Pediatric Immunization Information Session for Healthcare Providers

Vaccine Preventable Disease Control Program

Los Angeles County Department of Public Health

December 10, 2025 | 12:00-1:00 pm

Pediatric Immunization Information Session for Healthcare Providers

None of the planners or presenters for this activity have disclosed relevant financial relationships with ineligible companies.

There is no commercial support for today's activity

Ineligible companies are companies whose primary business is producing, marketing, selling, re-selling, or distributing healthcare products used by or on patients.

Agenda

Time	Topic	Speaker
12:00-12:03	Welcome	Jocelyn Martinez, MPH
12:04-12:23	LAC DPH Updates: • Infant Botulism Outbreak Linked to Infant Formula • Brief ACIP Updates • Respiratory Vaccine Dashboards	Dr. Moon Kim, MD, MPH Dr. Nava Yeganeh, MD, MPH Sherry Yin, MPH
12:24-12:54	The Science Behind Autism Etiology: From Vaccines to Medications	Dr. Hohui Wang, MD
12:55-1:00	Q&A and Closing Remarks	Jocelyn Martinez, MPH

LAC DPH Update:

Infant Botulism Outbreak Linked to Infant Formula November 2025

Presented by: Moon Kim, MD, MPH

Types of Botulism

- **Foodborne**
  - From eating foods contaminated with toxin
  - Often due to improperly canned/preserved foods
- **Wound**
  - Spores enter a wound and produce toxin
  - Higher risk with injection drug use or traumatic injuries
- **Infant**
  - Spores grow and make toxin in an infant's intestines
- **Iatrogenic**
  - Too much botulinum toxin given during cosmetic or medical procedures
- **Adult Intestinal Toxemia**
  - Very rare; spores grow in adult intestines
  - More likely with serious gut conditions

https://www.cdc.gov/botulism/about/index.html

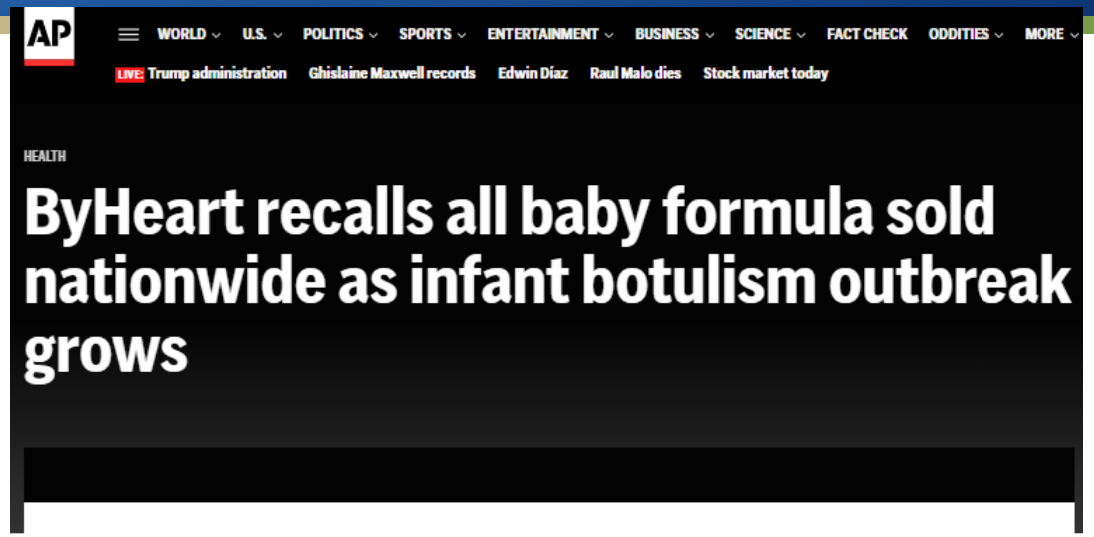
- Infant botulism is an intestinal toxemia.
- The neurotoxin binds to cholinergic nerve terminals and cleaves intracellular proteins necessary for acetylcholine release. This can result in:
  - Bulbar palsies
  - Hypotonia
  - A symmetric, descending, flaccid paralysis
- The disease results after spores of the bacterium Clostridium botulinum or related species are swallowed. These spores temporarily colonize an infant's large intestine and produce botulinum neurotoxin.
- Symptoms often start with:
  - Constipation
  - Difficulty feeding (sucking/swallowing), a weak or altered cry, loss of head control
- Without treatment, symptoms may progress to muscle paralysis and respiratory failure.

Patient recovering from infant botulism still has neck muscle weakness

https://www.cdc.gov/botulism/hcp/clinical-overview/infant-botulism.html#cdc_clinical_overview_clin_fea-signs-and-symptoms

Signs can appear more quickly or may appear up to 30 days after a baby swallows something that contains the bacterium

- Constipation
- Poor feeding
- Ptosis (drooping eyelid)
- Sluggish pupils
- Flattened facial expression
- Diminished suck and gag reflexes
- Weak and altered cry
- Respiratory difficulty and possibly respiratory arrest



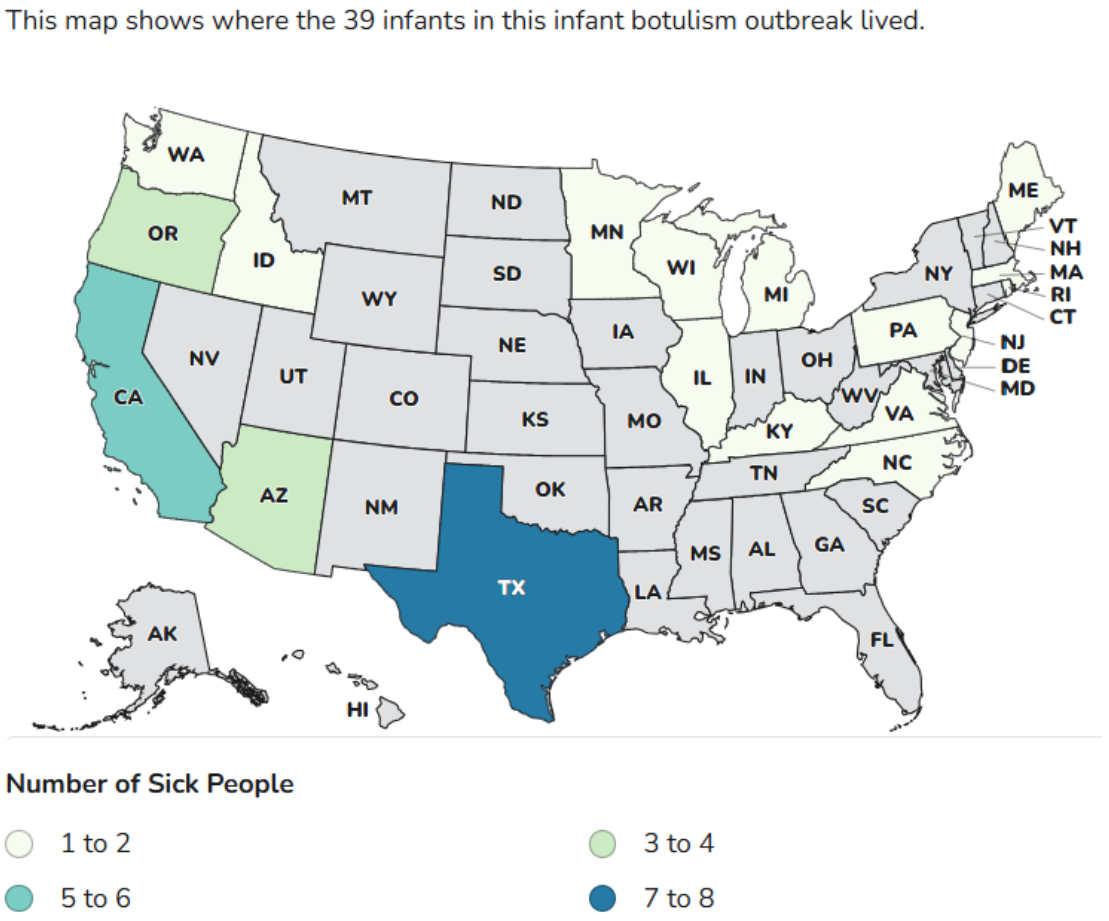
https://apnews.com/article/byheart-baby-formula-infant-botulism-recall-e070565daaf1f425e3d37dca20277714

Proportion vs Market Share: Why ByHeart Formula Stands Out

- Since August 1, 2025, among **84 infants** treated with BabyBIG® (Botulism Immune Globulin Intravenous (Human) (BIG-IV) that is FDA approved for treatment of infant botulism):
  - **36 (43%) had exposure to any powdered infant formula**.
  - **15 infants** (≈ 40% of those with formula exposure) reported use of ByHeart formula.
- Since ByHeart formula represents approx. **1% of all infant formula sales** in the U.S. — this indicated a disproportionate representation among affected infants.

Infant Botulism Outbreak Linked to Infant Formula — November 2025

- Multistate outbreak of infant botulism linked to infant formula.
- A recall of By Heart infant formula has been issued.
  - *All lot numbers* and *all sizes* (cans + single-serve packets).
- As of Dec 3, 2025 (updated weekly on Wednesdays):
  - Cases: **39** (2 new)
  - Hospitalizations: **39**
  - Deaths: **0**
  - States affected: **18** (1 new)



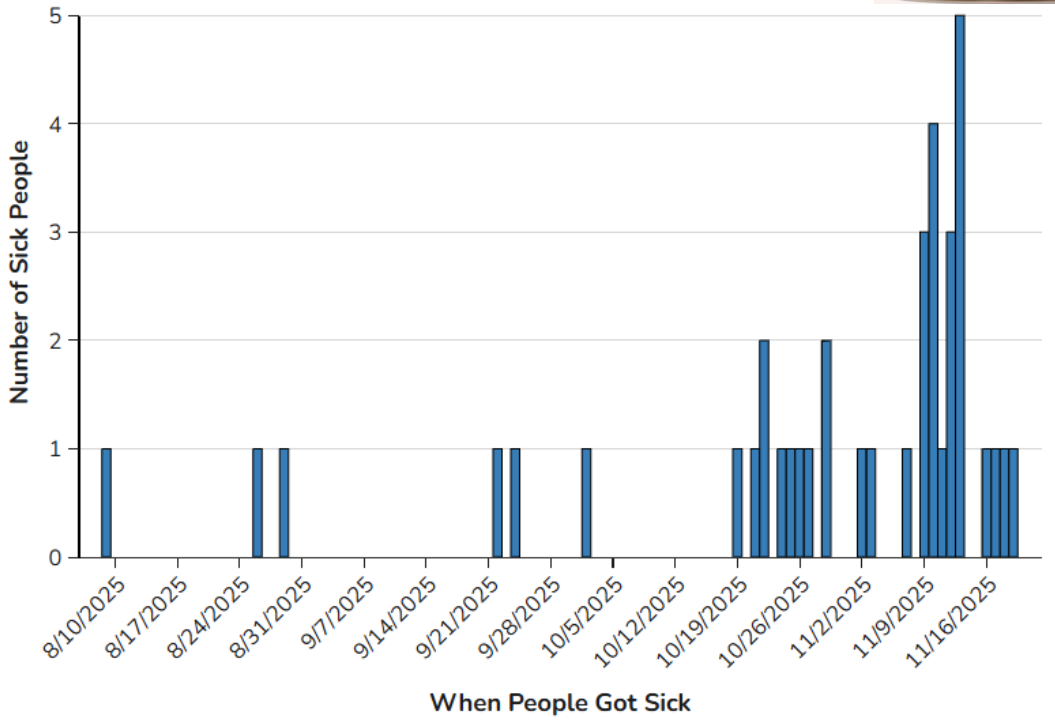
https://www.cdc.gov/botulism/outbreaks-investigations/infant-formula-nov-2025/index.html

https://www.cdc.gov/botulism/outbreaks-investigations/infant-formula-nov-2025/timeline.html

Timeline & Growth of the Outbreak

Date	Number of Reported Cases / States	Additional info
November 8, 2025	13 infants, 10 states — first recognized outbreak linked to ByHeart formula.	Two initial lots recalled.
November 11–14, 2025	23 infants, 13 states.	Additional states added; recall broadened.
November 19, 2025	31 infants, 15 states.	New states included (e.g., Idaho, Maine).
November 26, 2025	37 infants, 17 states.	Newly added cases, labs detected contamination in unopened formula.
December 3, 2025	39 infants, 18 states.	Latest official update.

