

Osteopontin (OPN) plays an important role in supporting the developing immune system

Breastmilk is a dynamic source of **nutrients** and **bioactive components**^{1,2}



Provides macro- and micronutrients to **support infant growth and development**^{1,4}

Contains bioactive components which may explain differences in health outcomes between breastfed and formula-fed infants^{2,3}

Osteopontin is a bioactive protein in breastmilk^{2,5} with **immune functions**⁶⁻⁹

Naturally found in human milk⁵



Present in a variety of tissues, cell types, and bodily fluids⁵ with **highest concentration in human milk**⁶



Concentrations significantly **differ across countries**¹¹

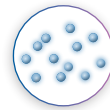


Significantly higher levels than those in **bovine milk**⁷

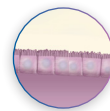
Important role in immunity^{6-9*}



Plays **role** in **TH1-mediated immunity**^{7,10}



Cytokine-like properties^{6,8} supporting development and maintenance of **immune responses**^{8,9}



Helps **protect** the integrity of the **gut barrier**¹²

*The immune-related functions shown are based on preclinical data.

Research shows infant formula with OPN **supports immunity**¹³

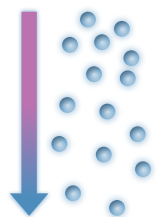
In a clinical study, **infant formula with OPN** was shown to have **beneficial effects** in infants¹³



Well tolerated¹³



No significant differences in intake or growth¹³



Modified serum **cytokine profile**, including TNF- α (pro-inflammatory cytokine; important mediator of fever) to be **closer** to that of **breastfed infants**¹³



Lower incidence of fever (not significantly different from breastfed infants)^{13†}

†Incidence of fever was significantly higher in control vs. breastfed group. Infants fed formula with OPN had lower incidence not different from control or breastfed group.

Clinical data show that OPN-supplemented formula may strengthen immune response¹³

References: 1. Cacho NT, et al. *Front Immunol.* 2017;8:584. 2. Ballard O, et al. *Pediatr Clin North Am.* 2013;60(1):49-74. 3. M'Rabet L, et al. *J Nutr.* 2008;138(9):1782S-90S. 4. Lönnnerdal B. *J Pediatr.* 2016;173:S4-9. 5. Lund SA, et al. *J Cell Commun Signal.* 2009;3(3-4):311-22. 6. Schack L, et al. *J Immunol.* 2009;182(11):6943-50. 7. Schack L, et al. *J Dairy Sci.* 2009;92(11):5378-85. 8. Demmelmair H, et al. *Nutrients.* 2017;9(8):817. 9. Wang KX, et al. *Cytokine Growth Factor Rev.* 2008;19(5-6):333-45. 10. Ashkar S, et al. *Science.* 2000;287(5454):860-4. 11. Bruun S, et al. *J Pediatr Gastroenterol Nutr.* 2018;67(2):250-6. 12. Woo S-H, et al. *Dig Dis Sci.* 2019;64(2):421-31. 13. Lönnnerdal B, et al. *J Pediatr Gastroenterol Nutr.* 2016;62(4):650-7.