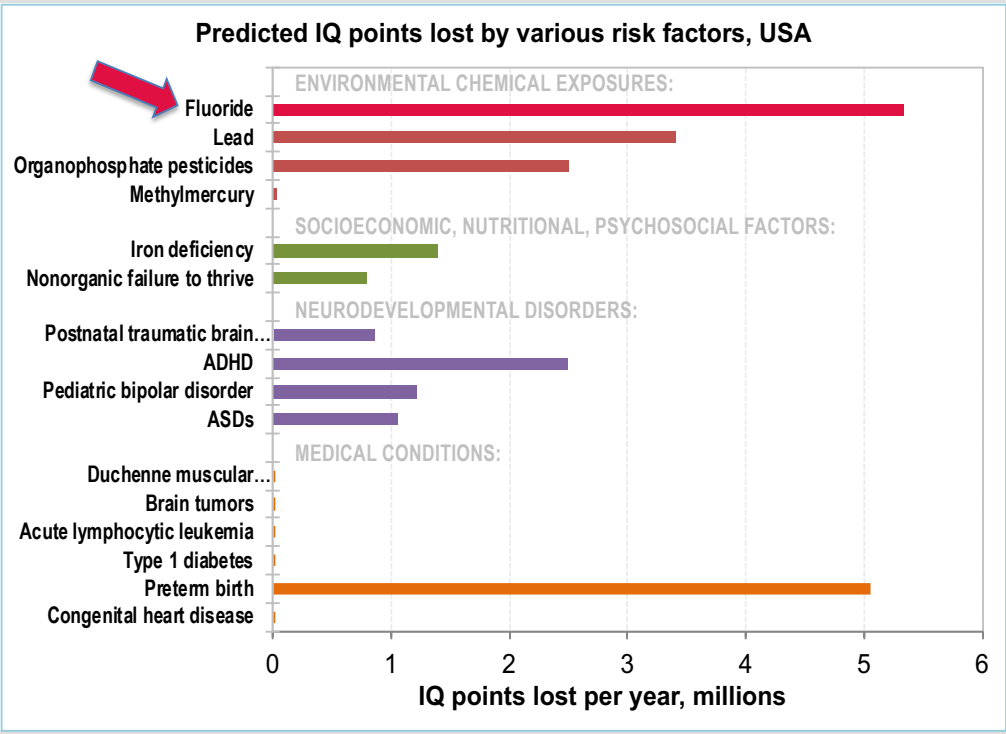
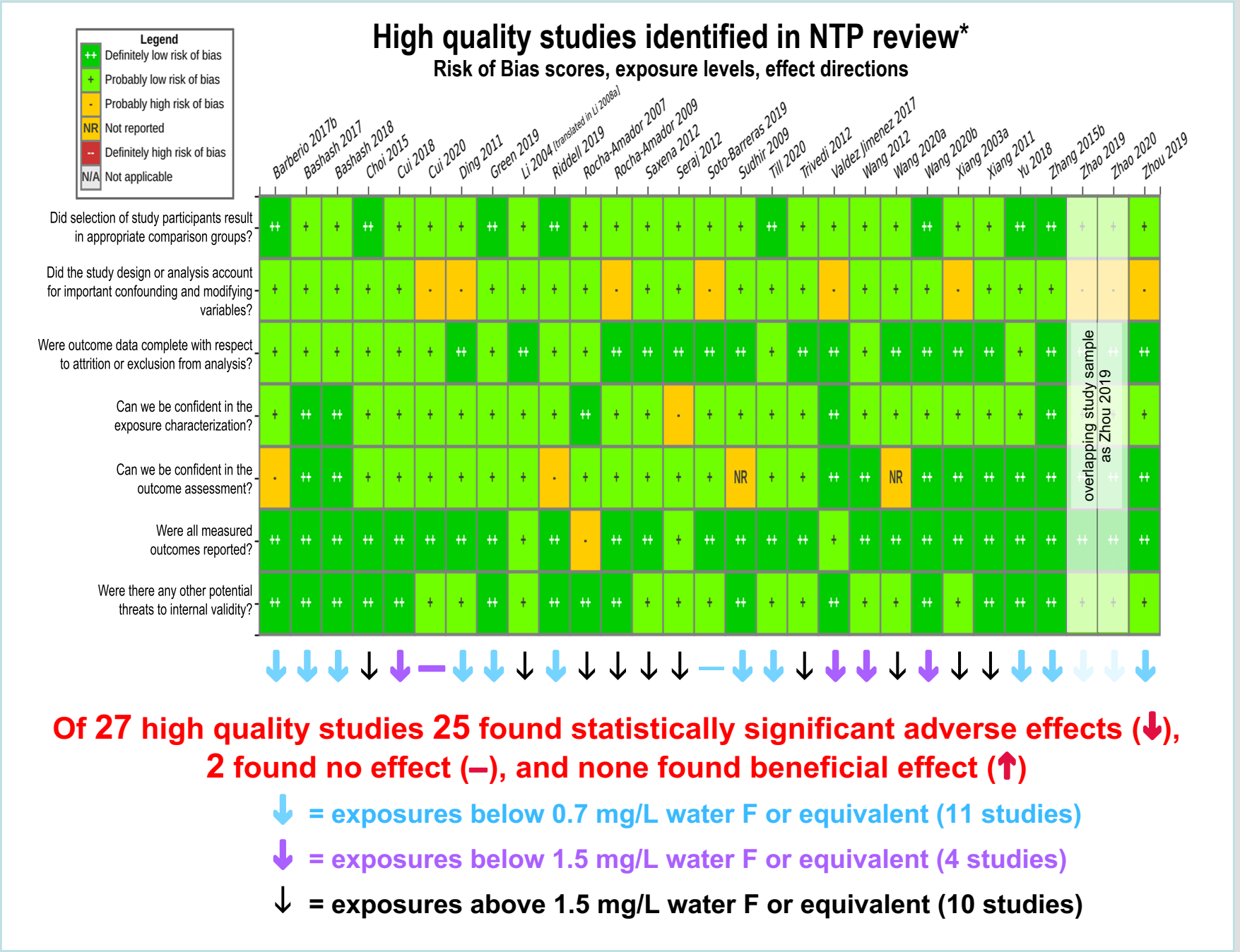