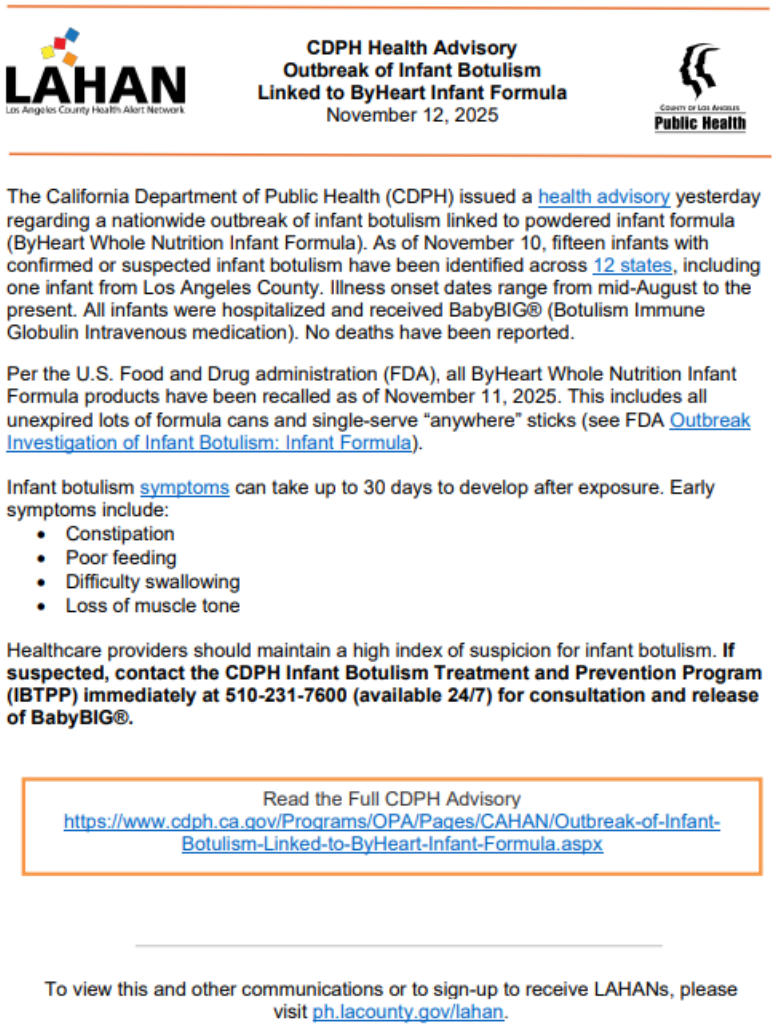
This chart shows when 39 infants in this infant botulism outbreak got sick.



https://www.cdc.gov/botulism/outbreaks-investigations/infant-formula-nov-2025/timeline.html

What the Investigation Found (Epidemiologic & Laboratory Data)

- **Epidemiologic Data**
- As of December 3, 2025: **39 infants** with suspected or confirmed infant botulism across **18 states**.
- Illness onset dates range from **August 9 through November 19, 2025**.
- All 39 infants were hospitalized and treated with BabyBIG® (botulism immune globulin).
- Age range: 16 to 264 days; about 38–43% are female.
- **Laboratory & Traceback Data**
- Epidemiologic and lab data indicate that ByHeart infant formula may be contaminated with Clostridium botulinum.
  - An opened can (lot 206VABP/251131P2) fed to a sick infant tested positive for the bacteria by the California Department of Public Health.
- Additional testing by state labs, CDC, and FDA is ongoing to identify scope and other potentially contaminated lots.



CDPH Health Advisory
Outbreak of Infant Botulism
Linked to ByHeart Infant Formula
November 12, 2025

The California Department of Public Health (CDPH) issued a health advisory yesterday regarding a nationwide outbreak of infant botulism linked to powdered infant formula (ByHeart Whole Nutrition Infant Formula). As of November 10, fifteen infants with confirmed or suspected infant botulism have been identified across 12 states, including one infant from Los Angeles County. Illness onset dates range from mid-August to the present. All infants were hospitalized and received BabyBIG® (Botulism Immune Globulin Intravenous medication). No deaths have been reported.

Per the U.S. Food and Drug administration (FDA), all ByHeart Whole Nutrition Infant Formula products have been recalled as of November 11, 2025. This includes all unexpired lots of formula cans and single-serve "anywhere" sticks (see FDA Outbreak Investigation of Infant Botulism: Infant Formula).

Infant botulism symptoms can take up to 30 days to develop after exposure. Early symptoms include:

- Constipation
- Poor feeding
- Difficulty swallowing
- Loss of muscle tone

Healthcare providers should maintain a high index of suspicion for infant botulism. **If suspected, contact the CDPH Infant Botulism Treatment and Prevention Program (IBTPP) immediately at 510-231-7600 (available 24/7) for consultation and release of BabyBIG®.**

Read the Full CDPH Advisory
https://www.cdph.ca.gov/Programs/OPA/Pages/CAHAN/Outbreak-of-Infant-Botulism-Linked-to-ByHeart-Infant-Formula.aspx

To view this and other communications or to sign-up to receive LAHANs, please visit ph.lacounty.gov/lahan.

- https://www.cdph.ca.gov/Programs/OPA/Pages/CAHAN/Outbreak-of-Infant-Botulism-Linked-to-ByHeart-Infant-Formula.aspx
- http://publichealth.lacounty.gov/lahan/

What clinicians should do:

- ❑ Initial diagnosis of infant botulism is based on clinical symptoms.
- ❑ Clinicians should consider infant botulism in an infant with unexplained weakness or feeding problems — do not wait for lab confirmation.
- ❑ Consult with the Infant Botulism Treatment and Prevention Program at the California Department of Public Health. is available for suspected cases, **immediately call 510-231-7600 for case consultation**. Consultation is available 24 hours a day, 7 days a week.
- ❑ If clinical consultation supports infant botulism, begin treatment as soon as possible. Do not wait for laboratory confirmation.
  - ❑ A stool or enema specimen is required for definitive diagnosis of infant botulism. Enemas should be performed with sterile, non-bacteriostatic water.
- ❑ Infant botulism is a notifiable disease. All suspected cases must be reported to the state public health department.

BabyBIG®, human antitoxin for the treatment of infant botulism

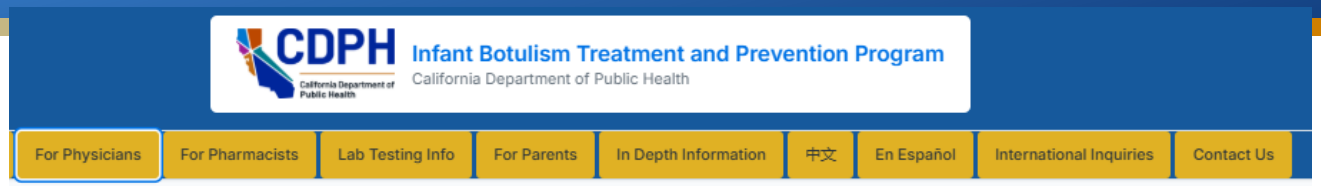
https://www.cdc.gov/botulism/hcp/clinical-overview/infant-botulism.html#cdc_clinical_overview_test_dia-steps-to-take

Recommendation for caregivers:

- Do **not** use any ByHeart infant formula.
- Wash items/surfaces that contacted the formula thoroughly with hot soapy water or use dishwasher).
- If an infant consumed ByHeart formula and shows any of these signs, seek immediate medical care: poor feeding, difficulty swallowing, loss of head control, decreased facial expression/alertness.
- Symptoms may take several weeks to appear — to remain vigilant even if formula use stopped as incubation period can be up to 30 days
- Keep leftover formula or potential testing if illness occurs

Ongoing Investigation: CDC, CDPH IBTPP, State, Local Health Depts

- Scope of contamination — whether more lots or other products (cans or single-serve packets) are affected.
- Source and point of contamination during manufacturing or distribution — FDA and public health partners continue inspections and testing.
- Long-term follow-up of affected infants and tracking additional cases through surveillance and caregiver interviews.



New Infant Botulism Hotline for Parents and Caregivers

1-833-398-2022

We are currently receiving a high volume of calls and emails. Please review the temporary hotline schedule below.

- The Infant Botulism Hotline will be closed for the Thanksgiving holiday from November 27–30.
- If you have questions, e-mail IBOHotline@cdph.ca.gov. Emails will be answered daily, Friday–Sunday while the hotline is closed.
- The public hotline will resume on December 1 and will be available toll-free 7 days a week, 7 a.m.–8 p.m. Pacific Time (PT).
- The clinical support line (510-231-7600) remains open 24/7 for suspected infant botulism cases. Calls from medical providers receive priority response.

Trained staff can help with:

- Understanding signs of infant botulism
- What to do if your baby consumed ByHeart formula
- How to safely handle recalled products
- Where to find updates and resources, including treatment, if needed

⚠ **If your baby is experiencing a medical emergency or showing signs of infant botulism, such as poor feeding, loss of head control or muscle weakness - call 9-1-1 or go to the nearest emergency room immediately.**

What should parents do?

Warning: If you feel that your baby is experiencing a medical emergency, please call 911 or go to the nearest emergency room.

- If this is not an emergency, please contact your child's primary care provider about your child's health.
- Our program does not provide medical advice directly to patients or families.

Do not use ByHeart Whole Nutrition infant formula

- Infant botulism is still a very rare disease, most infants who have been fed ByHeart formula will NOT experience infant botulism.
- If you have leftover ByHeart powdered formula that your infant was fed, keep it stored for at least a month. If your infant develops symptoms of infant botulism, your state health department may want to collect it for testing. If no symptoms appear after a month, throw the leftover formula away.
- Wash items and surfaces that may have touched the formula using soapy water or a dishwasher.
- **Seek immediate medical attention** if your baby drank ByHeart infant formula in the past 30 days and has any of these symptoms:
  - Poor feeding
  - Difficulty swallowing
  - Weaker facial expressions
  - Loss of head control
- Watch closely for these symptoms for 30 days after your baby last drank ByHeart formula.
- Constipation is a very common sign in healthy infants. It is also a common early sign of infant botulism.

My baby is not sick today. Does my baby need to be tested?

- No. Testing for infant botulism is not recommended for healthy babies.
- Testing for infant botulism is complicated, not rapid, and only performed by a few, specialized laboratories in the US.
- State public health departments need to approve requests for testing.

https://www.infantbotulism.org/

Key Takeaways

- ❑ Infant botulism — is rare but serious
  - ➢ early recognition and treatment (with BabyBIG®) is critical.
- ❑ Do not use ByHeart Whole infant formula has been recalled
- ❑ For caregivers: monitor infants for signs like poor feeding, weak cry, difficulty swallowing, loss of head control
  - ➢ seek medical care **immediately** if symptoms appear.
- ❑ For medical providers:
  - ➢ be alert to possible infant botulism in infants with corresponding symptoms and history of ByHeart formula use
  - ➢ do not wait for lab confirmation before starting treatment and reporting.
- ❑ Public health investigation continues — scope may change
  - ➢ stay updated via reliable sources (CDC, FDA, state health departments).

CDPH Infant Botulism

TREATMENT AND PREVENTION PROGRAM

Parents and caregivers

- If you have questions, e-mail IBOHotline@cdph.ca.gov. Emails will be answered daily.
- The Infant Botulism Hotline (1-833-398-2022) is available toll-free 7 days a week, 7 a.m.–8 p.m. Pacific Time (PT).

Health care providers

- The clinical support line (510-231-7600) remains open 24/7 for suspected infant botulism cases. Calls from medical providers receive priority response.

If your child has clinical symptoms or you are concerned about their health, contact your health care provider. In an emergency, seek medical care immediately.

https://www.cdph.ca.gov/Programs/cls/idld/ibtpp

LAC DPH Update:

Brief ACIP Updates

Presented by: Nava Yeganeh, MD, MPH

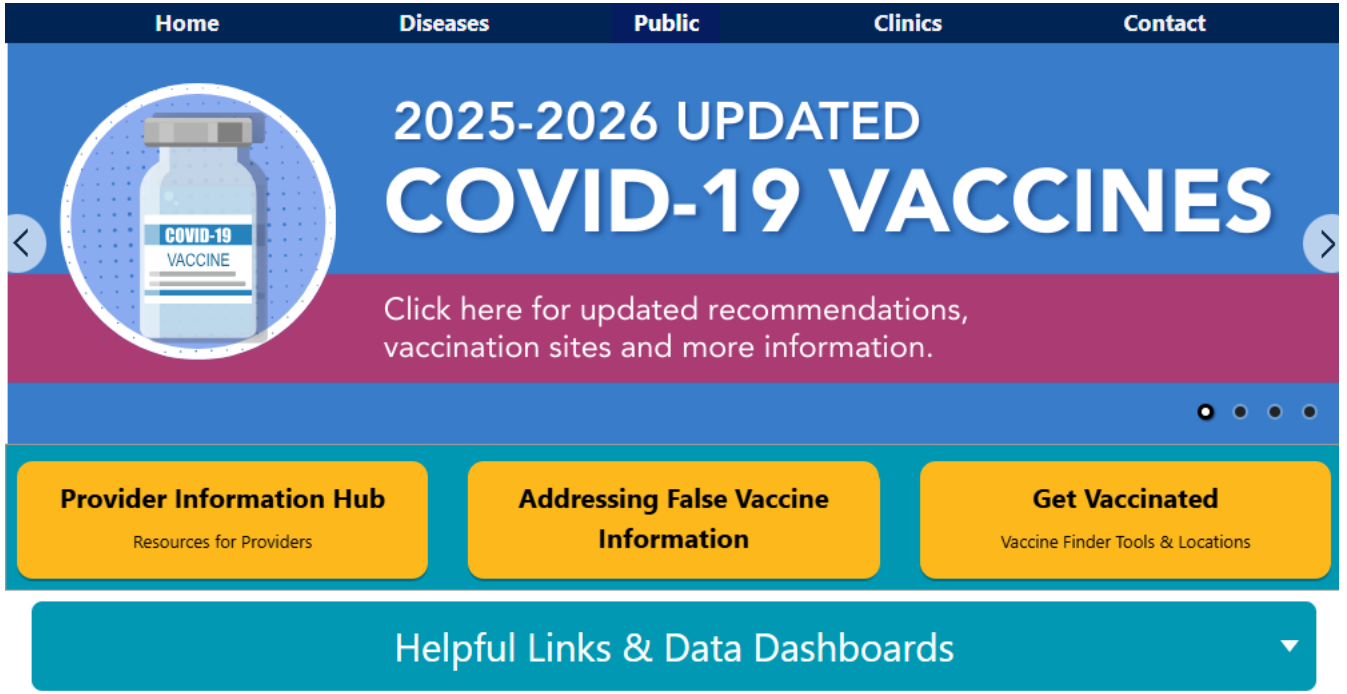
LAC DPH Update:

Respiratory Vaccine Dashboards

Presented by: Sherry Yin, MPH

Find it on our homepage!

