Using the Matrix to bridge the gap between epidemiology and risk assessment

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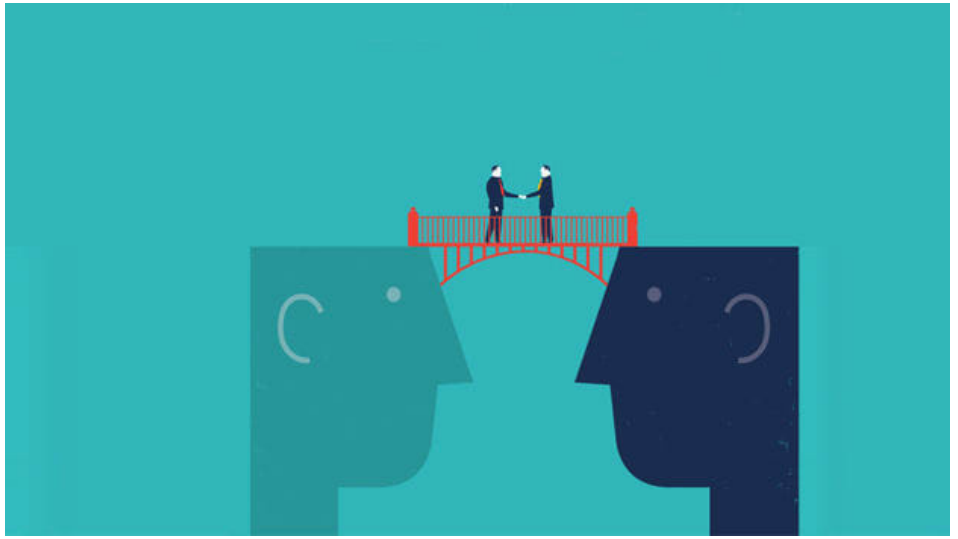
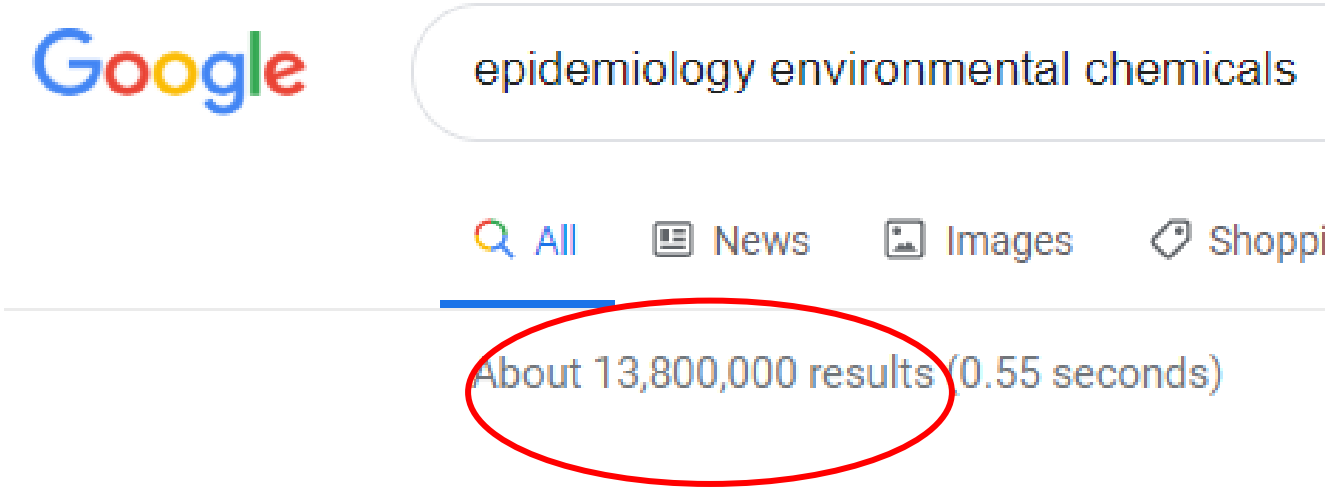


Large number of epid studies….



…with many positive attributes….

Target species is directly relevant

Reduces need for high-to-low dose extrapolations

No/poor laboratory animal models for some health endpoints

Minimize the use of animals in chemical testing

….but often aren’t used for risk assessment and public health decision-making.

Why?

