

Health effects of “new” diesel exhaust:
considering outcomes from a
risk assessment perspective

Sverre Vedal, MD MSc
National Jewish Medical and Research Center
Denver, CO

Why do we want to study effects of “new” diesel?

- pro
 - “new” diesel is not as pathogenic
 - the current crop of health studies is already irrelevant
- con
 - “new” diesel is qualitatively similar to “old” diesel
 - therefore, it’s just a dose issue

Considerations (sometimes competing) in selecting health outcomes for study

1. relevance
 - focus
 - toxicologic and *in vitro* studies
2. significance
 - “adverse”
 - surrogate endpoints (e.g., biomarkers)
3. practicality (measurable, accessible and timely)
4. validity and interpretability of available study designs
5. degree of confidence in “old” diesel effects

Health outcomes of interest related to diesel exhaust exposure

- effects of short-term (acute) exposure
 - irritant & “neurophysiological” symptoms
 - airways inflammation
 - allergy
- effects of long-term (chronic) exposure
 - lung cancer
 - airways inflammation and histopathological abnormalities (fibrosis)
 - allergy

Health outcomes of less/little interest related to diesel exhaust exposure

- effects of short-term (acute) exposure
 - lung function
- effects of long-term (chronic) exposure
 - lung function

Relationships between diesel exhaust and PM health effects?

- PM effects do not seem to depend on the presence of diesel exhaust
- however, many PM effects have not been studied for diesel exhaust
- some diesel exhaust effects of interest do not overlap with those of PM

short-term (acute) outcomes

	relevant	significant	practical	valid design	confidence
irritant/ neuropsych	+++	+(+)	+++	+++	+++
airways inflamm	++(+)	++	++	+++	++
allergy	++(+)	++	++	++(+)	++

long-term (chronic) outcomes

	relevant	significant	practical	valid design	confidence
lung cancer	+++	+++	+	+(+)	++
airways inflamm/ histopathol	+(+)	+(+)	+(+)	+++	++(+)
allergy	++	++	+(+)	++(+)	+

lung cancer

- observational cohort designs
 - for determination of carcinogenicity
 - unlikely to be helpful for “new” diesel
- intermediate endpoints?
- mutagenicity?
- animal model?

conclusions

observational studies

- require more specific exposure measures
- intermediate endpoints (lung Ca & allergy)?

toxicologic studies

- chronic inflammation/histopathology
- chronic allergy endpoints

human experimental studies

- irritant & neuropsych outcomes
- acute airways inflammation
- acute allergy endpoints

in vitro studies

- mutagenicity?