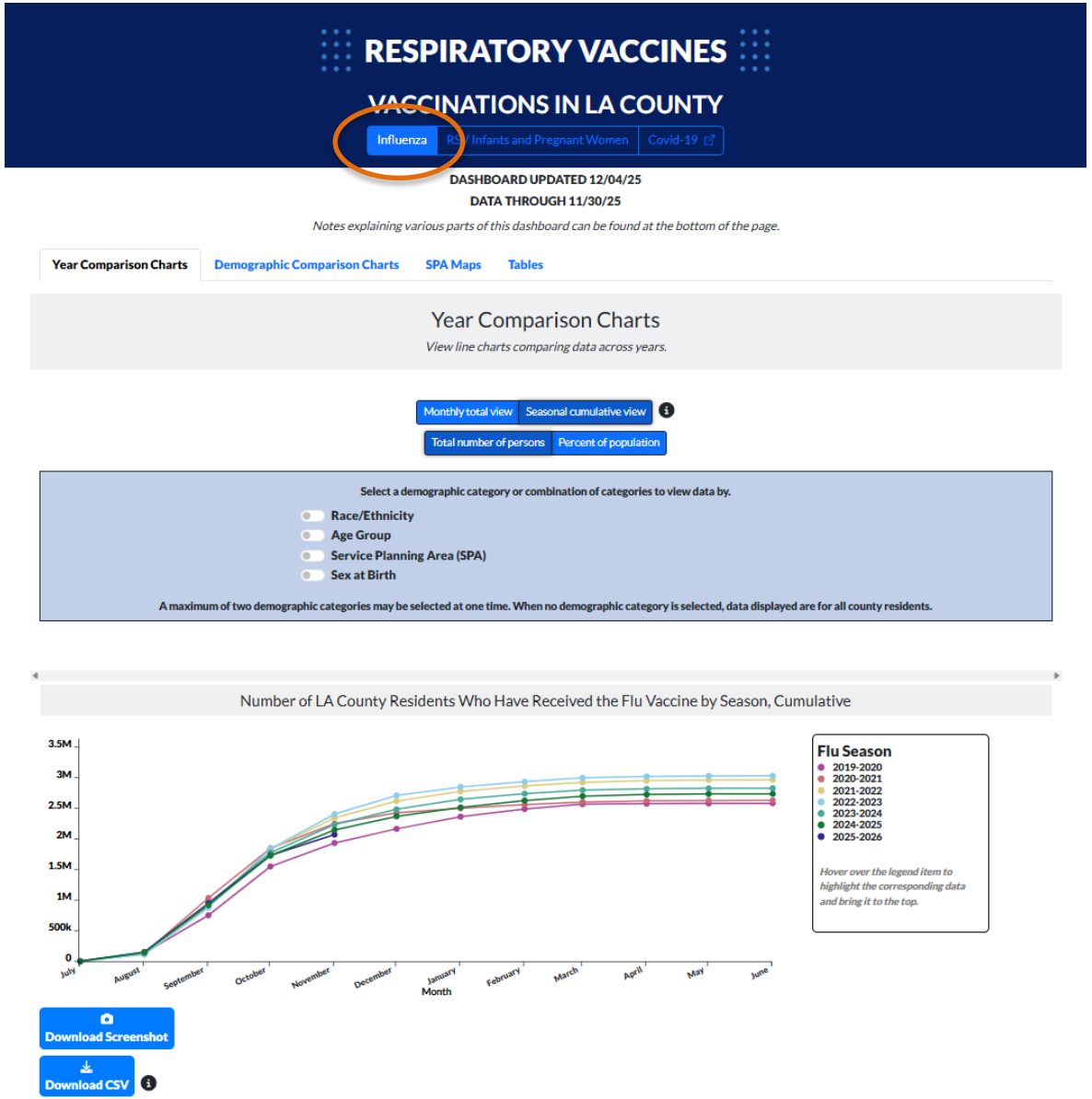
- Find on the VPDC homepage under the “Helpful Links & Data Dashboards” dropdown.
- Or use the direct link: http://ph.lacounty.gov/media/RespiratorySeason/vaccine/
- Dashboard displays administration data and coverage estimates for flu, RSV, and COVID-19 vaccines.

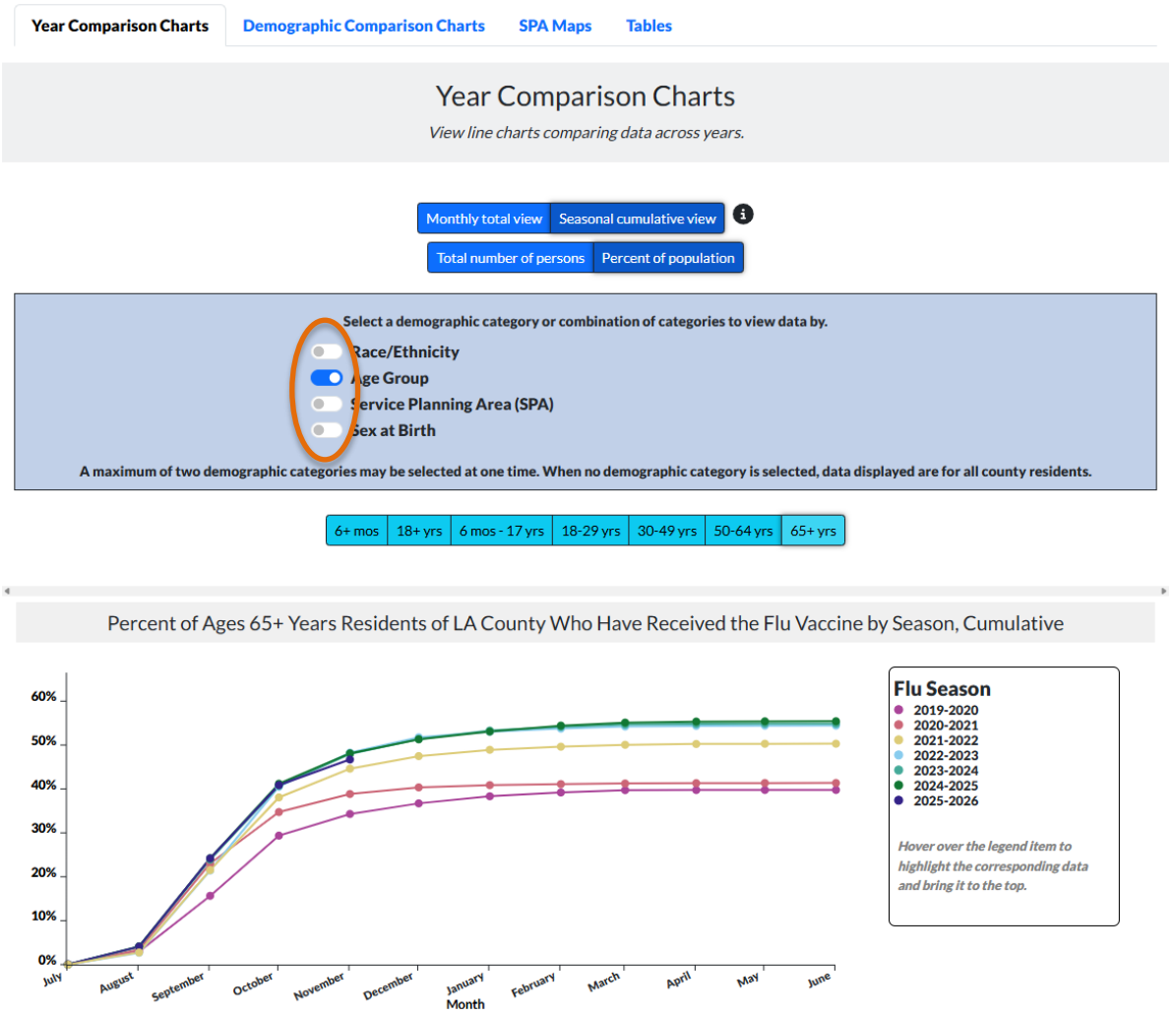


WHY VACCINATE?

- **Stay Healthy:** Vaccines protect us from getting serious illnesses and feeling really sick by strengthening the body’s natural defenses.
- **Protect Your Loved Ones & Community:** By getting vaccinated, we also protect those at higher risk of getting very sick, such as older adults or those with certain medical conditions.
- **Keep Schools & Activities Safe:** Vaccinations are a vital part of keeping schools and activities safe for everyone involved.

Flu Vaccination Dashboard





Flu Vaccination Dashboard

Year Comparison Charts | **Demographic Comparison Charts** | SPA Maps | Tables

Demographic Comparison Charts

View line charts comparing data across demographic groups for a specific year.

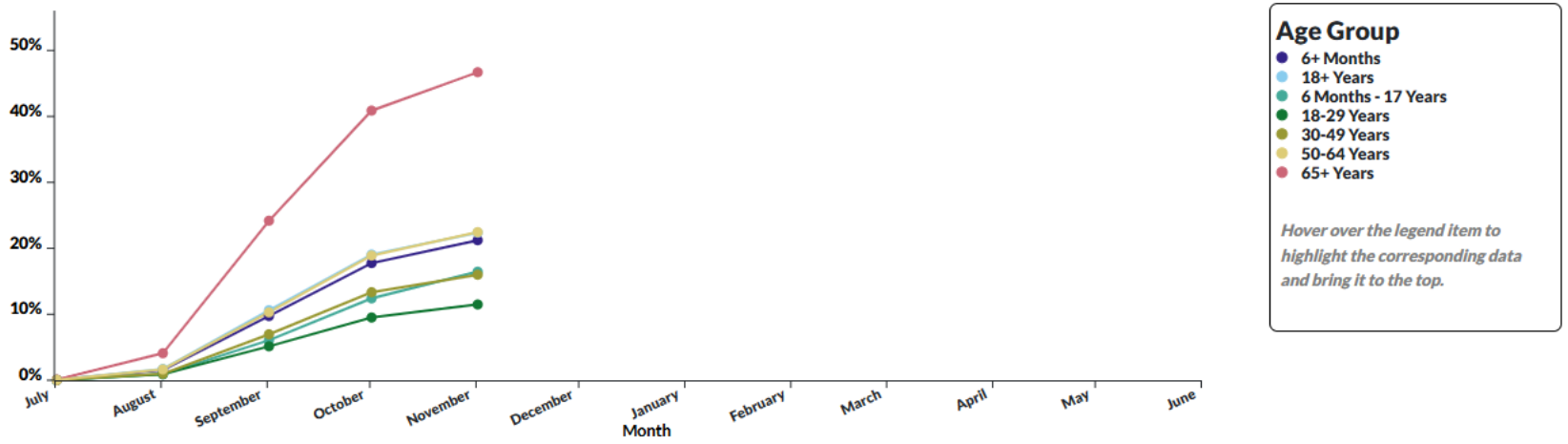
Monthly total view | Seasonal cumulative view

Total number of persons | Percent of population

Race/Ethnicity | Age Group | SPA | Sex at Birth

2019-2020 | 2020-2021 | 2021-2022 | 2022-2023 | 2023-2024 | 2024-2025 | 2025-2026

Percent of Each Subgroup of LA County Residents Who Have Received the Flu Vaccine During the 2025-2026 Season by Age Group, Cumulative



Flu Vaccination Dashboard

County of Los Angeles Public Health

Year Comparison Charts | Demographic Comparison Charts | **SPA Maps** | Tables

Service Planning Area (SPA) Maps

View maps showing cumulative data from the current season to-date for a specific demographic group.

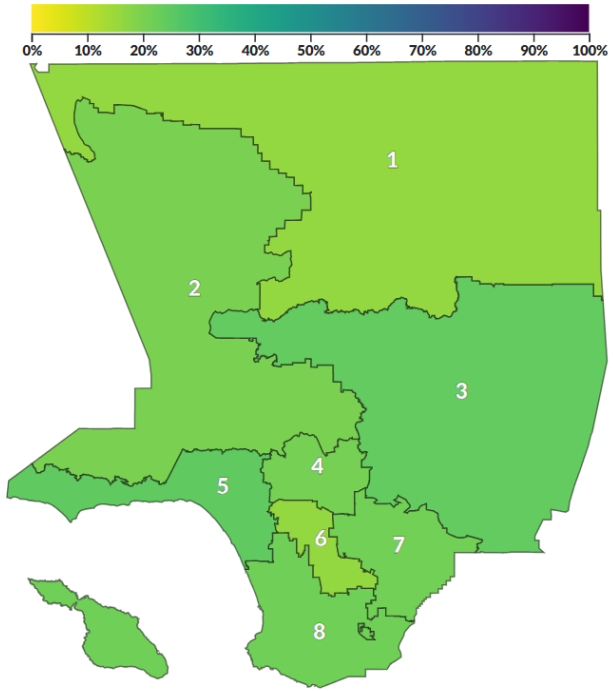
Select a demographic category to view data in each SPA by.

- Race/Ethnicity
- Age Group
- Sex at Birth

One demographic category may be selected at a time. When no demographic category is selected, data displayed is for all residents of each SPA.

Residents of Each SPA in LA County Who Have Received the Flu Vaccine During the 2025-2026 Season

Hover over or tap a SPA on the map to see data for that SPA.



