



**AMERICAN
OTOLOGICAL
SOCIETY**



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**“Determining the Role of Macrophages in the Pathogenesis of Cytomegalovirus
Induced Sensorineural Hearing Loss”**

FELLOWSHIP GRANT 2020

Amount Awarded by AOS: \$40,000

PUBLICATIONS: Otsuka KS, Nielson C, Firpo MA, Park AH, Beaudin AE. *Early Life Inflammation and the Developing Hematopoietic and Immune Systems: The Cochlea as a Sensitive Indicator of Disruption*. *Cells*. 2021 Dec 20;10(12):3596. doi: 10.3390/cells10123596. PMID: 34944105; PMCID: PMC8700005.

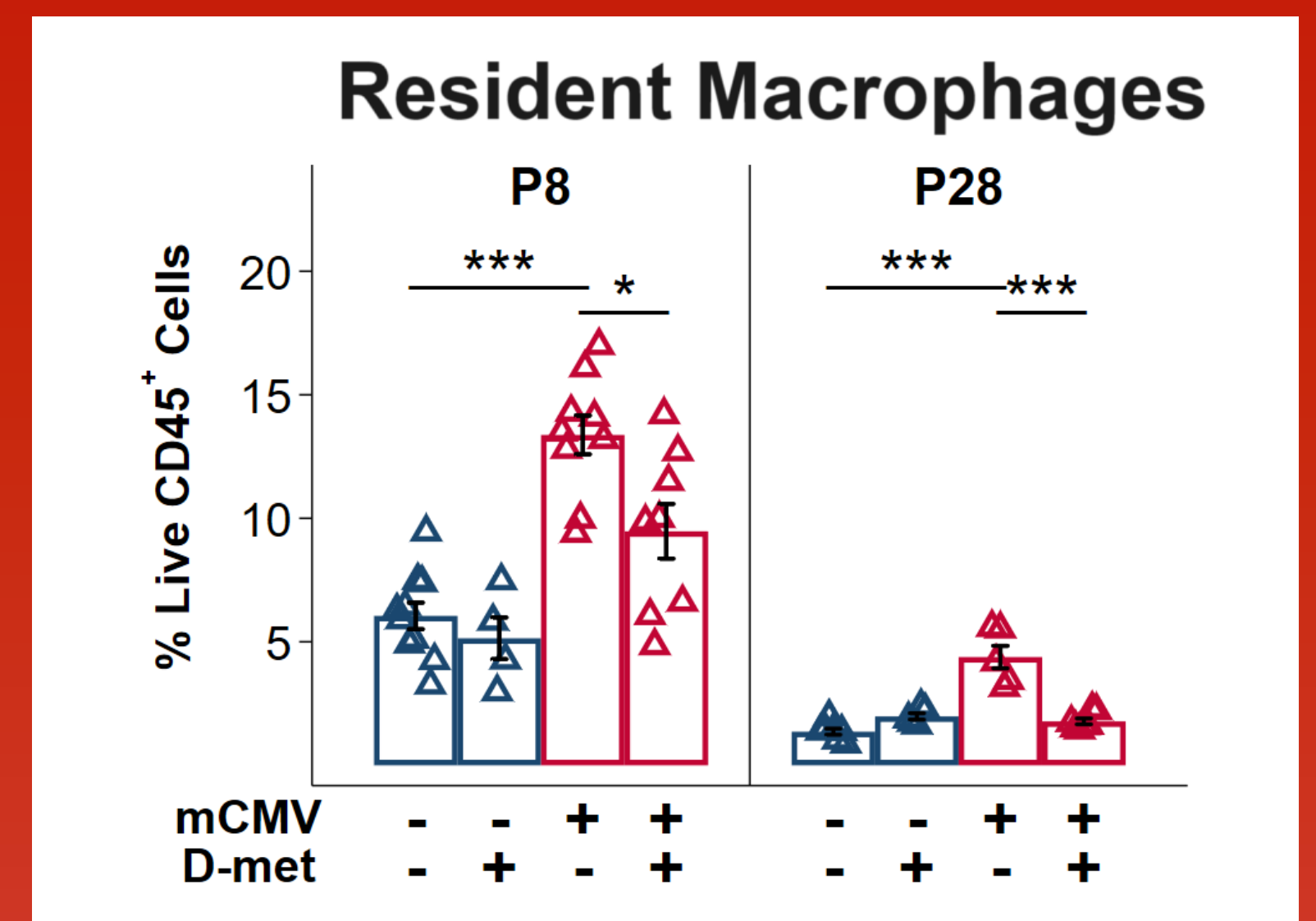
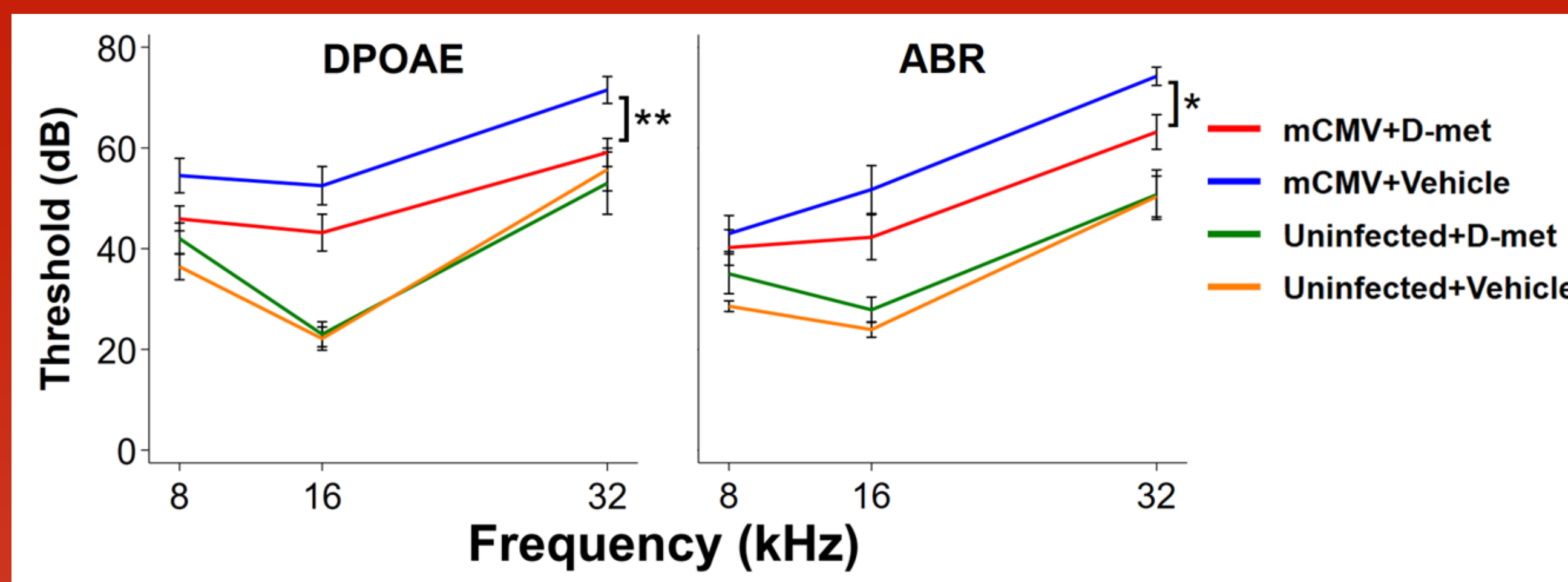
Otsuka KS, Nielson C, Suarez D, Park AH, Beaudin AE, *The contribution of fetal-derived tissue resident macrophages to cytomegalovirus-associated sensorineural hearing loss*, *The Journal of Immunology*, Volume 208, Issue Supplement_1, May 2022, Page 50.40, <https://doi.org/10.4049/jimmunol.208.Supp.50.40>