Training and expertise barriers
Language barriers
Evolving systematic review process
Interest

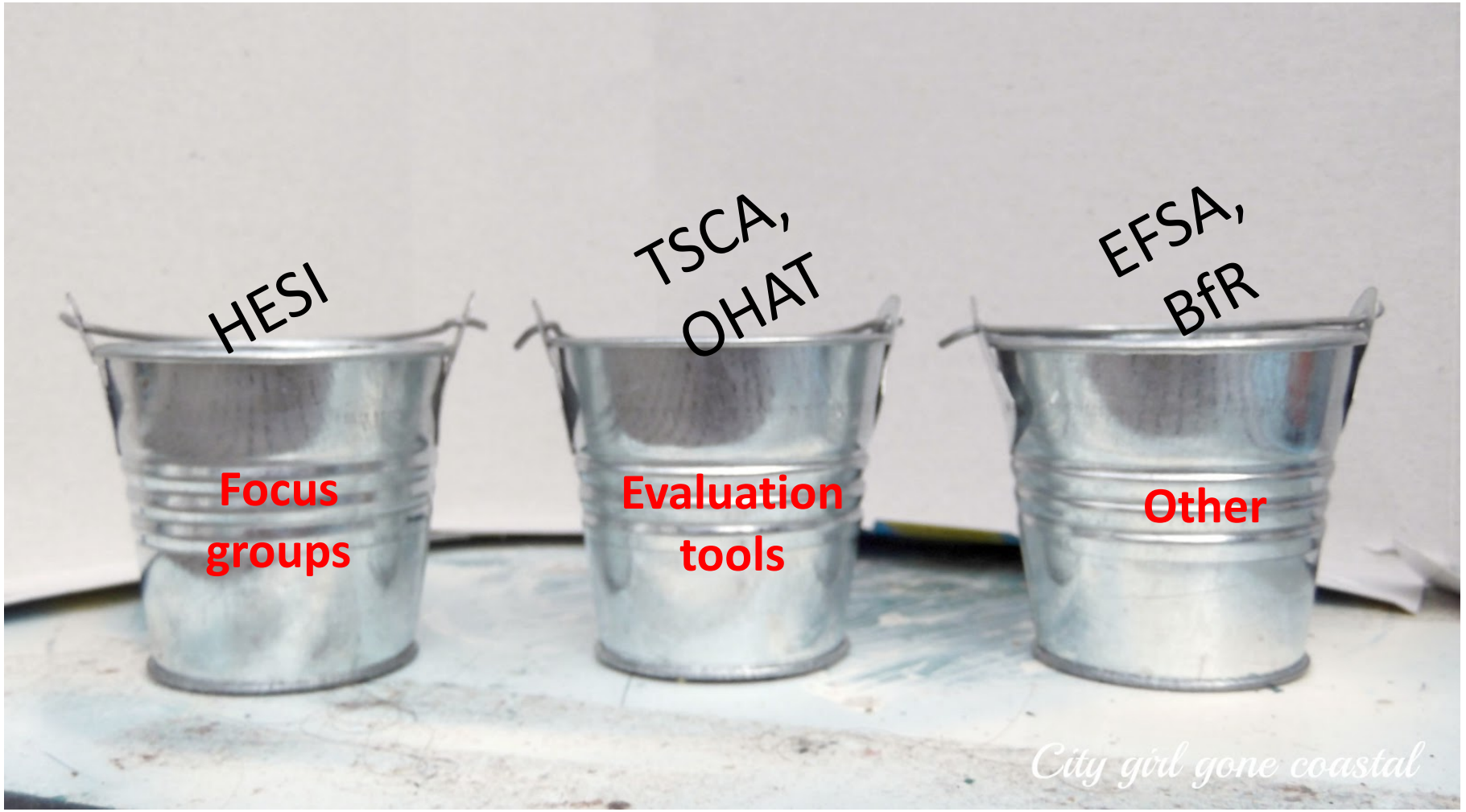
Is bridging the gap a new issue? A new awareness?

NO!

Since the 1990's there have been calls for improving suitability of epidemiology studies for risk assessment.

