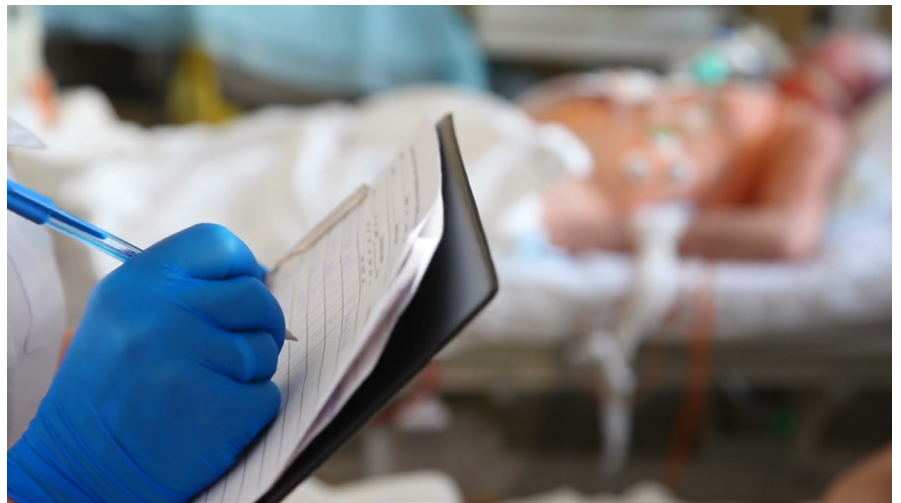




BLACK CARBON HEALTH EFFECTS STUDIES



MOTIVATION

APPLICATION NOTE

BC is a harmful pollutant with significant adverse effects on human health. The Aethalometer is a valuable tool in monitoring black carbon levels and aiding in health-related research. By providing accurate and real-time data, it supports efforts to understand and mitigate the health impacts of black carbon pollution. This application note provides an overview of the health implications of black carbon and highlights the use of the Aethalometer in studying these effects.

METHODOLOGY

MONITORING BLACK CARBON WITH AETHALOMETER

Understanding the affecting mechanism of BC and its concentration distribution in the atmosphere is essential for assessing its health impacts. The Aethalometer is a key instrument used for this purpose.

The Aethalometer is instrument that can be deployed in epidemiological studies to study the link between black carbon and its impact on human health. By providing precise and continuous measurements, it helps researchers:

- **Assess Exposure Levels:** Determine the concentration of black carbon that populations are exposed to in different settings, such as near roads, industrial areas, and residential zones.
- **Analyze Temporal Trends:** Study variations in BC levels over time and correlate them with health data to identify patterns and potential causative factors.
- **Evaluate Intervention Strategies:** Monitor the effectiveness of policies aimed at reducing BC emissions, such as traffic regulations and emission controls (3).

Related articles

1. World Health Organization. (2012). Health effects of black carbon. Copenhagen: WHO Regional Office for Europe.
2. Janssen, N. A., et al. (2011). Health effects of black carbon. Research report (Health Effects Institute), (153), 5-58.
3. Ezani E. et al. Characteristics and Source Apportionment of Black Carbon (BC) in a Suburban Area of Klang Valley, Malaysia, *Atmosphere* 2021, 12(6), 784.
4. Costabile F. et al. Exposure to urban nanoparticles at low PM concentrations as a source of oxidative stress and inflammation, *Scientific Reports* volume 13, Article number: 18616, 2023.
5. Daellenbach, K. R. et al. Sources of particulate-matter air pollution and its oxidative potential in Europe, *Nature* volume 587, pages414-419, 2020.
6. Chowdhury, S. et al. Global health burden of ambient PM2.5 and the contribution of anthropogenic black carbon and organic aerosols, *Envir. Inter.* Volume 159, 15 January 2022, 107020.
7. Bhattu D. et al. Local incomplete combustion emissions define the PM2.5 oxidative potential in Northern India, *Nature Communications* volume 15, Article number: 3517, 2024.

BLACK CARBON HUMAN HEALTH EFFECTS STUDIES

APPLICATIONS IN HEALTH STUDIES

Black Carbon (BC) particles are small enough to penetrate deep into the human body, leading to various health issues, such as:

1. **Respiratory problems and diseases:** Inhalation of BC can aggravate respiratory diseases such as asthma and bronchitis. It can also lead to decreased lung function and respiratory infections (1,2).
2. **Cardiovascular Issues:** Exposure to BC has been linked to cardiovascular diseases. The particles can enter the bloodstream, causing inflammation, oxidative stress, and potentially leading to heart attacks and strokes (1,2,4,5,7).
3. **Cancer:** Long-term exposure to BC is a potential risk factor for lung cancer due to the carcinogenic compounds that adhere to its surface (1,2).
4. **Premature death:** Studies have shown that chronic exposure to high levels of BC can affect human life expectancy (1,2,6).