Location

SPA 1 - Antelope Valley
SPA 2 - San Fernando Valley
SPA 3 - San Gabriel Valley
SPA 4 - Metro L.A.
SPA 5 - West L.A.
SPA 6 - South L.A.
SPA 7 - East L.A.
SPA 8 - South Bay

Year Comparison Charts | Demographic Comparison Charts | SPA Maps | **Tables**

Tables

View tables showing yearly cumulative data across demographic groups.

Total number of persons | Percent of population

Select a demographic category to view data by.

- Race/Ethnicity
- Age Group
- Service Planning Area (SPA)
- Sex at Birth

Two demographic categories may be selected at a time. When no demographic category is selected, data displayed are for all residents of LA County.

Number of LA County Residents Who Have Received the Flu Vaccine in Each Season, by Location

	2019-2020	2020-2021	2021-2022	2022-2023	2023-2024	2024-2025	2025-2026
SPA 1 - Antelope Valley	110,778	106,634	104,470	102,358	96,284	93,207	66,166
SPA 2 - San Fernando Valley	554,071	565,532	627,031	642,301	595,032	578,439	436,835
SPA 3 - San Gabriel Valley	477,397	493,917	559,459	579,223	540,239	530,961	413,872
SPA 4 - Metro L.A.	253,462	265,254	318,609	332,296	313,227	302,821	227,267
SPA 5 - West L.A.	176,582	177,215	227,174	233,702	212,066	202,064	156,418
SPA 6 - South L.A.	228,982	226,571	254,168	251,692	238,043	227,455	160,665
SPA 7 - East L.A.	352,668	362,007	390,266	392,271	367,270	349,719	266,522
SPA 8 - South Bay	403,284	408,342	457,510	469,789	439,371	428,074	326,023

Percent of Each Subgroup of LA County Residents Who Have Received the Flu Vaccine in Each Season, by Location

	2019-2020	2020-2021	2021-2022	2022-2023	2023-2024	2024-2025	2025-2026
SPA 1 - Antelope Valley	26.9%	25.9%	25.4%	24.8%	23.4%	22.6%	16.1%
SPA 2 - San Fernando Valley	25.7%	26.3%	29.1%	29.8%	27.6%	26.9%	20.3%
SPA 3 - San Gabriel Valley	27.6%	28.6%	32.4%	33.5%	31.2%	30.7%	23.9%
SPA 4 - Metro L.A.	23.1%	24.2%	29.0%	30.3%	28.5%	27.6%	20.7%
SPA 5 - West L.A.	27.4%	27.5%	35.2%	36.2%	32.9%	31.3%	24.3%
SPA 6 - South L.A.	23.2%	22.9%	25.7%	25.5%	24.1%	23.0%	16.3%
SPA 7 - East L.A.	28.1%	28.9%	31.1%	31.3%	29.3%	27.9%	21.2%
SPA 8 - South Bay	26.6%	26.9%	30.2%	31.0%	29.0%	28.2%	21.5%

RSV Immunization Dashboard

County of Los Angeles Public Health

RESPIRATORY VACCINES

VACCINATIONS IN LA COUNTY

Influenza | RSV Infants and Pregnant Women | Covid-19

DASHBOARD UPDATED 12/04/25

DATA THROUGH 11/30/25

Notes explaining various parts of this dashboard can be found at the bottom of the page.

Year Comparison Charts | Demographic Comparison Charts | Tables

Year Comparison Charts

View line charts comparing data across years.

Monthly total view | Seasonal cumulative view

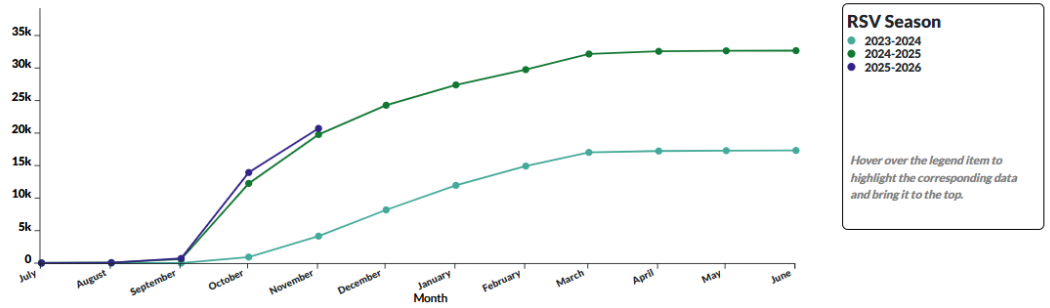
Select a demographic category or combination of categories to view data by.

- Race/Ethnicity
- Age Group
- Service Planning Area (SPA)
- Sex at Birth

A maximum of two demographic categories may be selected at one time. When no demographic category is selected, data displayed are for all county residents.

0-7 mos | 18 - 49 yrs (female)

Number of Ages 0 - 7 Months Residents of LA County Who Have Received the RSV Immunization by Season, Cumulative



RESPIRATORY VACCINES

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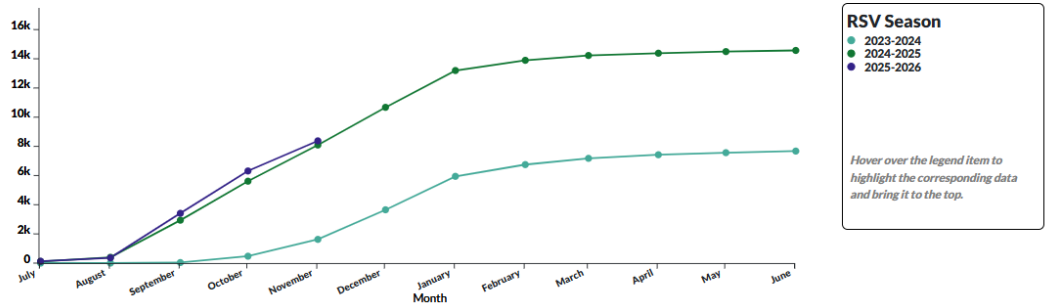
Number of Ages 18 - 49 (Female) Residents of LA County Who Have Received the RSV Immunization by Season, Cumulative



RSV Immunization Dashboard

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Demographic Comparison Charts

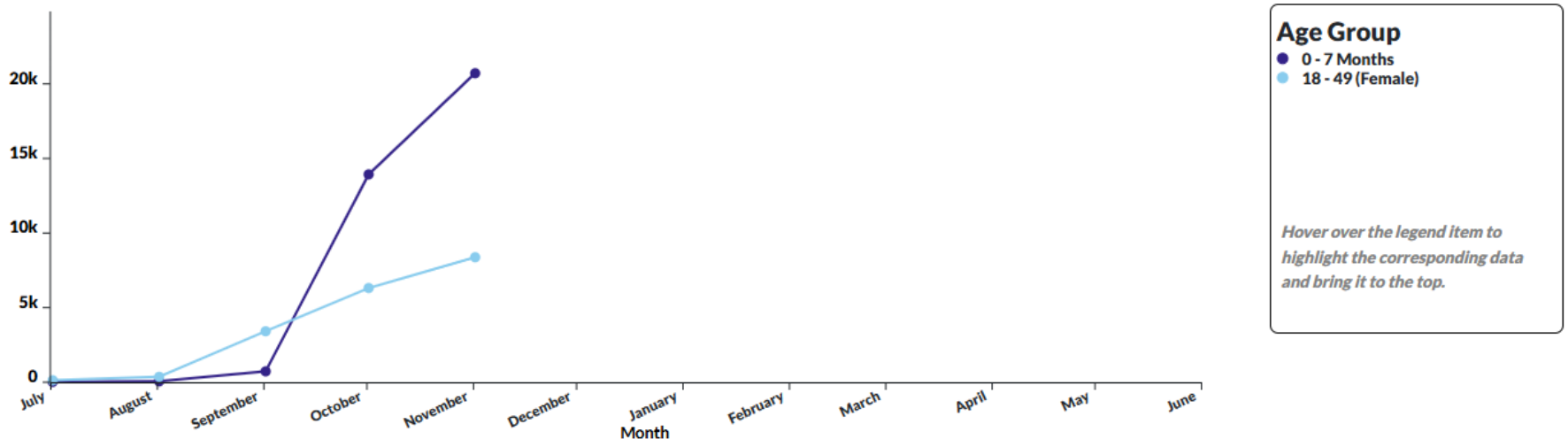
View line charts comparing data across demographic groups for a specific year.

Monthly total view | Seasonal cumulative view

Show Age Group by Other Demographics

2023-2024 | 2024-2025 | 2025-2026

Number of LA County Residents Who Have Received the RSV Immunization During the 2025-2026 Season by Age Group, Cumulative



RSV Immunization Dashboard

County of Los Angeles Public Health

Year Comparison Charts | Demographic Comparison Charts | **Tables**

Tables

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- Race/Ethnicity
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- Service Planning Area (SPA)
- Sex at Birth

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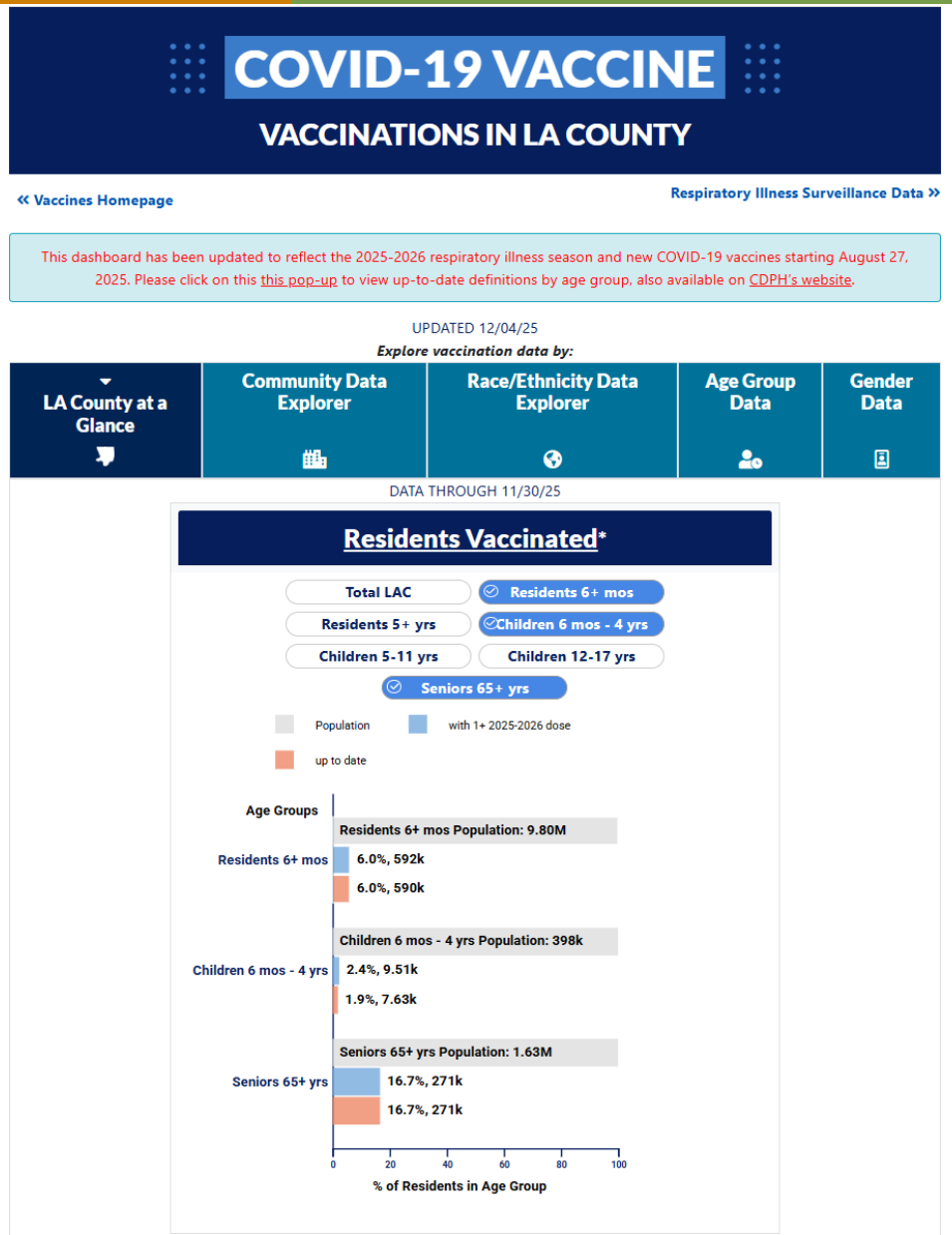
Number of LA County Residents Who Have Received the RSV Immunization in Each Season, by Age Group

	2023-2024	2024-2025	2025-2026	Total
Ages 0 - 7 Months	17,324	32,674	20,716	70,577
Ages 18 - 49 (Female)	7,676	14,572	8,377	30,522

