HHRA

Heartland Health Research Alliance

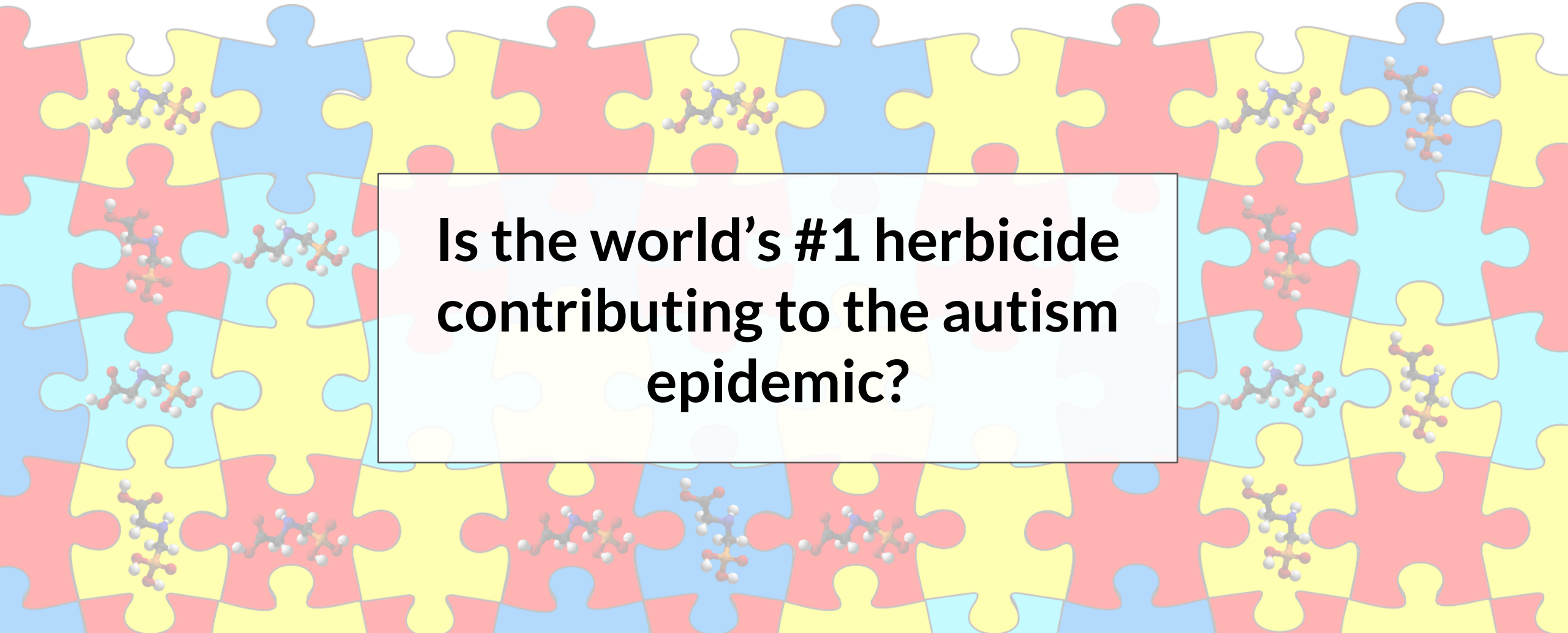
Cutting-edge science to enhance public and environmental health

Our Flagship Project

The Heartland Study

Supporting Children's Health
In the Heartland and Beyond

Glyphosate and Autism

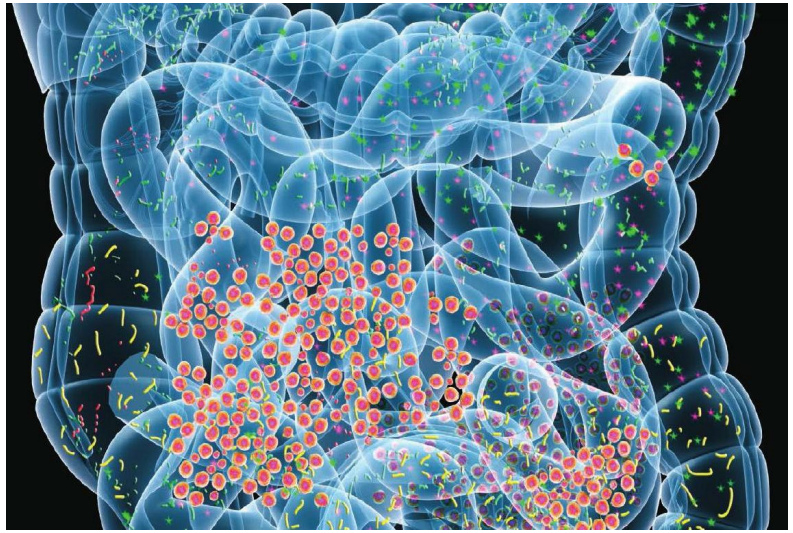


Is the world's #1 herbicide contributing to the autism epidemic?