Hillam K, Suarez D, Nielson C, Traxler A, Sommer E, Winslow A, Holley A, Huang E, Hughes M, Firpo MA, Rower J, Park AH. *Hearing Following Prolonged and Delayed Ganciclovir Treatment in a Murine Cytomegalovirus Model*. *Laryngoscope*. 2024 Jan;134(1):433-438. doi: 10.1002/lary.30860. Epub 2023 Jul 8. PMID: 37421238.

Suarez D, Kjar A, Scott B, Hillam K, Vargis E, Nielson C, Sommer E, Zhang E, Holley A, Traxler A, Hughes M, Wang Y, Firpo MA, Britt D, Park AH. *Can Ganciclovir and Quercetin-P188 Ameliorate Cytomegalovirus Induced Hearing Loss?* *Laryngoscope*. 2024 Mar;134(3):1457-1463. doi: 10.1002/lary.30975. Epub 2023 Aug 17. PMID: 37589298.

RESEARCH SUMMARY:

Congenital cytomegalovirus (CMV) is the most common non-genetic cause of hearing loss in newborn infants, yet the mechanism is poorly understood and treatment options are limited. We hypothesized that an exaggerated immune response may contribute to the progressive nature of patients with congenital CMV infection. To test this hypothesis, we evaluated immune cell frequencies in the cochleae of a mouse model of congenital CMV hearing loss.



OUTCOME:

We demonstrated a persistent expansion of cochlear macrophages in response to congenital infection compared to the ears of uninfected mice. When treated with the reactive-oxygen species scavenger, D-methionine, hearing improved and cochlear macrophage frequencies were reduced.

FURTHER FUNDING HAS ENABLED US TO EXPAND OUR RESEARCH TO:

Collaborate with fetal stem cell researchers at our institution to successfully obtain R01 funding.

LAY SUMMARY OF FINDINGS AND IMPLICATIONS OF THIS RESEARCH:

Our research demonstrates that an inflammatory response may play a key role in hearing loss for infants infected with congenital CMV. We have demonstrated that a specific type of immune cell may be central to this process, and may represent a specific target for treatment.