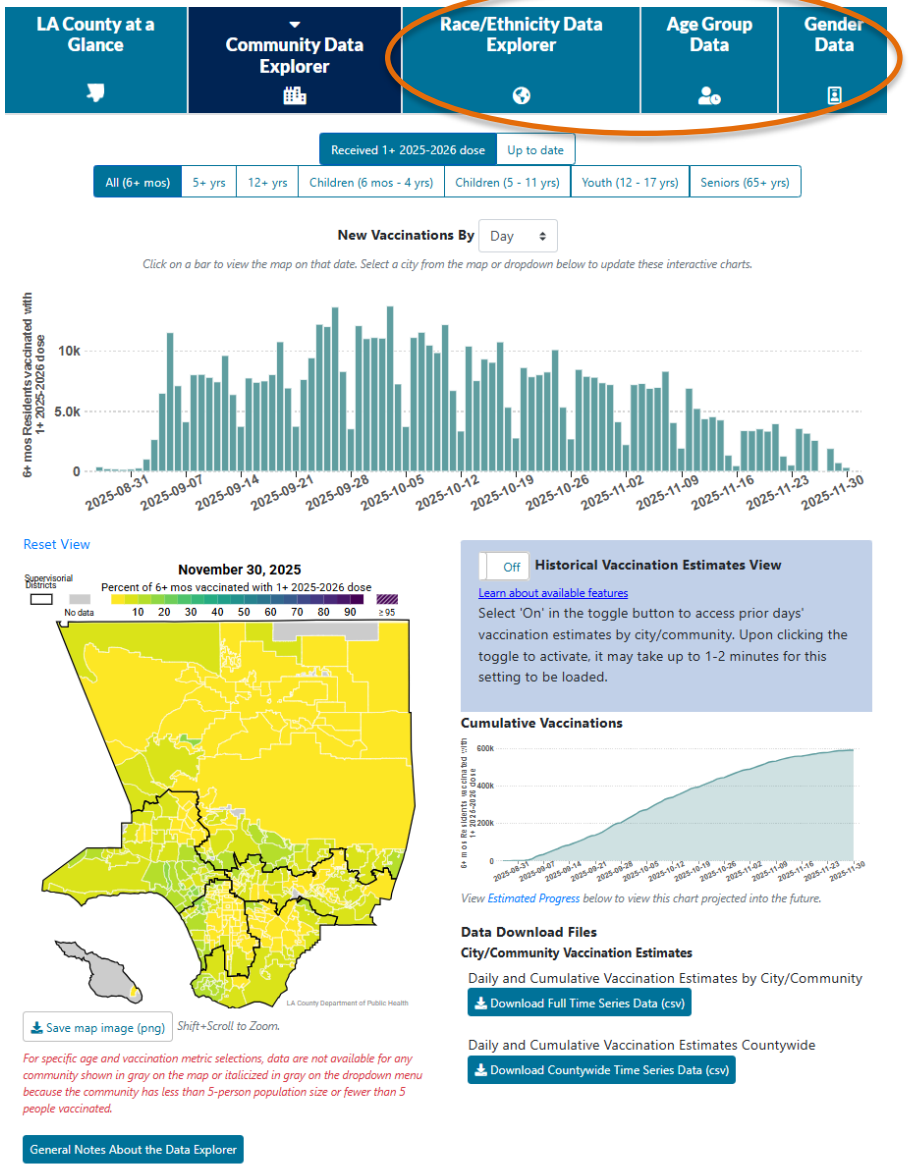
Download CSV*

COVID-19 Vaccination Dashboard

- Revised each respiratory season to align with new recommendations and vaccine products.
- Released an updated version for the 2025–2026 season with data refreshed weekly.
- CDPH dashboard contains state and county-level data: https://www.cdph.ca.gov/Programs/CID/DCDC/Pages/COVID-Vaccine-Data.aspx



COVID-19 Vaccination Dashboard



Download Census Tract Vaccination Coverage Maps and Charts

The purpose of these census tract maps and charts is to provide communities vaccination coverage information at a smaller geographic level. These data visualizations can be used to tailor vaccination outreach efforts led by community officials or other agencies serving the community. Please review the ReadMe file before proceeding to interpret the maps and charts.

Select one or more communities: Select a community

Download Census Tract Vaccination Estimate Tables

Data through 11/30/25

Download Notes about Census Tract CSV Tables (pdf)

Total Cumulative 5+ Years of Age Vaccination Estimates by Census Tract within City/Community

Download CT Totals (csv)

Weekly Cumulative 5+ Years of Age Vaccination Estimates by Census Tract within City/Community

Download CT Time Series (csv)

City/Community Data Table

DATA THROUGH 11/30/25

Use the toggle below to view data for the selected age group. Click on a column header to sort.

Received 1+ 2025-2026 dose | Up to date

All (6+ mos) | 5+ yrs | 12+ yrs | Children (6 mos - 4 yrs) | Children (5 - 11 yrs) | Youth (12 - 17 yrs) | Seniors (65+ yrs) | Search...

City/Community	6+ mos with 1+ 2025-2026 dose	Population (6+ mos)	6+ mos Pop. Vaccinated (%)
City of Agoura Hills	2,148	19,732	10.9%
City of Alhambra	5,922	81,731	7.2%
City of Arcadia	4,756	55,784	8.5%
City of Artesia	988	16,037	6.2%
City of Avalon	44	3,340	1.3%
City of Azusa	2,123	49,297	4.3%
City of Baldwin Park	2,611	70,321	3.7%
City of Bell	785	33,236	2.4%
City of Bell Gardens	718	38,203	1.9%
City of Bellflower	2,763	76,842	3.6%

COPY | CSV | EXCEL | PDF

Note that it's not recommended to open CSV download files in the Microsoft Excel application because select values and column labels will not accurately render.

Time Series Vaccination Data — In the Interactive Tracker above, download time series for all communities or select regions (use city menu or click on map).

RESPWatch – Respiratory Illness Surveillance

RESPWatch
Respiratory Illness Surveillance
Los Angeles County Department of Public Health

Page update 12-05-25. Information on COVID-19, influenza, and other respiratory illnesses in LA County for MMWR Week 48 ending on November 29, 2025.

Welcome

Los Angeles County Department of Public Health (Public Health) collects information on indicators of COVID-19, influenza, and Respiratory Syncytial Virus activity year-round. These indicators track the intensity, spread, and temporal trends of viral respiratory illness in LA County.

The weekly surveillance data presented here are preliminary and subject to change.

Sign up

Sign up to receive this report directly in your inbox every Friday during the respiratory virus season.

SUBMIT email address

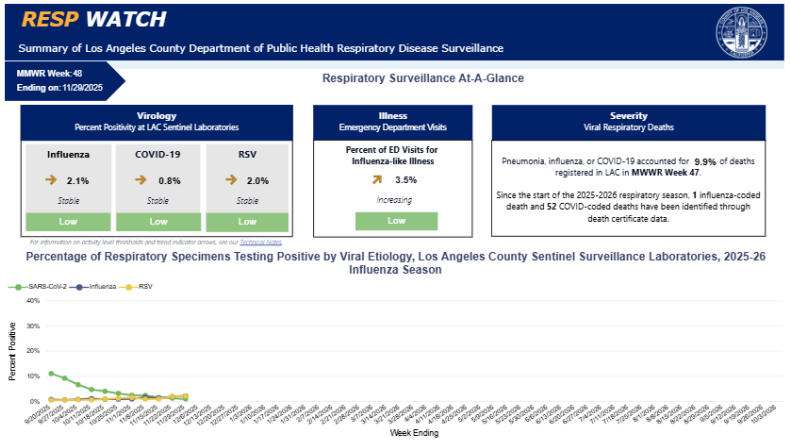
VIEW OUR DATA

At-a-Glance | Viruses | Wastewater | Emergency Department | Hospitalizations | Angelenos in Action | Mortality | MIS-C

Archives | Technical Notes | Additional Resources | LA County Respiratory Vaccines Dashboard

Respiratory Surveillance At-a-Glance

Public Health prepares this report to summarize current respiratory illness surveillance data in LA County*. ***Weekly surveillance data are preliminary and subject to change.*** More information regarding methods can be found on the surveillance system specific pages of this report.

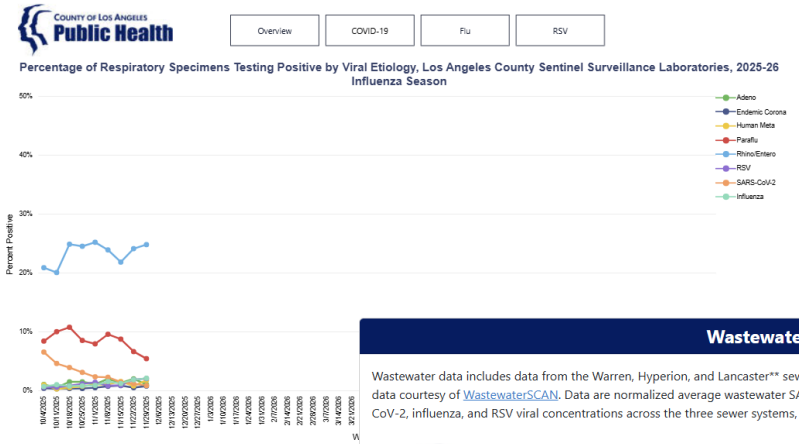


Microsoft Power BI

*For information on activity level thresholds and trend indicator arrows, see our Technical Notes.

Viruses

Viral surveillance data is provided by clinical laboratories serving hospitals and healthcare networks across Los Angeles County. Participating laboratories provide the number of positive tests and total number of specimens tested for SARS-CoV-2, influenza, and respiratory syncytial virus. Some laboratories also share testing data on other common respiratory viruses with Public Health.

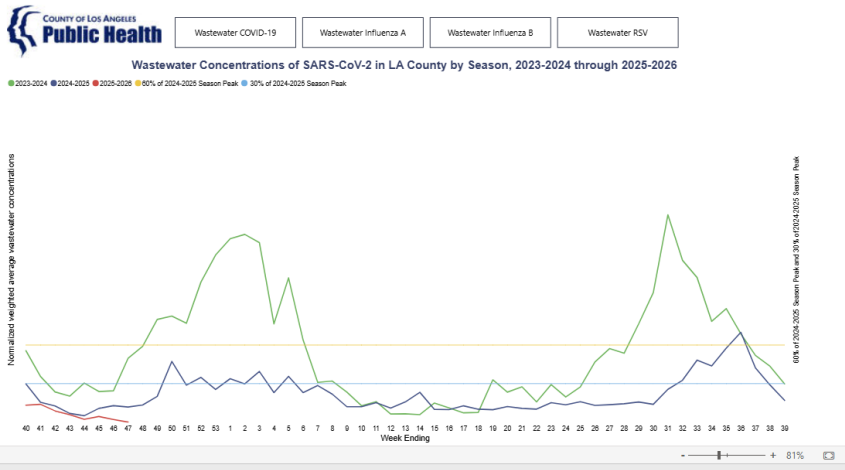


Microsoft Power BI

*Baseline is defined as mean percentage of specimens testing positive during non-ep
periods of ≥2 consecutive weeks during which each week accounted for < 2% of the
circulation of other respiratory viruses. Pandemic weeks are excluded from the baseli

Wastewater Surveillance

Wastewater data includes data from the Warren, Hyperion, and Lancaster** sewersheds. These three sewersheds cover 90% of the population of LA County. All data courtesy of WastewaterSCAN. Data are normalized average wastewater SARS-CoV-2 concentrations. A weighted average is calculated by using the SARS-CoV-2, influenza, and RSV viral concentrations across the three sewer systems, with the weights representing the population size served by each sewer system.



Microsoft Power BI 1 of 4

*Threshold values representing 30% and 60% of the previous season's peak are shown in the light blue and yellow horizontal lines on the COVID-19 graph. These thresholds can aid in interpreting the current season; for example, values at or below the 30% threshold indicate lower concentrations of SARS-CoV-2 (the virus that causes COVID-19) in the wastewater, whereas values at or above the 60% threshold indicate higher concentrations.

Resources

- VPDC homepage: http://www.publichealth.lacounty.gov/ip/
- LAC respiratory vaccines dashboard: http://ph.lacounty.gov/media/RespiratorySeason/vaccine/#/flu
- LAC COVID-19 vaccination dashboard: http://publichealth.lacounty.gov/media/coronavirus/vaccine/vaccine-dashboard.htm
- Statewide COVID-19 vaccination data: https://www.cdph.ca.gov/Programs/CID/DCDC/Pages/COVID-Vaccine-Data.aspx
- LAC RESPWatch: http://publichealth.lacounty.gov/acd/RespWatch/index.htm

The Science Behind Autism Etiology: From Vaccines to Medications

Presented by: Hohui "Eileen" Wang, MD

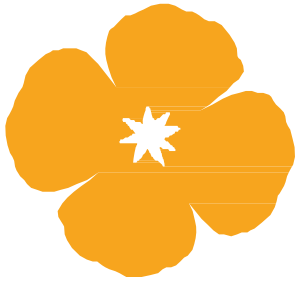
The Science Behind Autism Etiology: From Vaccines to Medications

Hohui E. Wang, MD
Department of Psychiatry and Behavioral Sciences
University of California, San Francisco

Cal-MAP

Dec 10, 2025

The California Child and Adolescent Mental Health Access Portal



Cal-MAP

a Child Youth Behavioral Health Initiative
CalHOPE program powered by UCSF

Empowering California Primary Care Providers to Assess and Treat
Mental & Behavioral Health Conditions in Youth 0-25

Language and Terminology: The Neuroaffirming Approach

Terminology	Definition and Rationale
Neurodiversity	Neurological differences are **natural variations,** not deficits or disorders that necessarily need to be cured. This framework promotes acceptance and respect for diverse brain function.
Neuroaffirming	Perspectives, policies, and language that recognize and validate neurodevelopmental differences and experiences.
Language Choice: Autistic Person vs. Person with Autism	**Identity-First Language** ("Autistic Person") is preferred by many in the autism community, as it recognizes autism as an inherent part of identity (like being "Irish" or "athletic"). **Person-First Language** ("Patient/Person with Autism") is common in medical and clinical settings.