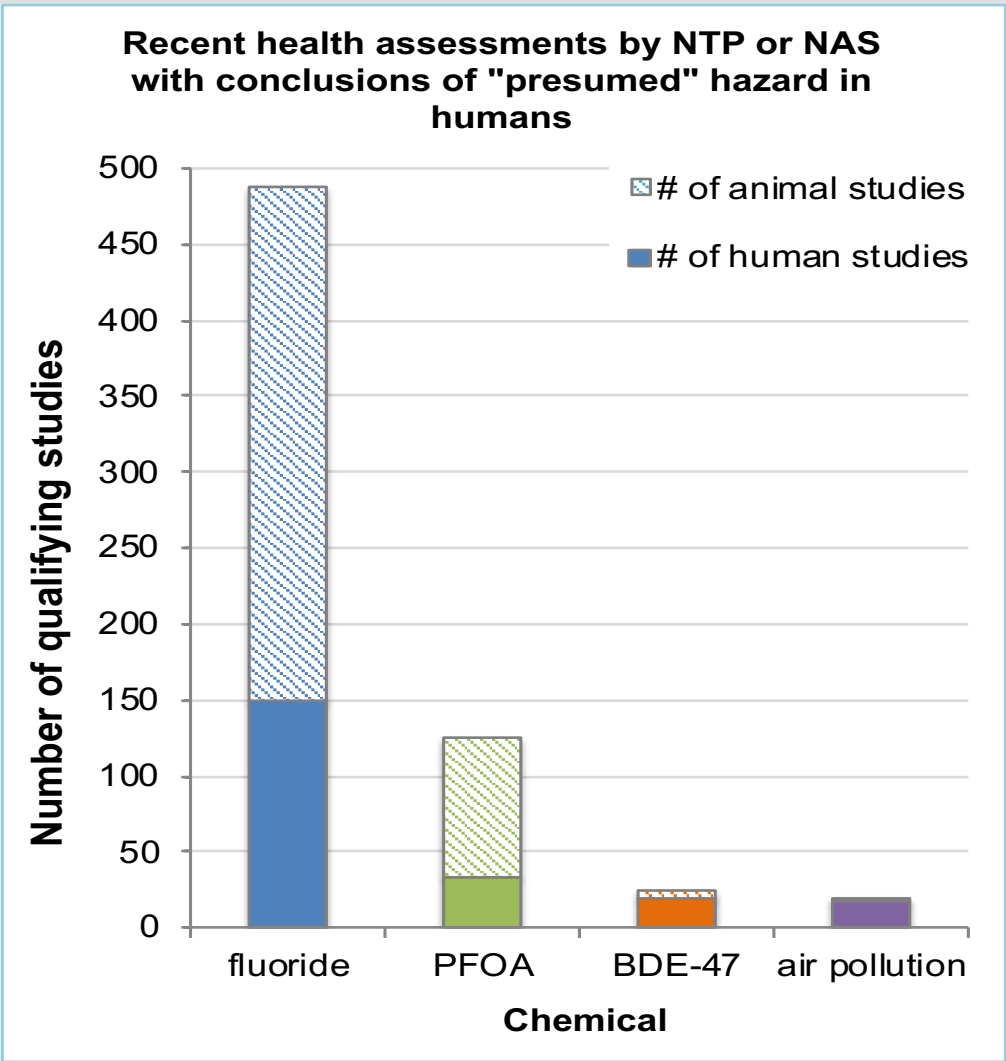