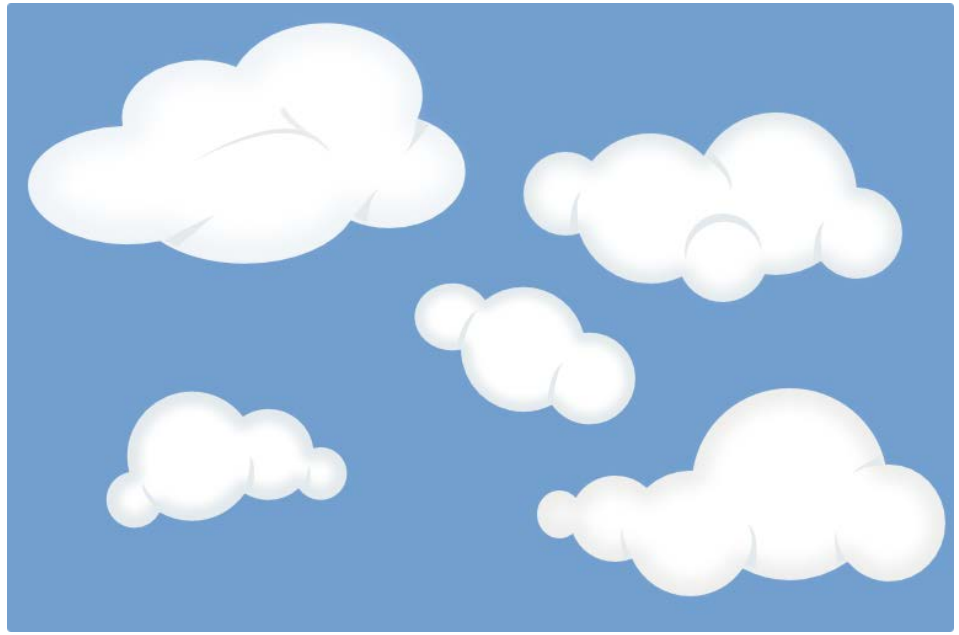
- Samet et al. 1998. Am J Epidemiol 148(10):929-36.
- Goodman et al. 2010. Environ Health Perspect 118:727–734.
- Burns et al. 2014. Environ Health Perspect 122:1160–1165.
- European Food Safety Authority. 2017. EFSA Journal. doi: 10.2903/j.efsa.2017.5007

Current activities on bridging epi/risk assessment gap



What are we hearing?

Get off my cloud!



How can I learn more?

Fresh thinking

Workshop attendee	Affiliation
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Weis, Christopher	Office of the Director, National Institute of Environmental Health Sciences
Zidek, Angelika	Existing Substances Risk Assessment Bureau, Health Canada

Contents lists available at ScienceDirect

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Methodology article

A matrix for bridging the epidemiology and risk assessment gap☆

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Methodology

Bridging the Epidemiology Risk Assessment Gap: An NO_2 Case Study of the Matrix

Judy S. LaKind [a], Carol J. Burns [b], Heidi Erickson [c], Stephen E. Graham [d], Scott Jenkins [d], Giffe T. Johnson [e]

Rigid frameworks, detailed how-to's

Focusing on important *concepts*

Improved dialogue, communication

A nudge, not a shove

Risk Assessment Asks

https://openi.nlm.nih.gov/detailedresult.php?img=PMC4147733_jphr-2013-2-e18-g001&req=4

The Matrix

	Asks for risk assessment		
Hazard ID	Confirm outcome?	Confirm exposure?	Report methods fully and transparently?
Dose Response	Include information on shape of the curve?	Harmonize exposure categories?	Describe direction/ magnitude of error?
Exposure Assessment	Describe source-to-intake pathways?	Provide complete exposure data?	Report on quality assurance/quality control?

The Matrix is:

- communication tool
  - advance an understanding of risk assessment
  - increase the translation of epidemiology data
- includes elements that have impact
- not intended to supplant current best practices
- forward looking

Case Study of NO_2 epidemiology literature

- Scope: 14 mortality studies of long-term NO_2 exposure.
- Why: Does the *existing* epidemiology literature meet the needs of risk assessment(s)?
- What: Examples of providing high/low confidence for each Matrix element
- Conclusion: Epidemiology studies weren't conducted and reported with risk assessment in mind…but they could be.

The Matrix: some positive examples

	Asks for risk		
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Medical diagnoses

Online supplements

Histograms, box plots, etc.