The Origin of a Myth: A Retracted Study

- The initial concern linking the MMR vaccine and autism originated from a single study published in *The Lancet* in 1998.
- This study has been discredited and was retracted by the journal.
- Investigations revealed critical flaws:
  - Methodological Flaws: A small, uncontrolled case series of only 12 children without valid comparison group.
  - Ethical Violations: The lead author had undisclosed financial conflicts of interest and manipulated patient data.

Bester JC. JAMA Pediatrics, 2016

The Overwhelming Evidence

- A 2019 Nationwide Study of Over 650,000 Children
- Danish Cohort Study, Annals of Internal Medicine
- Followed 657,461 children for over a decade
- Conclusion: no increased risk of autism after MMR vaccination
- Crucial Sub-point: true even for children with higher genetic risk for ASD (e.g., having a sibling with autism)

- A JAMA Study on High-Risk US Children
- US Sibling Study, JAMA
- A study of 95,727 US children with older siblings
- Conclusion: MMR vaccination was not associated with an increased risk of ASD at any age

Hviid et al., Annals of Internal Medicine, 2019, Jain et al., JAMA, 2015

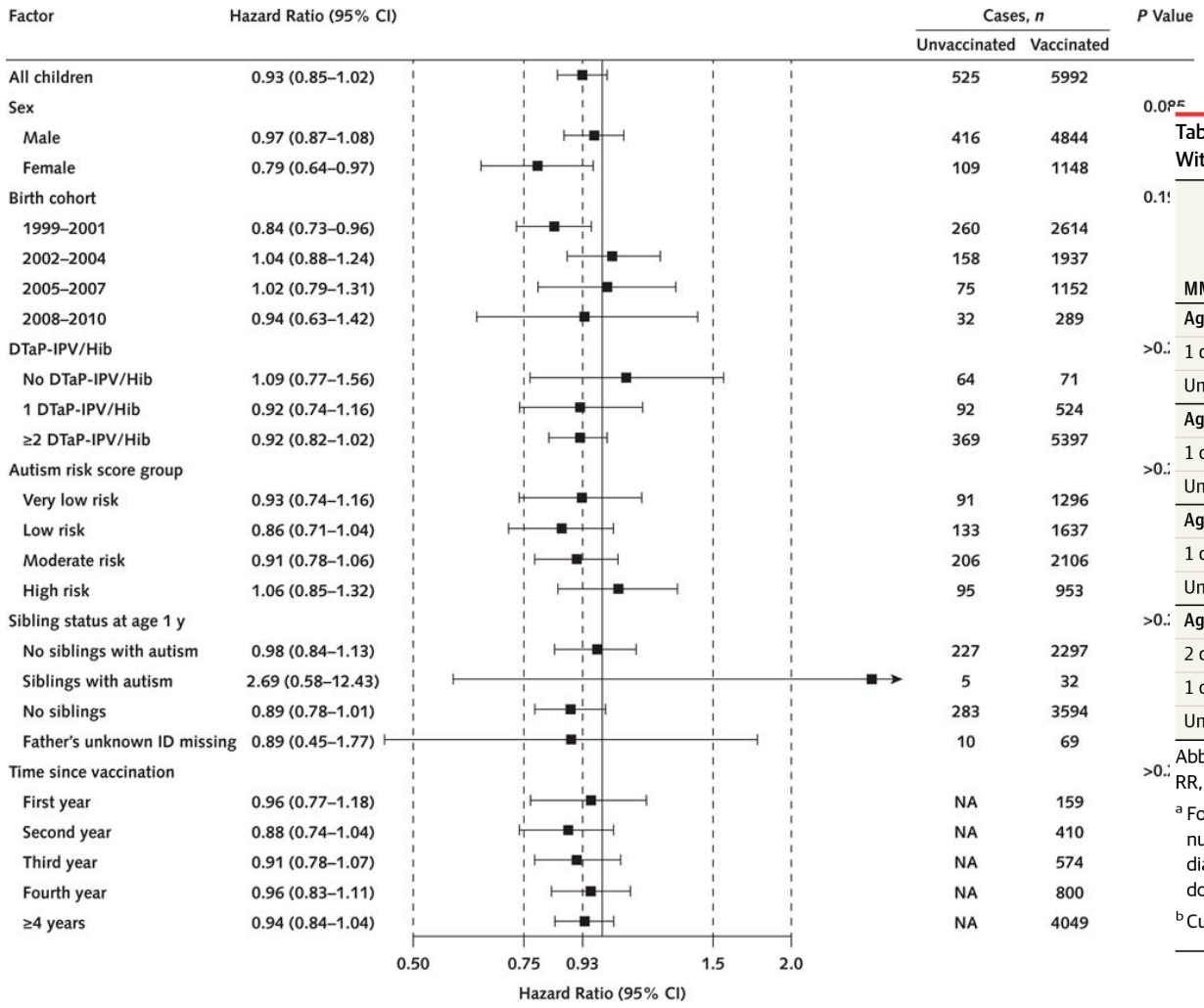


Table 2. Unadjusted and Adjusted Relative Risk Estimates for MMR Vaccination and ASD at Ages 2 to 5 Years in Children With Older Siblings With and Without Diagnosed ASD

	Older Sibling Without ASD (n = 93 798)					Older Sibling With ASD (n = 1929)				
		Unadjusted[b]		Adjusted[c]			Unadjusted[b]		Adjusted[c]	
MMR Status	No. of ASD Cases/Total No.[a]	RR (95% CI)	*P* Value[d]	RR (95% CI)	*P* Value	No. of ASD Cases/Total No.[a]	RR (95% CI)	*P* Value[d]	RR (95% CI)	*P* Value
Age 2 y										
1 dose	53/77 822	0.80 (0.44-1.46)	.57	0.91 (0.68-1.20)	.50	7/1394	0.44 (0.15-1.29)	.22	0.76 (0.48-1.22)	.25
Unvaccinated	13/15 249	1 [Reference]		1 [Reference]		6/520	1 [Reference]		1 [Reference]	
Age 3 y										
1 dose	239/79 666	0.86 (0.62-1.18)	.39	0.97 (0.77-1.21)	.76	38/1458	0.67 (0.38-1.18)	.22	0.81 (0.53-1.25)	.34
Unvaccinated	45/12 853	1 [Reference]		1 [Reference]		17/438	1 [Reference]		1 [Reference]	
Age 4 y										
1 dose	395/79 691	0.91 (0.70-1.18)	.53	1.03 (0.81-1.31)	.82	64/1491	0.66 (0.42-1.04)	.10	0.86 (0.56-1.34)	.51
Unvaccinated	65/11 957	1 [Reference]		1 [Reference]		25/387	1 [Reference]		1 [Reference]	
Age 5 y										
2 doses	244/45 568	0.74 (0.55-0.99)	.049	1.09 (0.76-1.54)	.65	30/796	0.44 (0.26-0.75)	.003	0.56 (0.30-1.04)	.07
1 dose	339/40 495	1.16 (0.87-1.53)	.35	1.10 (0.79-1.53)	.59	51/864	0.69 (0.43-1.11)	.16	0.92 (0.56-1.50)	.74
Unvaccinated	56/7735	1 [Reference]		1 [Reference]		23/269	1 [Reference]		1 [Reference]	

Abbreviations: ASD, autism spectrum disorders; MRM, measles-mumps-rubella; RR, relative risk.

[a] For each row, categories for No. and No. of ASD cases will not sum to the total number as ASD cases described in Results because some children were diagnosed with ASD after age 5 years and some children received 2 MMR doses prior to the recommended ages as reported.

[b] Cumulative incidence rate ratio based on simple incidence proportions.

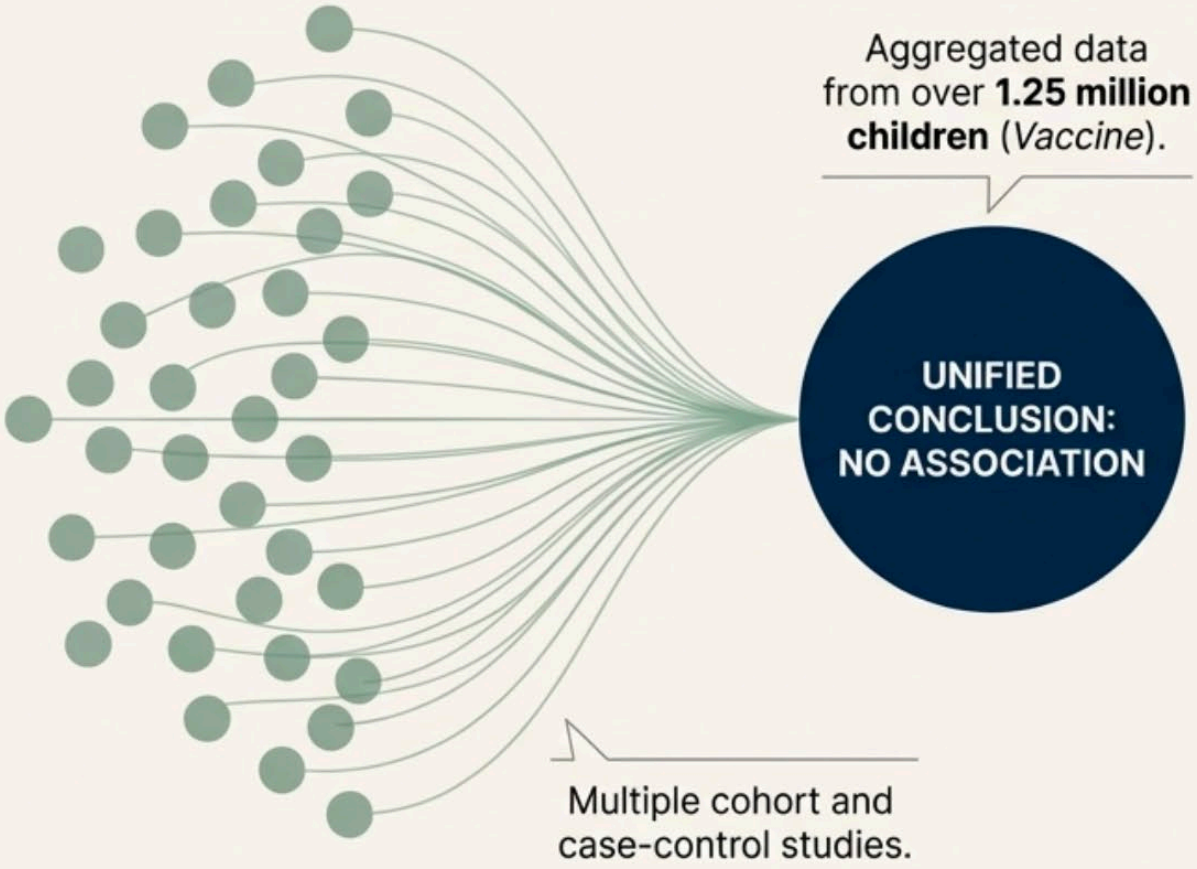
[c] Hazard rate ratio from Cox proportional hazards model adjusting for birth year, sex, region, race/ethnicity, maternal or paternal highest education level, household income, mother's age at birth of index infant, father's age at birth of index infant, continuous enrollment with mental health carve-out benefit, Childhood Chronic Conditions score, seizure, allergies, and preterm birth.

[d] Yates-corrected χ^2 test.

Hviid et al., Annals of Internal Medicine, 2019, Jain et al., JAMA, 2015

The Verdict from Meta-Analyses: A Million Children Studied

The conclusion is not based on a single study, but on a vast body of global research.



- No association between vaccination and autism.
- Specifically, no link was found for:
  - The MMR vaccine.
  - Thimerosal (a mercury-based preservative).
  - Mercury (Hg) exposure from vaccines.

JAMA
Journal of the American Medical Association

THE LANCET

Annals of Internal Medicine

The NEW ENGLAND JOURNAL of MEDICINE

Taylor et al., Vaccine, 2014

Deconstructing Evolving Hypotheses: Thimerosal, Aluminum, and “Immune Overload”

Thimerosal

Myth: ”Thimerosal, a mercury preservative once used in vaccines, causes autism."

Fact: Thimerosal was removed from most childhood vaccines in the US by 2001 as a precaution. Large-scale epidemiological studies before and after its removal have shown no link between thimerosal exposure and autism. ASD rates continued to rise long after its removal.

Aluminum Adjuvants

Myth: ”Aluminum adjuvants in vaccines are linked to autism.”

Fact: While a few publications have speculated on a link, these claims are not supported by the broader body of high-quality epidemiological evidence, which consistently shows no association between aluminum adjuvants and ASD.