The Evidence

GLYPHOSATE HAS ANTIBACTERIAL PROPERTIES

Glyphosate kills weeds by impacting the shikimate pathway, which is an important metabolic pathway in plants ***and*** bacteria. HS research shows that glyphosate is disrupting microbiomes, with possible impacts on many health endpoints.



THE MICROBIOME MATTERS

The healthy human gut is ***full of beneficial bacteria*** – there are 10 bacterial cells for every 1 human cell. This microbiome helps us make key nutrients, break down toxins, and stimulate the immune system.

THE GUT-BRAIN CONNECTION

New science illustrates that the gut microbiome plays important roles in brain health and neurodevelopment. Conditions ranging from anxiety to Parkinson's to autism can arise from, or worsen in response to chemical-induced shocks to the microbiome.

The Science: von Ehrenstein et al., 2019

RESEARCH

BJN
BRITISH JOURNAL OF NUTRITION

Prenatal and infant exposure to ambient pesticides and autism spectrum disorder in children: population based case-control study

Ondine S von Ehrenstein,[1,2] Chenxiao Ling,[2] Xin Cui,[2,3,4] Myles Cockburn,[5] Andrew S Park,[2] Fei Yu,[6] Jun Wu,[7] Beate Ritz[2,8,9]

March 2019
DOI: 10.1136/bmj.l962

- Epidemiological study of 8 counties in California's Central Valley
- Researchers mapped use of eleven target pesticides with data from California's comprehensive pesticide reporting system CA-PUR
- Correlated pesticide use (i.e. exposure) with the occurrence and severity of 2,961 cases of autism in the region

- Development of autism was positively associated with exposure to some pesticides, especially during pregnancy

- Glyphosate showed a slight increase in ASD risk when the exposure occurred in the first year of life