The Matrix: some examples for improvement

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Assume linear models

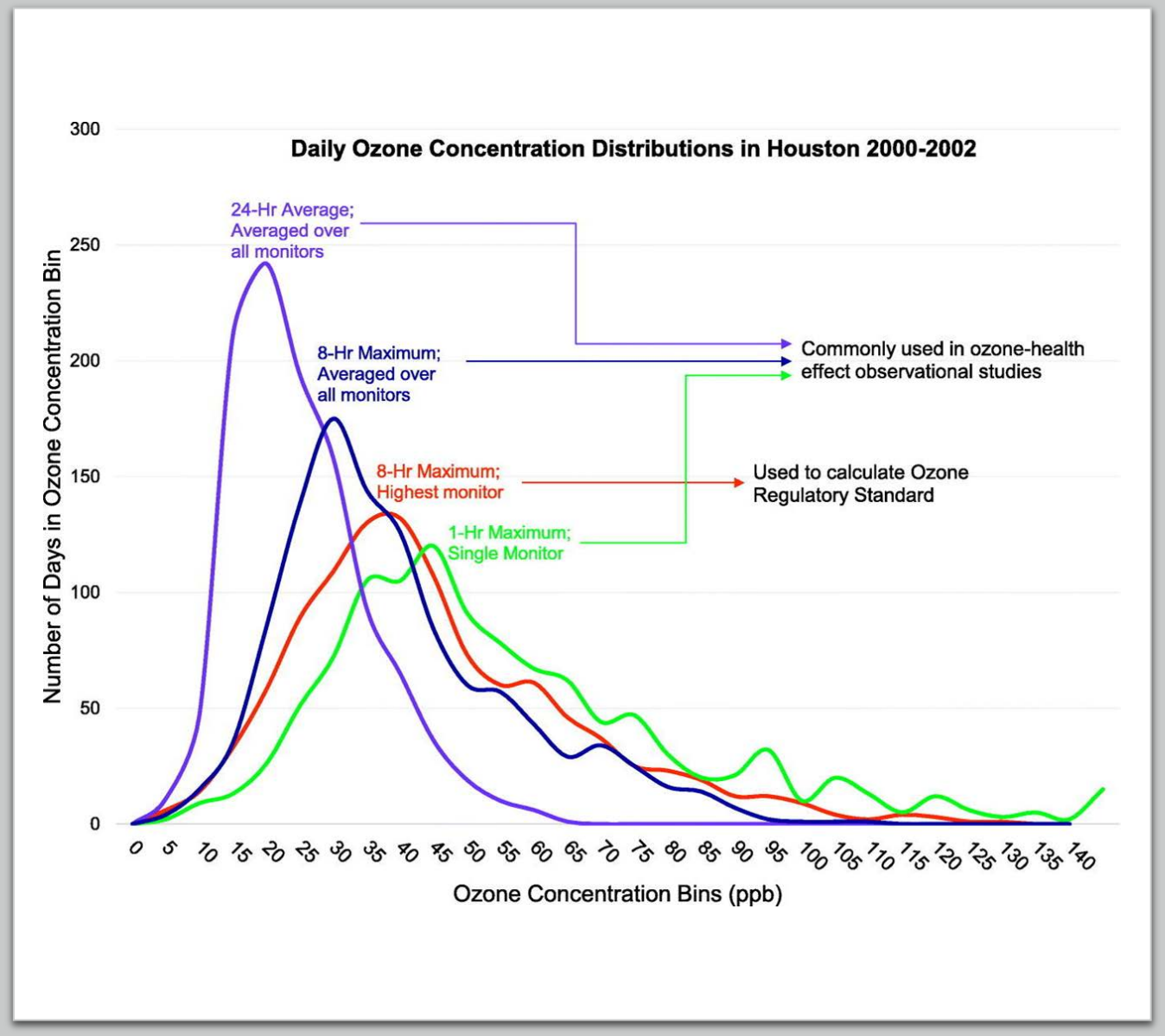
Incorporate same metrics

Mobile or stationary?

Apples and Oranges

Lange S. Sci Total Environ, 644 (2018) 1547-1556

Example: Ozone



Matrix Refresher

Does not include:

- Confounding
- Study design
- Types of bias

Focuses on:

- Risk language
- Elements with “impact”
- Current regulatory thinking

Matrix provides a constructive template

- Can a study be improved in the following stage(s)?

  Design – Reporting - Analysis

- If more research is needed…

  Tell me more. Be specific.

Temporal trends of reviews

- Past: Compared *results* across studies, focus on consistency
- Recent: EPA concluded…"evidence is suggestive of, but not sufficient"…
- Future: Attention on quality, completeness and integration

Matrix Users

REGULATORS

RESEARCHERS

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- Heidi Erickson
- Stephen Graham
- Scott Jenkins
- Giffe Johnson

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Questions?

The Matrix

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