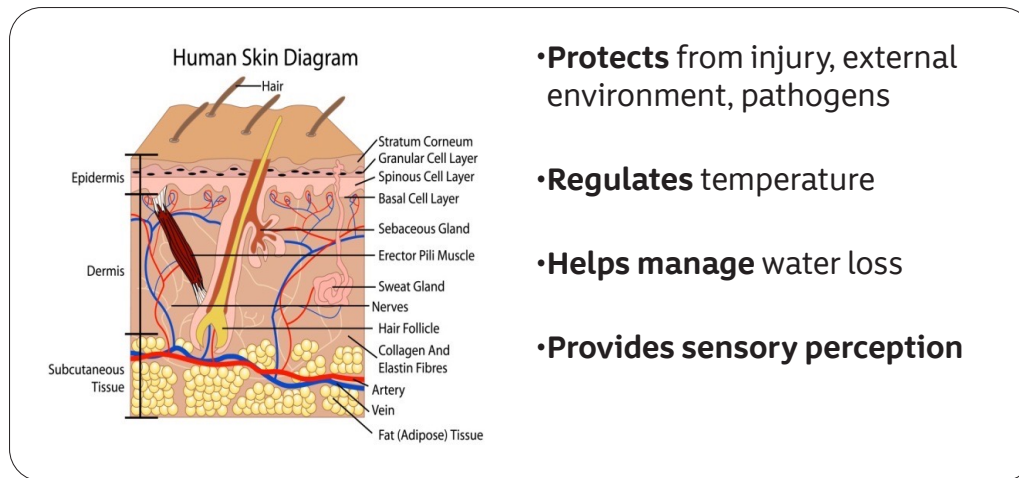


Can emollients play a role in maintaining skin barrier integrity and supporting the skin microbiome?

Maintaining Skin Barrier Integrity is Essential



- **Protects** from injury, external environment, pathogens
- **Regulates** temperature
- **Helps manage** water loss
- **Provides sensory perception**

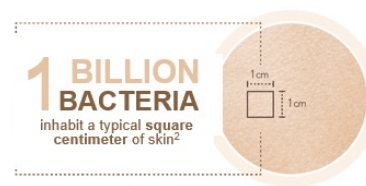
Measured by:

- Skin's ability to hold onto water -TEWL (transepidermal water loss)
- Skin Hydration
- Skin pH (acid mantle) – protective, mildly acidic, supports resident flora & inhibits pathogens

1. Irving V. J Wound Care 2001, 10:253-6. 2. Nikolovski J et al. J Invest Dermatol 2008, 128:1728-36.

Skin is an ecosystem; microbiome works with skin barrier

- **Healthy skin** inhabited by harmless microbes; helps **protect against harmful** microbes



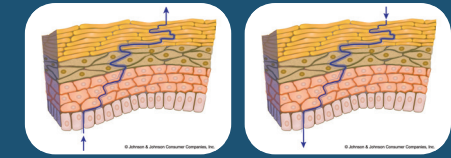
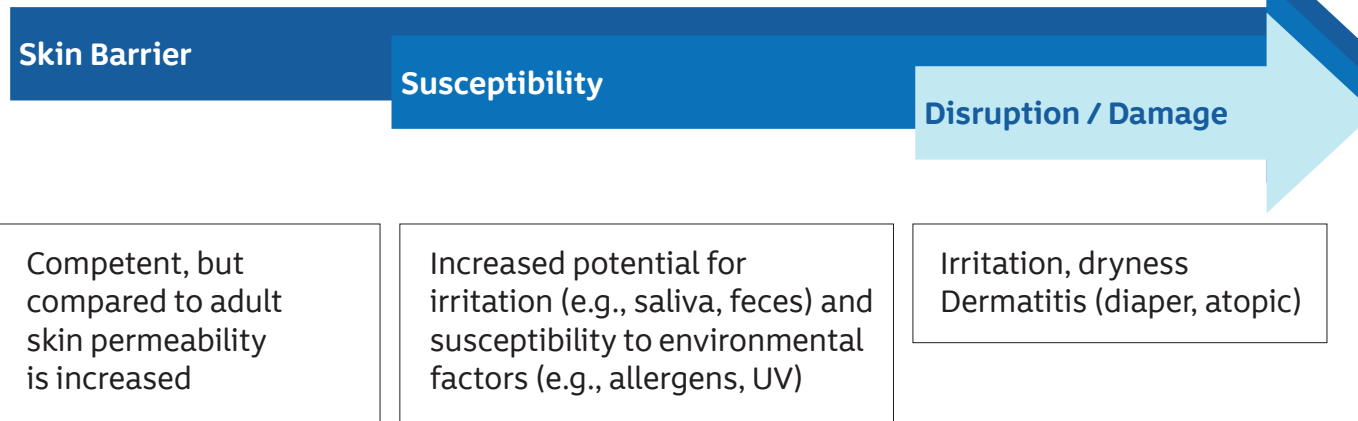
pH Balance

The skin microbiome prefers a relatively acidic environment (pH around 5.0) which also inhibits growth of pathogens.¹

EA Grice, JA Segre, Nat Rev Microbiol 2011; 9(4), 244-53.
EA Grice, HH Kong, G Renaud, AC Young, et al. Genome Res 2008; 18(7), 1043-50.