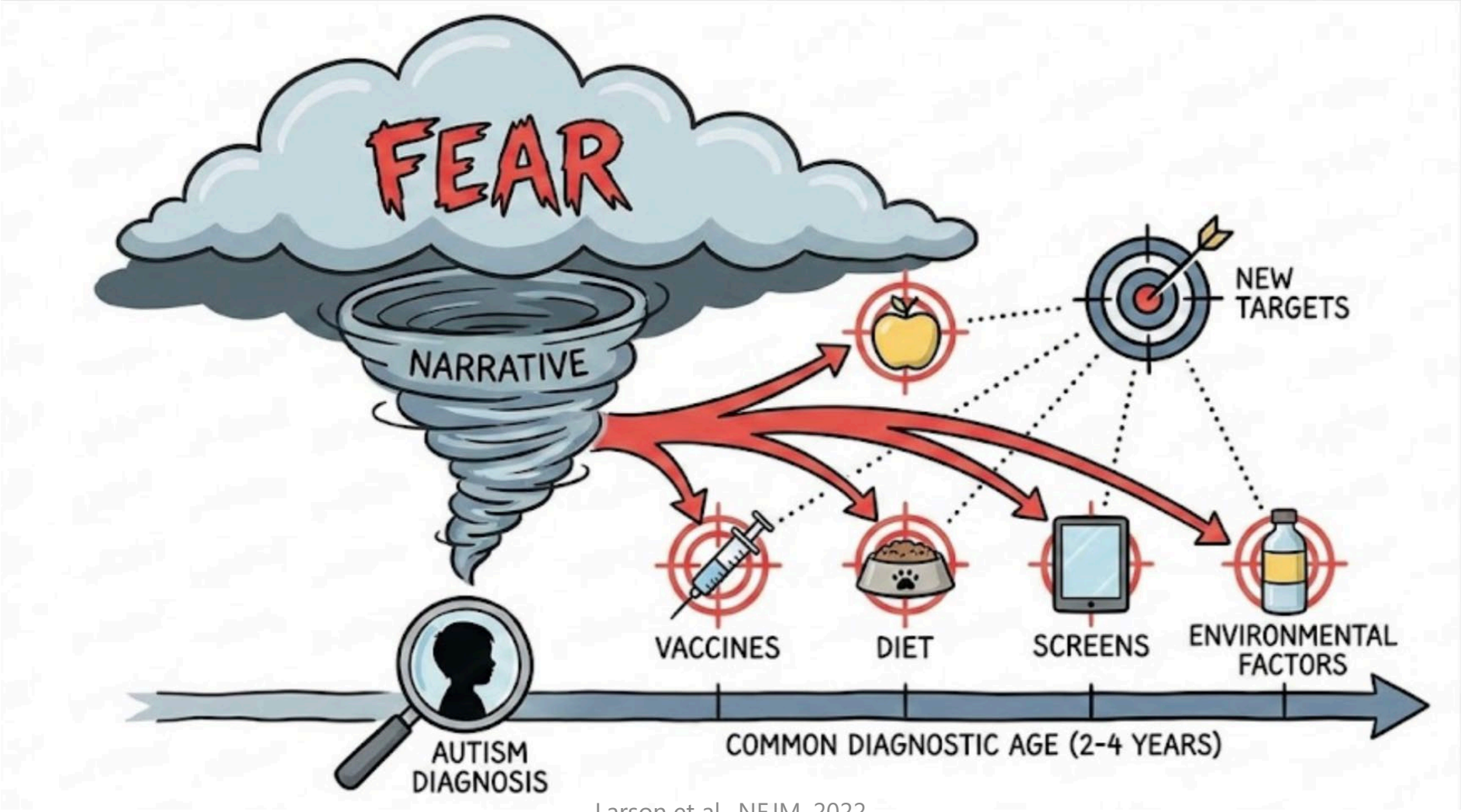
Immune Overload

Myth: "The number of vaccines in the childhood schedule overwhelms the immune system."

Fact: This hypothesis is not supported by scientific evidence. Studies have shown no difference in ASD risk between children who follow the recommended schedule and those with delayed or alternative schedules.

Parker et al., Pediatrics, 2004, Miller ER et al., Vaccine, 2019, DeStefano F et al., Pediatrics, 2013

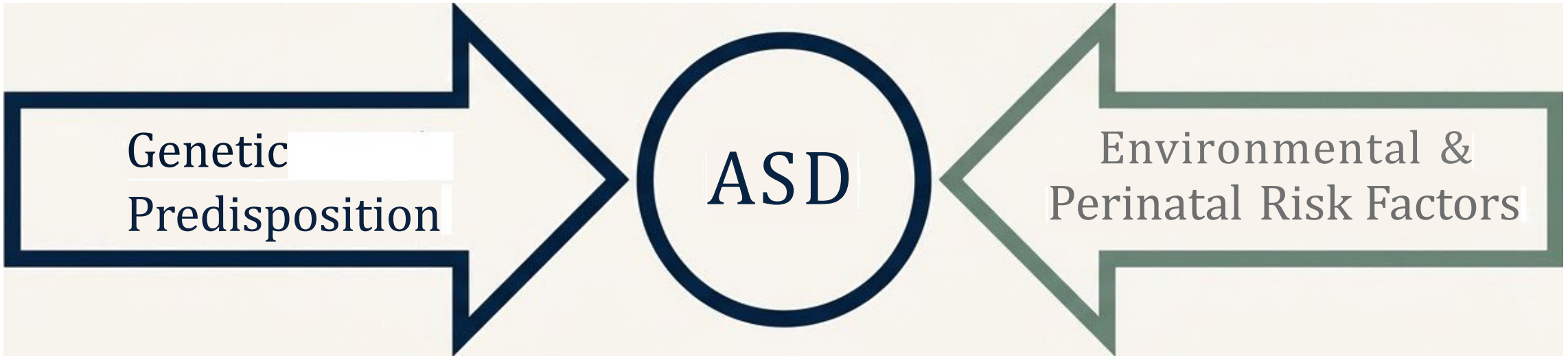
The “Moving Target”



Larson et al., NEJM, 2022

Beyond The Myths: The Etiology of ASD

A Complex Interplay of Genetic Predisposition and Environmental Factors



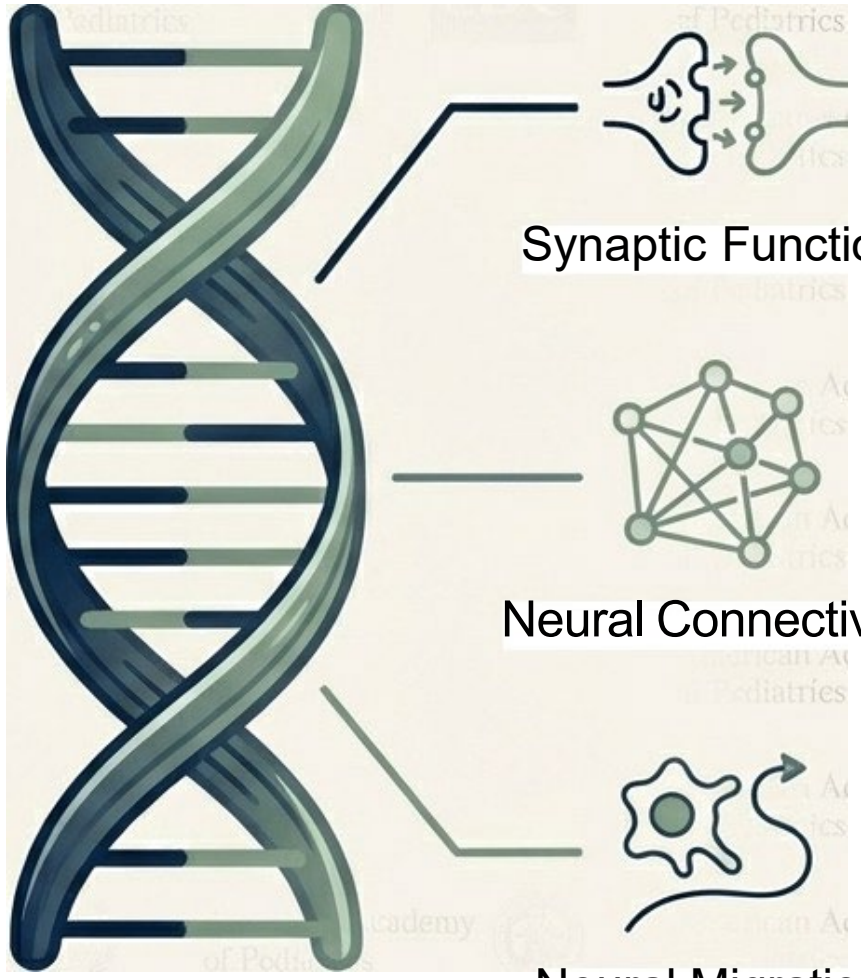
The Foundation: A Strong Genetic Contribution

Heritability of ASD:
50% to 80%

Based on twin and family studies

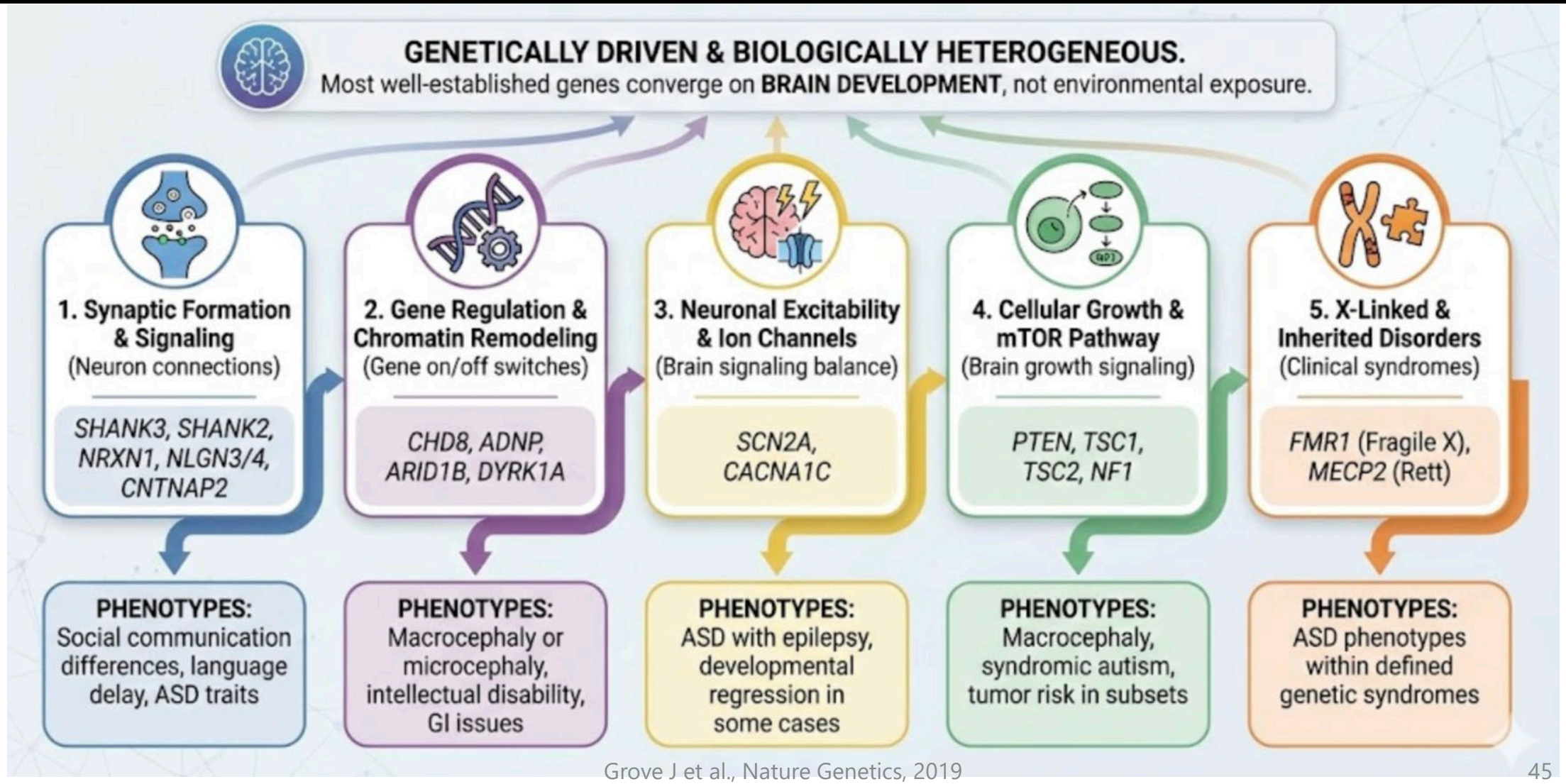
ASD is not caused by a single “autism gene.” Hundreds of different genes have been implicated, many involved in early brain development.

Key Concept: Gene-Environment Interaction. Genetic susceptibility can be amplified or triggered by exposure to specific environmental risk factors.



Sandin S et al., JAMA, 2017, Tick B et al., JAMA Psychiatry, 2016

Autism Genetics



Grove J et al., Nature Genetics, 2019

Established Environmental Factors

Parental & Pregnancy Factors

- Advanced Parental Age: Both maternal (>35) and paternal (>40) age
- Interpregnancy Interval: Short (<12 months) or long (>72 months)
- Maternal Health: Gestational diabetes, obesity, hypertension during pregnancy.

