The SARS-CoV-2 Virus, COVID-19, and Smoking

ASH Webinar

May 7, 2020

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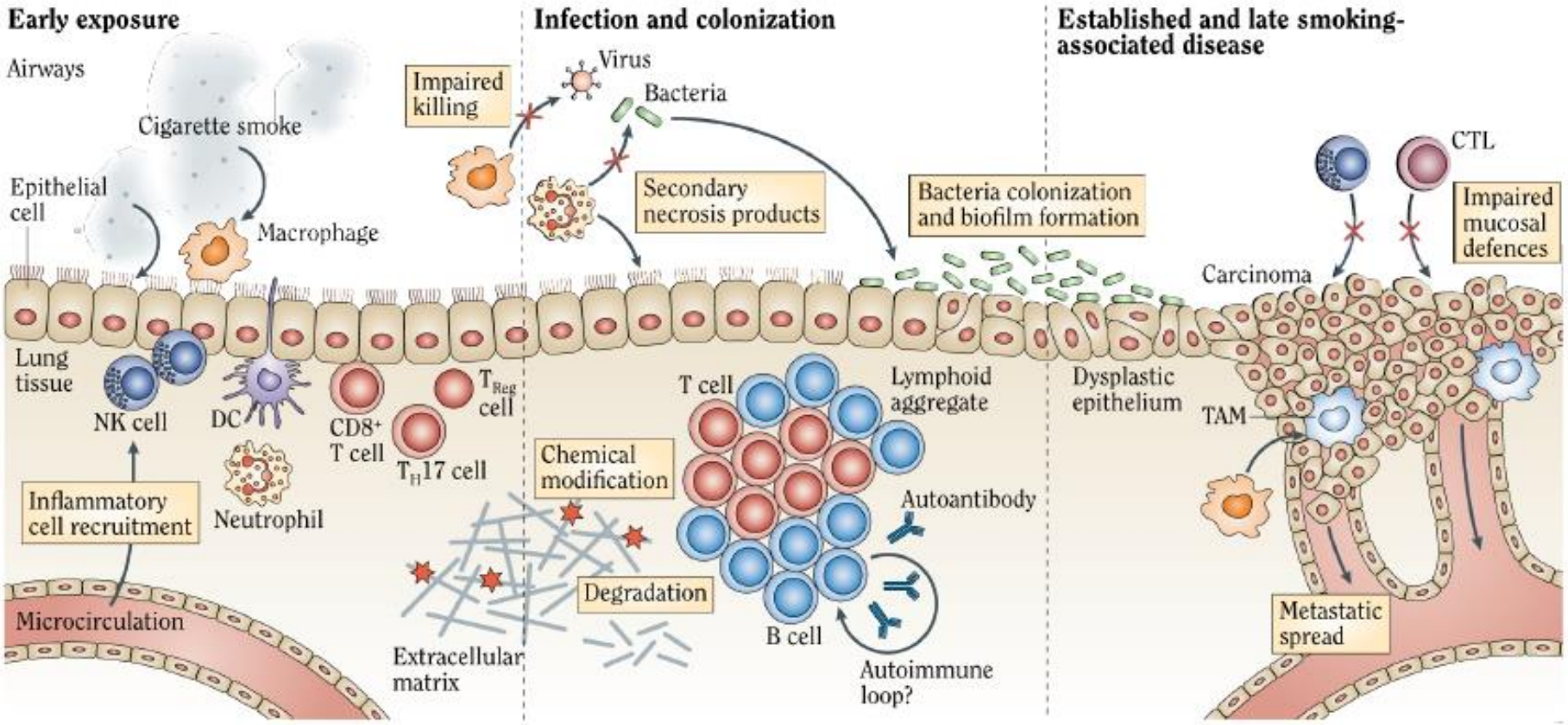
Smoking affects the immune system