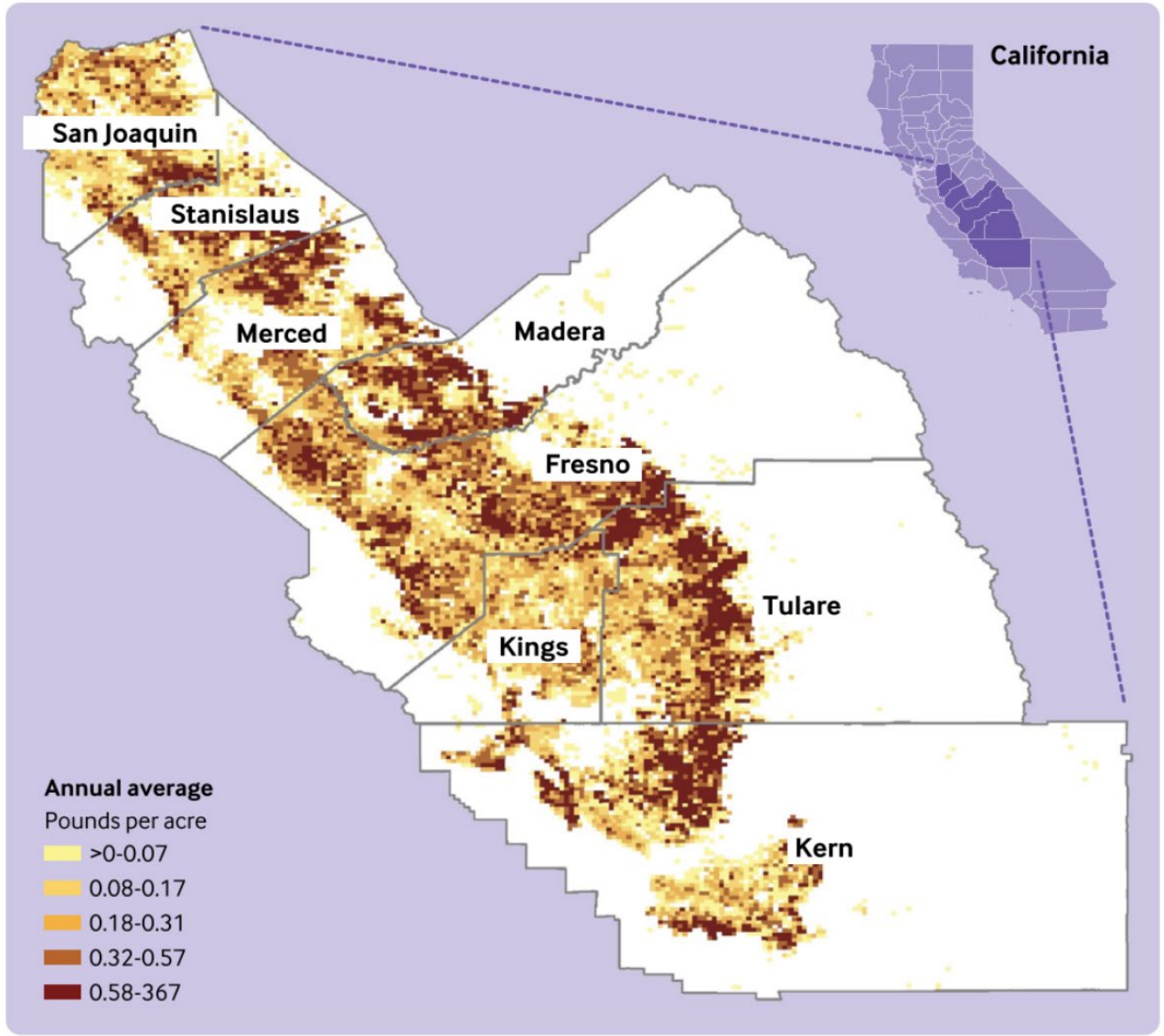
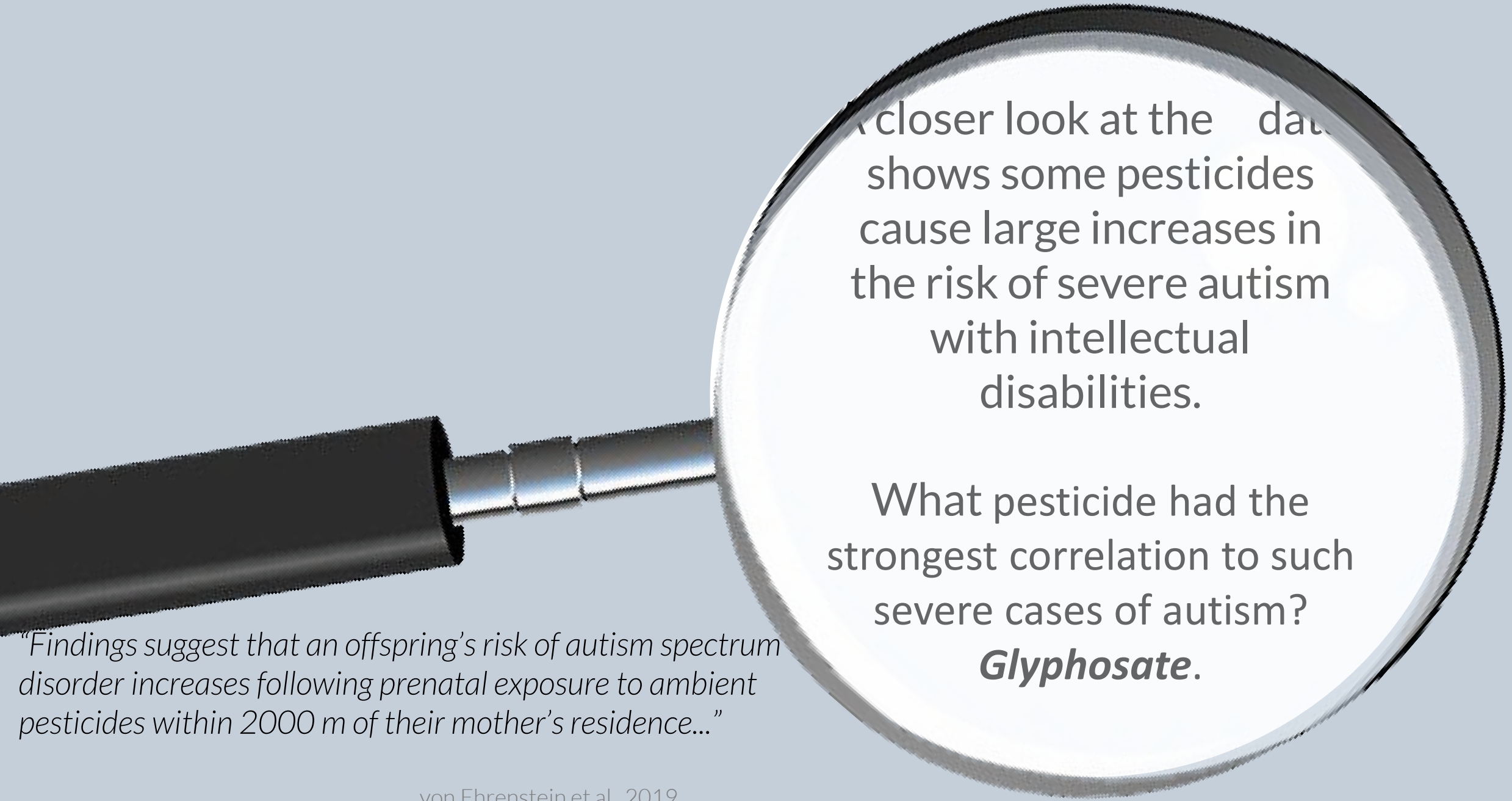