Fluoride Developmental Neurotoxicity: Dose-Response Analyses of Recent High Quality Studies

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Dose-response analysis summaries

Study	Effect Magnitude β	BMDL
Xiang 2003	–5.7 IQ / 1 mg/L water F	0.27 mg/d
Xiang 2003	+10% IQ<80 / 1 mg/L water F	
Zhang 2015b	–9.7 IQ / 1 mg/L urine F	0.16 mg/L
Cui 2018	–12.3 IQ / 1 mg/L urine F	0.00 mg/L
Bashash 2017	–6.3 IQ / 1 mg/L urine F	0.10 mg/L
Bashash 2018	+5.7 pts / 1 mg/L urine F	
Green 2019	–4.5 IQ / 1 mg/L urine F	0.12 mg/L
Till 2020	–8.8 IQ / 1 mg/L water F	0.06 mg/L
average	–7.9 IQ / 1 mg/L	0.09 mg/L

- Notes**
- Exposures measured as urine F concentrations are considered equivalent to drinking water F concentrations.
 - Community water fluoridation concentration is typically 0.7 – 1.0 mg/L.
 - For studies with multiple subpopulations, outcomes or exposure measures, the most sensitive significant association was chosen, consistent with standard risk assessment practice.
 - Benchmark Dose analyses (BMD) used response (BMR) of –1 IQ point as adverse effect.
 - No intra-species Uncertainty Factor (UF) applied to BMDLs.
 - BMDLs for Xiang 2003 from Hirzy 2016; for Bashash 2017, Green 2019 from Grandjean 2019; for Zhang 2015b, Cui 2018, Till 2020 by Neurath using PROAST BMD software or linear dose-response method of Grandjean 2019.
- References**
- *Adapted from NTP draft monograph data:
<https://hawcproject.org/assessment/405/>
<https://hawcproject.org/summary/visual/524/>
- Hirzy 2016
https://www.fluorideresearch.org/494Pt1/files/FJ2016_v49_n4Pt1_p379-400_pg.pdf
- Grandjean 2019
<https://doi.org/10.1186/s12940-019-0551-x>
- PROAST BMD software:
<https://proastweb.rivm.nl/>
- additional information:
<http://fluoridealert.org/studies/neurath-powerpoint-developmental-neurotoxicity/>

Examples of studies suitable for dose-response analyses

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