Figure 10.4 Overview of immune defects caused by smoking in the lungs



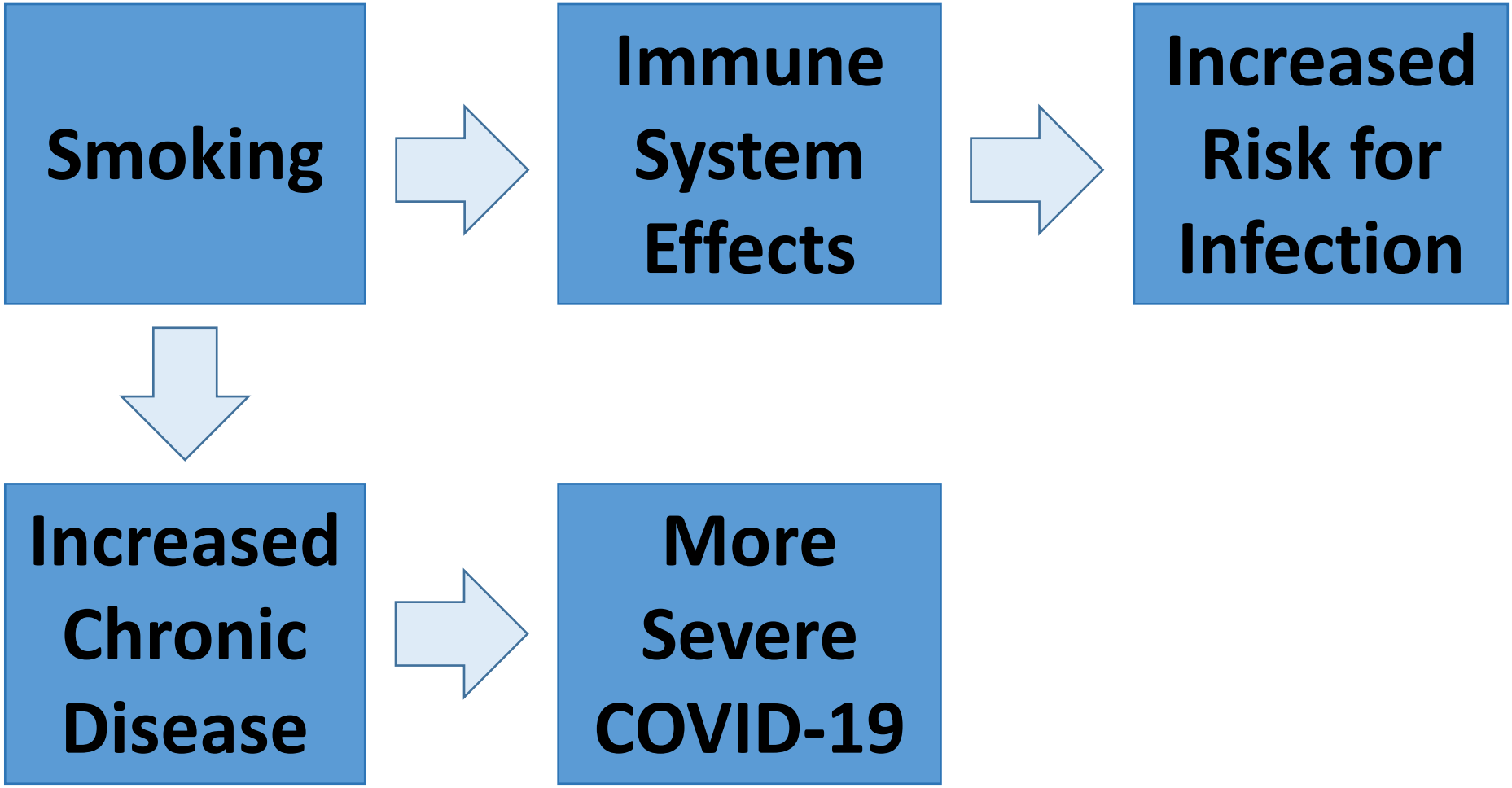
Source: Stampfli and Anderson 2009. Reprinted with permission from Macmillan Publishers Ltd., © 2009.