Fig 1 | Pesticide application of glyphosate in Central Valley, CA, 1998-2010

From von Ehrenstein et al., 2019



"Findings suggest that an offspring's risk of autism spectrum disorder increases following prenatal exposure to ambient pesticides within 2000 m of their mother's residence..."

von Ehrenstein et al., 2019

New Science: Zhang et al., 2020

SCIENCE ADVANCES | RESEARCH ARTICLE

HEALTH AND MEDICINE

A quasi-paired cohort strategy reveals the impaired detoxifying function of microbes in the gut of autistic children

Mengxiang Zhang[1]*, Yanan Chu[2]*, Qingren Meng[3]*, Rui Ding[1,4], Xing Shi[5], Zuqun Wang[1,4], Yi He[1,4], Juan Zhang[6], Jing Liu[7], Jie Zhang[8], Jun Yu[2], Yu Kang[2†], Juan Wang[1,4†]

October 2020
DOI: 10.1126/sciadv.aba3760

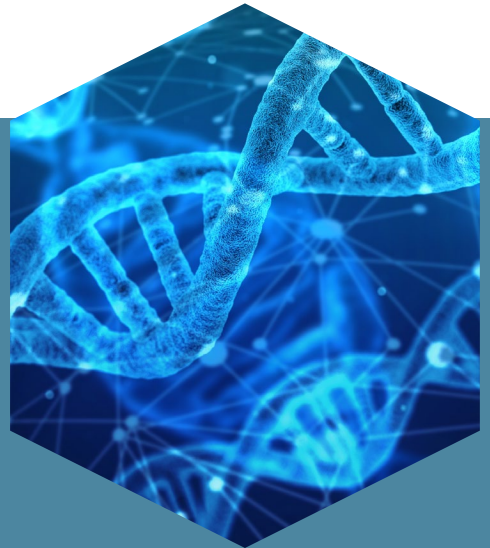
- Findings in von Ehrenstein et al. led a team of Chinese scientists to look to the microbiome for evidence of a link between toxins like pesticides and ASD
- Hot-off-the-press research provides further evidence of connections between the microbiome and ASD, ***and*** a possible mechanism opening the door to the ASD
- Study included 79 Chinese children ages 3-8, 39 with ASD plus 40 age and gender-matched controls

- The team identified “significant deficiencies” in the microbiota that help with chemical detoxification in the gut of children with ASD
- The study’s microbiome findings accurately predicted the children diagnosed on the autism spectrum
- This is a “previously undiscovered potential role of impaired intestinal microbial detoxification” that could help ID future treatment strategies

IMPLICATIONS FOR THE HEARTLAND STUDY

Dr. Robin Mesnage, HHRA's Molecular Profiling and Genomics Science Advisor, analyzed this new study. He found interesting parallels between his observed affects of glyphosate on the microbiome and the patterns Zhang et al. report.

More research is needed – ***and the Heartland Study is poised to play an important role***. Dr. Mesnage recommends microbiome sampling in the HS research protocol. The costs of doing so are coming down rapidly. Important new science is coming out almost weekly.



Questions?? And Thank You!

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The Heartland Study