Fluoride Developmental Neurotoxicity: Dose-Response Analyses of Recent High Quality Studies

Chris Neurath\textsuperscript{a}, Paul Connett\textsuperscript{b}, Michael Connett\textsuperscript{c}, Bill Hirzy\textsuperscript{d}
\textsuperscript{a} American Environmental Health Studies Project, \textsuperscript{b} Fluoride Action Network, \textsuperscript{c} Waters Kraus & Paul

Recent health assessments by NTP or NAS with conclusions of "presumed" hazard in humans

- Number of qualifying studies
- Mean IQ of children

Recent health assessments by NTP or NAS

- Type 1 diabetes
- Maternal urine fluoride (mg/L)
- Environmental Chemical Exposures:
  - BDE-47

Environmental neurodevelopmental disorders

- Fluoride
- Organophosphate pesticides
- Acute lymphocytic leukemia
- Pediatric bipolar disorder

Recent health assessments by NTP or NAS

- Risk of Bias scores, exposure levels, effect directions
- # of animal studies
- # of human studies

Dose-response analysis summaries

- Study
- Effect Magnitude \( \beta \)
- BMDL

Examples of studies suitable for dose-response analyses

- Dose-response curves and BMD analyses based on data or figures in each paper

Notes

1.) Exposures measured as urine F concentrations are considered equivalent to drinking water F concentrations.

2.) Community water fluoridation concentration is typically 0.7 – 1.0 mg/L.

3.) For studies with multiple subpopulations, outcomes or exposure measures, the most sensitive significant association was chosen, consistent with standard risk assessment practice.

4.) Benchmark Dose analyses (BMD) used response (BMR) of –1 IQ point as adverse effect.

5.) No intra-species Uncertainty Factor (UF) applied to BMDLs.


References

*Adapted from NTP draft monograph data: http://hawproject.org/assessment/405/
https://hawproject.org/summary/visual524/

Hirzy 2016
https://www.fluoridedevelopmentalneurotoxicity.com/PROASTBMDSoftware.pdf

Grandjean 2019
https://doi.org/10.1186/s12940-019-0551-x

PROAST BMD software: http://fluoridealert.org/studies/neurath-powerpoint-developmental-neurotoxicity/

additional information:
http://fluoridealert.org/studies/neurath-powerpoint-developmental-neurotoxicity/