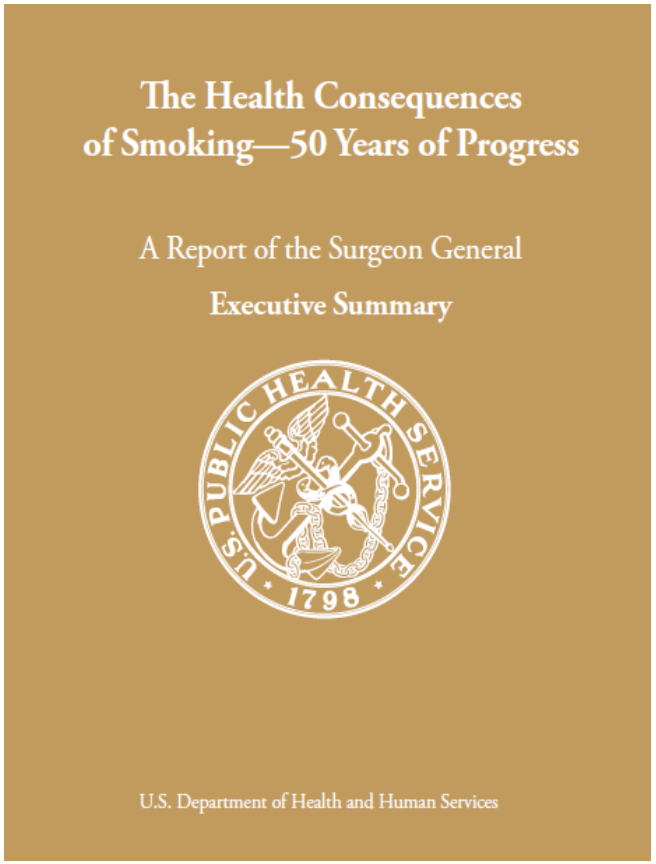
Smoking damages the lungs

- Diffuse inflammation
- Small and large airways damage
- Emphysema
- Chronic bronchitis
- Chronic obstructive pulmonary disease (COPD)

Smoking can plausibly increase incidence and severity of infectious respiratory illnesses

How Could Smoking Affect Risk for COVID-19?





Immune Function and Autoimmune Disease

1. The evidence is sufficient to infer that components of cigarette smoke impact components of the immune system. Some of these effects are immune activating and others are immune suppressive.

2. The evidence is sufficient to infer that cigarette smoking compromises the immune system and that altered immunity is associated with increased risk for pulmonary infections.

3. The evidence is sufficient to infer that cigarette smoke compromises immune homeostasis and that altered immunity is associated with an increased risk for several disorders with an underlying immune diathesis.

Rheumatoid Arthritis

1. The evidence is sufficient to infer a causal relationship between cigarette smoking and rheumatoid arthritis.

2. The evidence is sufficient to infer that cigarette smoking reduces the effectiveness of the tumor necrosis factor-alpha (TNF-α) inhibitors.

Systemic Lupus Erythematosus

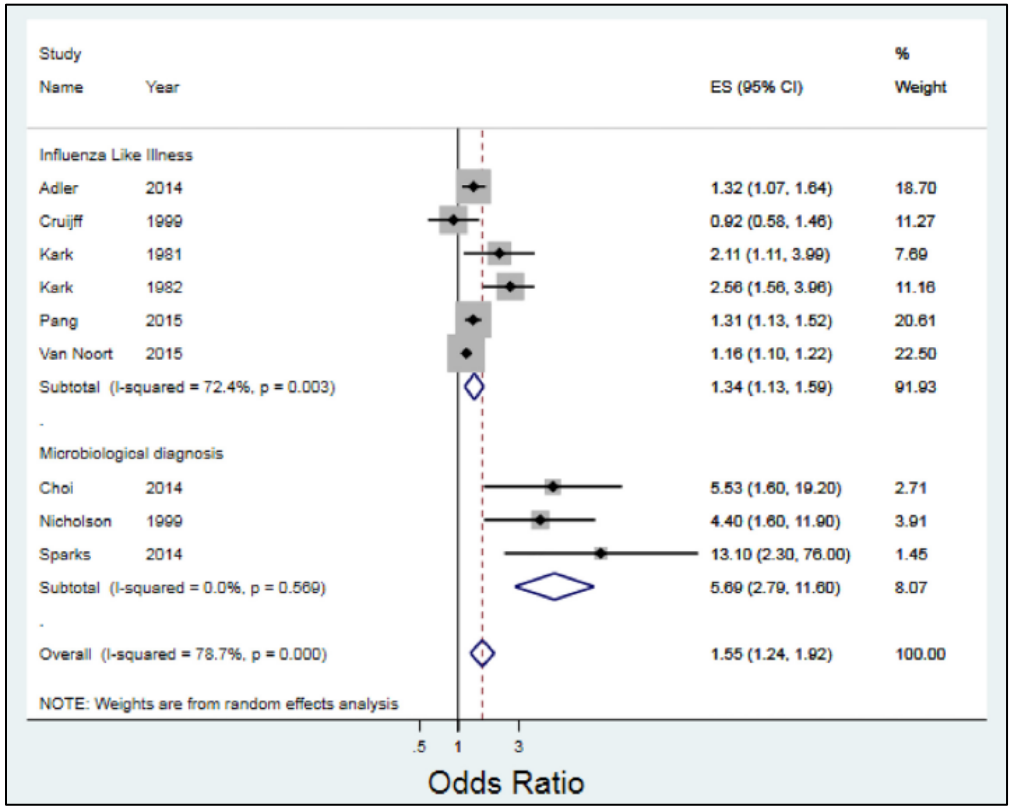
1. The evidence is inadequate to infer the presence or absence of a causal relationship between cigarette smoking and systemic lupus erythematosus (SLE), the severity of SLE, or the response to therapy for SLE.

