compensation ..................... .44  
- Studies of Smoking Cigarettes with Different Machine-Determined Yields: Methodological Considerations .......... .44  
- Short-Term Experimental Switching Studies ................. .45  
- Long-Term Experimental Switching Studies ................ .47  
- Studies of Smokers Smoking Self-Selected Brands .......... .49  
- Spontaneous Brand Switching ................................ .56  
- Summary ....................................................... .58  
- Conclusions .................................................... .60  
- References ..................................................... .60
## Chapter 4: Smoking Lower Yield Cigarettes and Disease Risks . . . .65
- Introduction ......................................................65
- Historical Development of the Lower Yield Cigarette Issue ........68
- Limitations of Epidemiological Studies in Examining the
  Risks of Low-Yield Cigarette Use ..............................72
- Published Epidemiological Studies of Health Endpoints ...........81
- Biologic Implications of Compensation for Changes
  in Cigarette Design ...........................................109
- Correlation of Cigarette Brand Choice with Number of Cigarettes
  Smoked per Day and Duration of Smoking ......................111
- Temporal Trends in Lung Cancer and Other Diseases in Major
  Cohort Studies ..............................................119
- Temporal Trends in National Lung Cancer Death Rates and
  Smoking Behaviors .......................................123
- Summary .....................................................145
- Conclusions .................................................146
- Appendix ....................................................147
- References .................................................152

## Chapter 5: The Changing Cigarette: Chemical Studies
and Bioassays ..................................................159
- Introduction ..................................................159
- Identification of Carcinogens, Tumor Promoters, and
  Carcinogens in Tobacco Smoke ...............................160
- Smoking Conditions .......................................165
- Changes in Cigarette Smoke Composition with Various
  Design Changes ..............................................166
- Observations on Cigarette Smokers ...........................181
- Summary .....................................................182
- Conclusions ...............................................184
- Appendix ....................................................185
- References .................................................185

## Chapter 6: Public Understanding of Risk and Reasons for
Smoking Low-Yield Products ..................................193
- Introduction ..................................................193
- Perceptions of Light Cigarettes ..............................193
- Reasons for Smoking or Switching to Light Cigarettes .......194
- The Relationship of Switching to Quitting .....................195
- Summary .....................................................196
- Conclusions ...............................................196
- References .................................................197

## Chapter 7: Marketing Cigarettes with Low Machine-
Measured Yields ..................................................199
- Introduction ..................................................199
- The 1950s .....................................................199
- The 1960s .....................................................204
- The 1970s .....................................................207
<table>
<thead>
<tr>
<th>Contents</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>The 1980s</td>
<td>223</td>
</tr>
<tr>
<td>Discussion</td>
<td>228</td>
</tr>
<tr>
<td>Summary</td>
<td>231</td>
</tr>
<tr>
<td>Conclusions</td>
<td>233</td>
</tr>
<tr>
<td>References</td>
<td>233</td>
</tr>
</tbody>
</table>