Perinatal Complications

- Preterm Birth (<37 weeks)
- Low Birthweight
- Birth Trauma / Hypoxia (oxygen deprivation) COVID infection

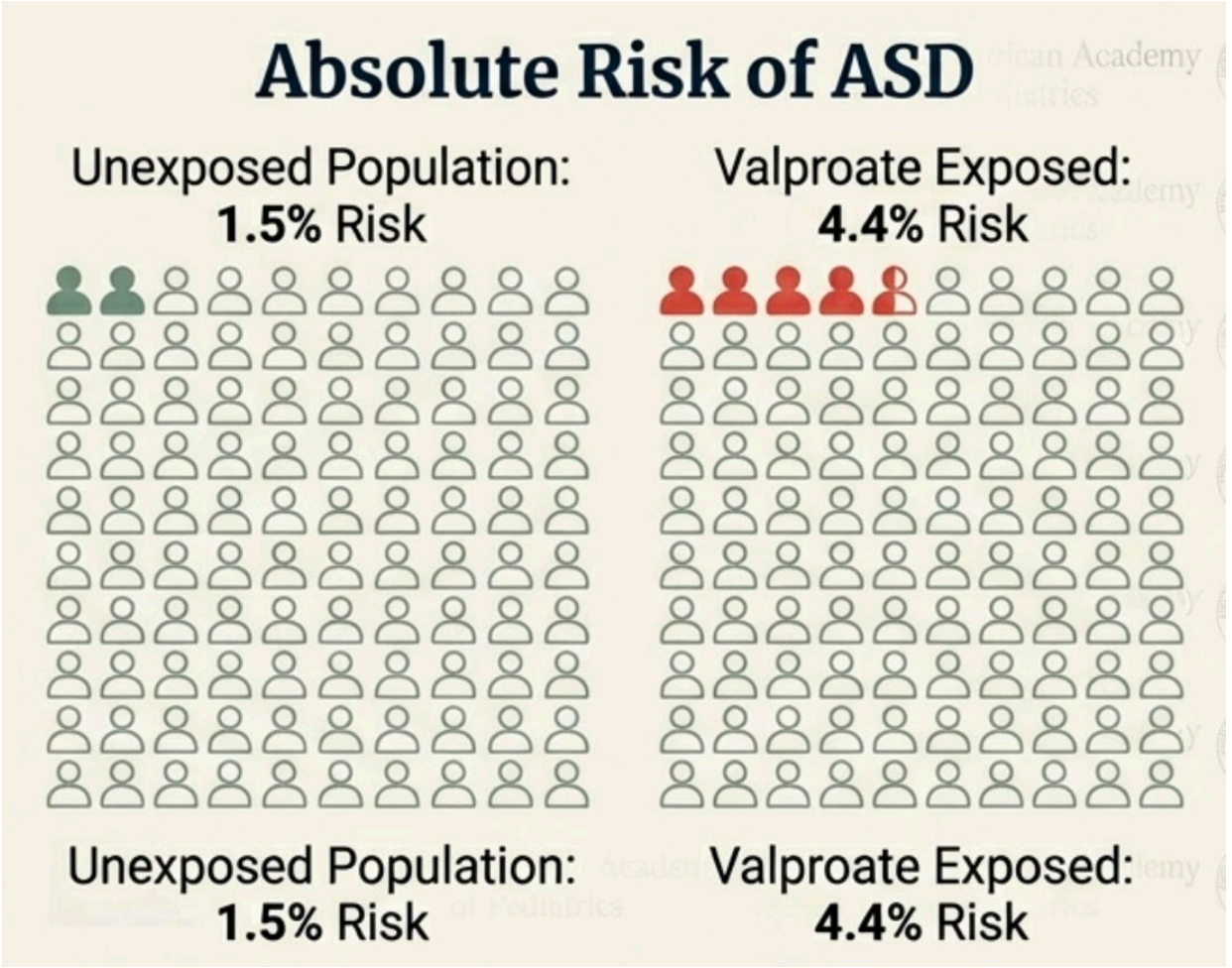
Protective Factors

- Folic Acid Supplementation: Consistent evidence shows that maternal folic acid supplementation before and during early pregnancy is protective against ASD

Gardener H et al., Pediatrics, 2011

Valproic Acid: A Confirmed Prenatal Risk Factor

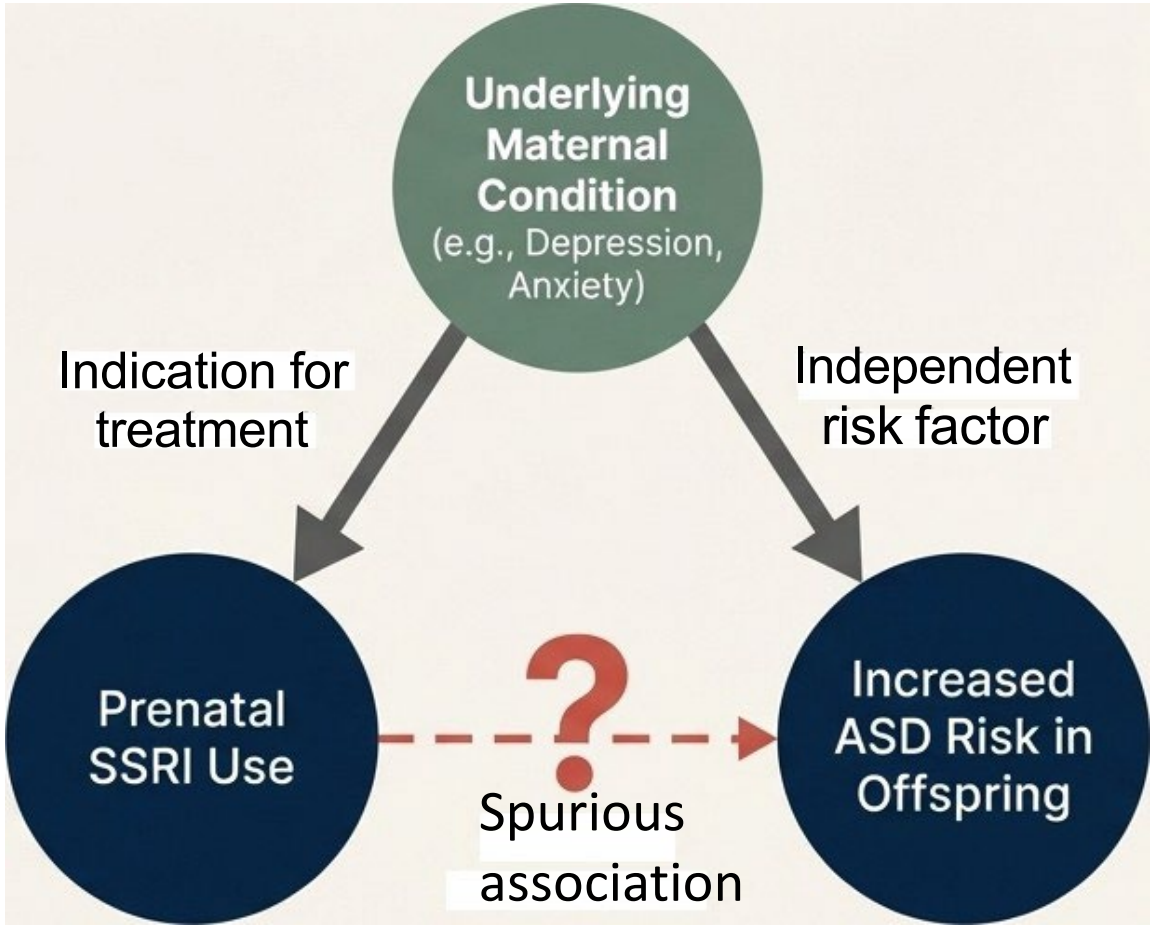
- While most medications are not linked to autism, prenatal exposure to the anticonvulsant/mood stabilizer: valproic acid (valproate) is a well- documented risk.
- Clinical Implication: This is a known teratogen with risks that must be carefully weighed against benefits in women of childbearing age.



Christensen J et al., JAMA, 2013

Interpreting the Evidence: The Case of SSRIs

- The Question: Some studies have suggested a statistical association between prenatal SSRI use and ASD
- The Nuance: This association is likely due to confounding by indication
- Clinical Bottom Line: The evidence does not preclude the use of SSRIs during pregnancy when clinically indicated.
- Untreated maternal depression carries its own significant risks



Leucovorin and Its Application

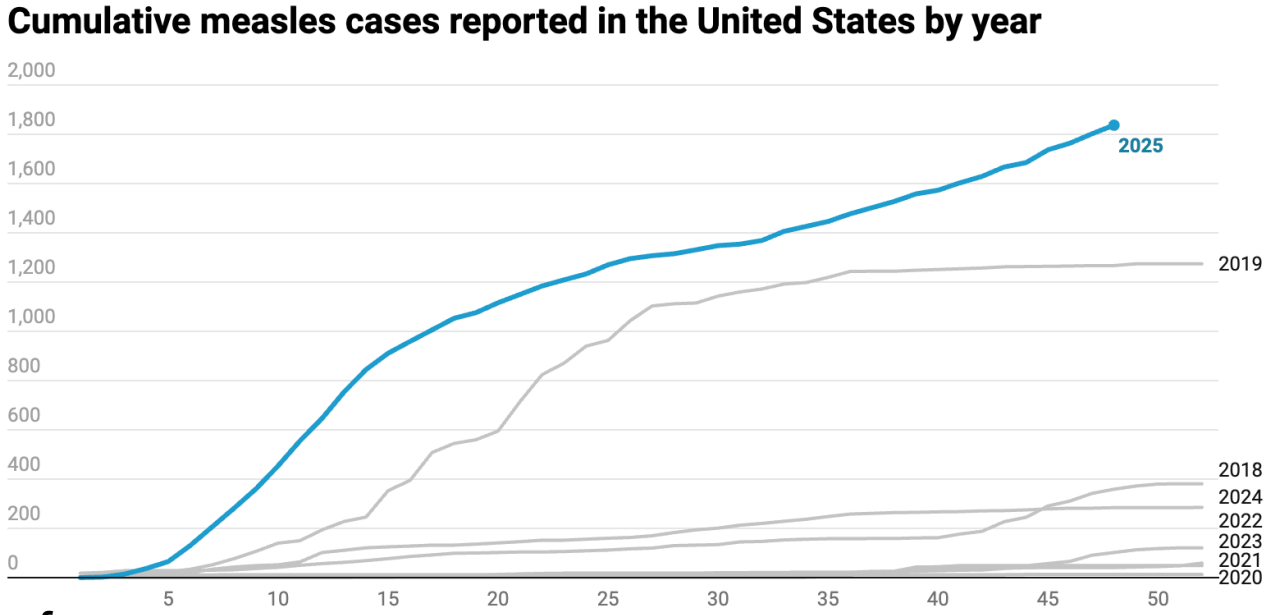
- A reduced form of vitamin B9, mostly used for methotrexate toxicity rescue
- Emerging Research Area: It is currently being investigated as a targeted therapy for a specific subgroup of children with ASD, “cerebral folate deficiency”
- Mechanism: The research focuses on children with confirmed folate metabolism abnormalities or cerebral folate receptor alpha autoantibodies
- Data for short-term use (12-week trial) was found in children 3-14 y/o, mean 7 y/o, male-predominant cohort
- Preliminary Findings: Early studies suggest high-dose leucovorin (0.5-2 mg/kg, NTE 50 mg daily) may improve language impairment in these specific patient populations
- Weighing risks and benefits for each case: most common side effects are hyperactivity and irritability. Long-term effect and side effects unclear.

Frye et al., Molecular Psychiatry, 2018

The Clinical Imperative: Public Health Consequences of Misinformation

The vaccine-autism myth has led to a measurable public health crisis:

- Vaccine Hesitancy: A documented increase in parental refusal or delay of recommended vaccines
- Disease Outbreaks: Resurgence of vaccine- preventable diseases, such as measles, in communities with low immunization rates
- The PCP's Role: Clinicians are on the front lines of this information battle and play a critical role in protecting both individual patients and community health



https://publichealth.jhu.edu/ivac/resources/us-measles-tracker

A Motivational Interviewing Framework To Educate Families

Skills	Objectives	Examples
Open questions	To evoke responses and avoid doubts	Open-ended questions: (“What did you understand?”/“What do you think?”) Closed questions: (“Did you understand?”/“Do you think it’s important?”)
Affirmation	To encourage the individual and highlight their strengths	“The health and safety of your children are important to you.” “You already have a lot of knowledge.”
Reflective listening/summaries	To allow the individual to add nuance to and correct what they have just said Simple reflection: what the individual says Complex reflection: what the individual means	“You have read articles about the relationships between vaccines and disorders such as autism.” “What matters most to you is that your child is as healthy as possible.”
Elicit–Share–Elicit	How to give information/advice: ELICIT = ask what the parent/caregiver knows and ask permission to complete their knowledge SHARE = provide the information /advice on the subject ELICIT = verify what the parent/caregiver has understood and what they will do with this information	“What do you know about …?” “If you agree, I could complete …” “Does this new information make sense?”

Gagneur A., Can Commun Dis Rep. 2020

Key Takeaways

- *The Verdict is In*

The vaccine-autism link has been exhaustively investigated and disproven by decades of robust, global scientific research.

- *Etiology is Complex*

ASD is a neurodevelopmental disorder with strong genetic roots, modulated by primarily prenatal environmental and physiological risk factors

- *Communication is Critical*

PCP's role in clearly and confidently communicating the scientific evidence is our strongest tool to counter misinformation and protect public health

You Can Call "Curbside" Consultations

- Providers can consult directly with:
  - Child and Adolescent Psychiatrists
  - Psychologists with Specialized Expertise - Substance Use, Autism, Mood & Behavior
  - LCSW Care Coordinators

Telephone	e-Consult
Monday-Friday, 8:30am-5pm Receive a call back within 5 minutes, max 30 minutes	Request anytime
Receive consult letter detailing discussion and recommendations within 24 hours	Receive written recommendations within 1 business day

Fast, convenient, on-demand

No call is too small!

Get started on Cal-MAP.org
-or -
Call 1-800-253-2103

Cal-MAP Offerings

- **"Curbside consultations"** with providers on specific patient cases
- **50+ hours of CME training** with other clinicians on diagnosing and treating mental health concerns.
- **Curated resources for clinicians and families** including diagnosis-specific information
- **Care Coordination services**, including vetted referrals by patient insurance and location, and direct-to-family care coordination support

References

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- Vaccination Patterns in Children After Autism Spectrum Disorder Diagnosis and in Their Younger Siblings. Zerbo O, Modaressi S, Goddard K, et al. JAMA Pediatrics. 2018;172(5):469-475. doi:10.1001/jamapediatrics.2018.0082.

Thank you!

For questions, please contact:

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