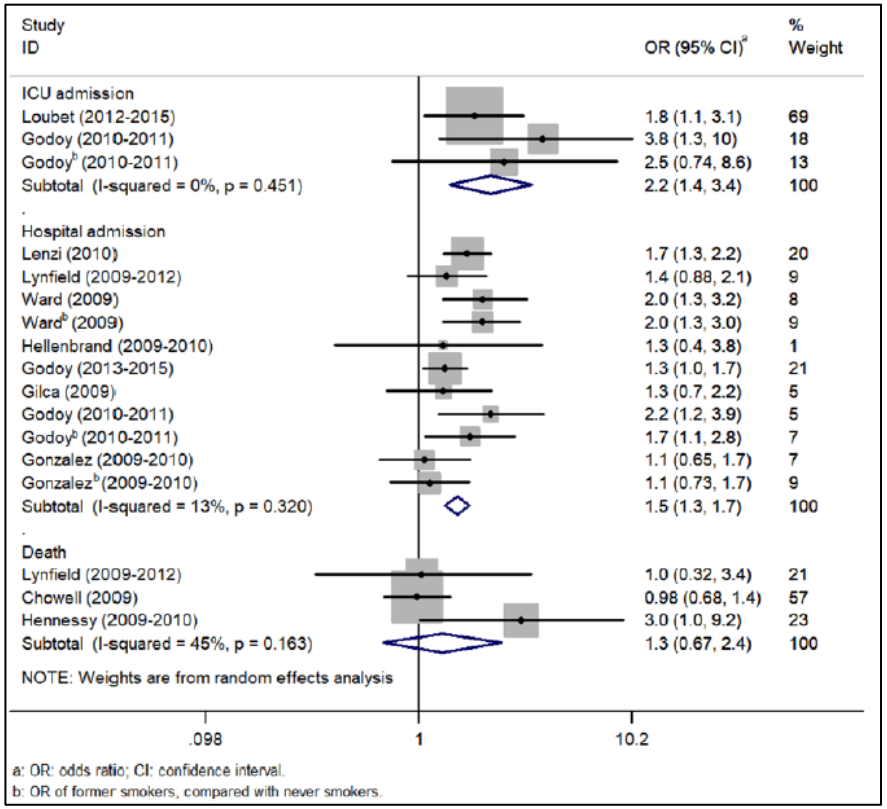
Table 10.10 Conclusions about the adverse effects of tobacco use and exposure to tobacco smoke on infectious diseases, from previous Surgeon General's reports

Selected conclusions	Year and page number of Surgeon General's report
1. The evidence is sufficient to infer a causal relationship between smoking and acute respiratory illnesses, including pneumonia, in persons without underlying smoking-related chronic obstructive lung disease.	2004, p. 27
2. The evidence is suggestive but not sufficient to infer a causal relationship between smoking and acute respiratory infections among persons with preexisting chronic obstructive pulmonary disease.	2004, p. 27
3. The evidence is sufficient to infer a causal relationship between secondhand smoke exposure from parental smoking and lower respiratory illnesses in infants and children.	2006, p. 14
4. The increased risk for lower respiratory illnesses is greatest from smoking by the mother.	2006, p. 14

Source: U.S. Department of Health and Human Services 2004, 2006.

Forest Plots of Odds Ratios for Smoking and Influenza from Two Studies

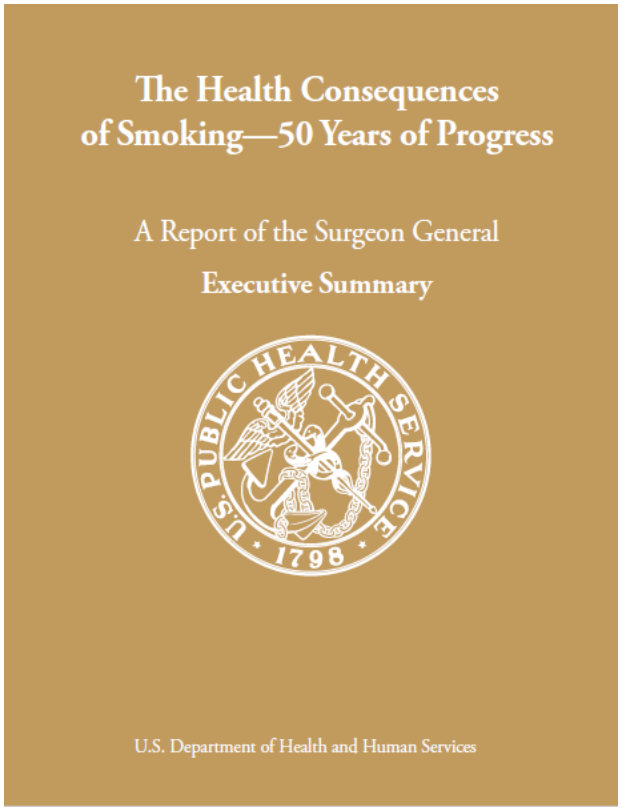




Journal of Infection • 79 (2019) 401–406

Epidemiology • Volume 30, Number 3, May 2019

Smoking and Tuberculosis



Tuberculosis

1. The evidence is sufficient to infer a causal relationship between smoking and an increased risk of *Mycobacterium tuberculosis* disease.

2. The evidence is sufficient to infer a causal relationship between smoking and mortality due to tuberculosis.

3. The evidence is suggestive of a causal relationship between smoking and the risk of recurrent tuberculosis disease.

4. The evidence is inadequate to infer the presence or absence of a causal relationship between active smoking and the risk of tuberculosis infection.

5. The evidence is inadequate to infer the presence or absence of a causal relationship between exposure to secondhand smoke and the risk of tuberculosis infection.

6. The evidence is inadequate to infer the presence or absence of a causal relationship between exposure to secondhand smoke and the risk of tuberculosis disease.

Smoking and the SARS-CoV-2 virus: what are the questions?

Assume the virus is *necessary* and *sufficient* to cause COVID-19, then how does smoking increase risk?

- Smoking increases the risk for incident infection?
- Smoking increases the risk for symptomatic infection?
- Smoking increases the risk for more severe disease and death?

What actions follow from answering these questions?

Rationale for research

- Amass evidence affirming that smoking increases risk for and/or severity of COVID-19
  - A modifiable and common risk factor
  - Imperative for action
- A possible powerful lever for tobacco control
- In many jurisdictions, resources for tobacco control likely to be reduced .

What research?

- GOOD RESEARCH—studies to date have been flawed, likely reflecting circumstances
- Ideal (but feasible?) designs—tailor to the question:
  - Increased incidence: cohort-based designs in high risk areas
  - Increased severity: case-control studies based in hospitals
- Would collecting smoking history for cases help?
- Other questions—consequences of the pandemic for initiation and cessation