Infant Skin is Uniquely Different and Develops Over First Years

Structure and composition differences lead to functional differences

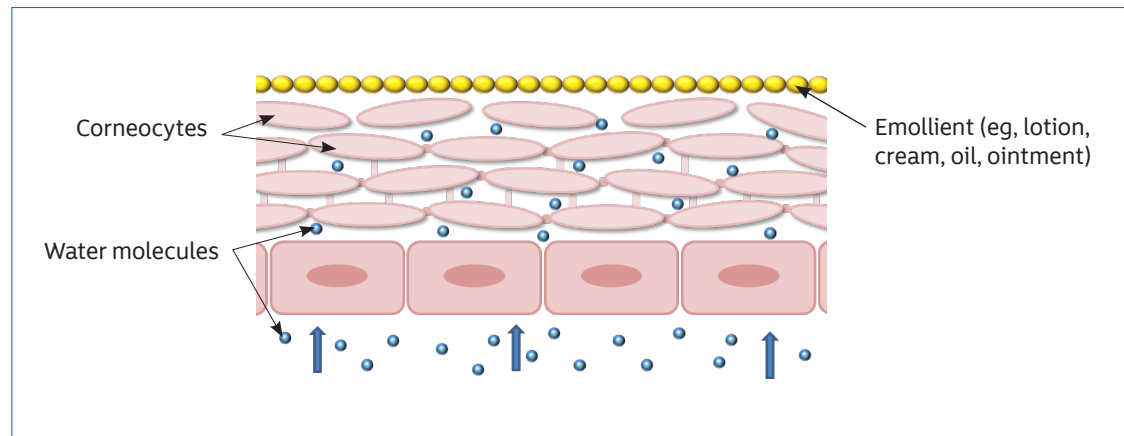


- Infant skin can lose water 2x as fast.
- Smaller cells and thinner skin - shorter pathway outside to inside.
- Skin pH higher at birth, acidifies first weeks
- More reactive

1. Stamatias G, et al. *Pediatr Dermatol.* Mar-Apr 2010;27(2):125-31.
2. Nikolovski J, et al. *J Invest Dermatol.* 2008;128:1728-1735
3. Mack M, et al. *J Invest Dermatol.* 2009;129(S1):S143
4. Stamatias G, et al. *Int J Cosmet Sci.* 2011;33:17-24.
5. Stamatias GN, Martin K. *Cosmetics and Toiletries.* 2009;124:50-53
6. Stamatias GN, Tierney NK. Update on infant skin with special focus on dryness and the impact of moisturizers. In: Lodén M, Maibach HI, eds. *Treatment of Dry Skin Syndrome.* Heidelberg, Germany: Springer-Verlag; 2012;295-310.
7. Telofski, LS et al. *Dermatology Research and Practice*, vol 2012. 2. G.N. Stamatias et al. *International Journal of Cosmetic Science*, 2011, 33, 17-24
8. Behrendt, H and Green, M. "Patterns of skin pH from birth through adolescence : with a synopsis on skin growth." (1971).
9. Danby SG, Cork MJ. The skin barrier in atopic dermatitis. In: Irvine AD, Hoeger PH, Yan AC, eds. *Harper's Textbook of Pediatric Dermatology.* Vol 1. 3rd ed. Oxford, UK: Wiley-Blackwell; 2011:271-2718.
10. Danby SG, Cork MJ. *DERMA* 2010;1:33-46
11. Stamatias GN, Tierney NK. Update on infant skin with special focus on dryness and the impact of moisturizers. In: Lodén M, Maibach HI, eds. *Treatment of Dry Skin Syndrome.* Heidelberg, Germany: Springer-Verlag; 2012;295-310

How Do Emollients Work?

- Products that create a partially occlusive barrier between skin and air, thereby reducing transepidermal water loss (TEWL) and increasing the ability of the skin to hold water
- Allow skin to rehydrate by diffusion of water from deeper skin layers
- Have the potential to protect skin from the external environment



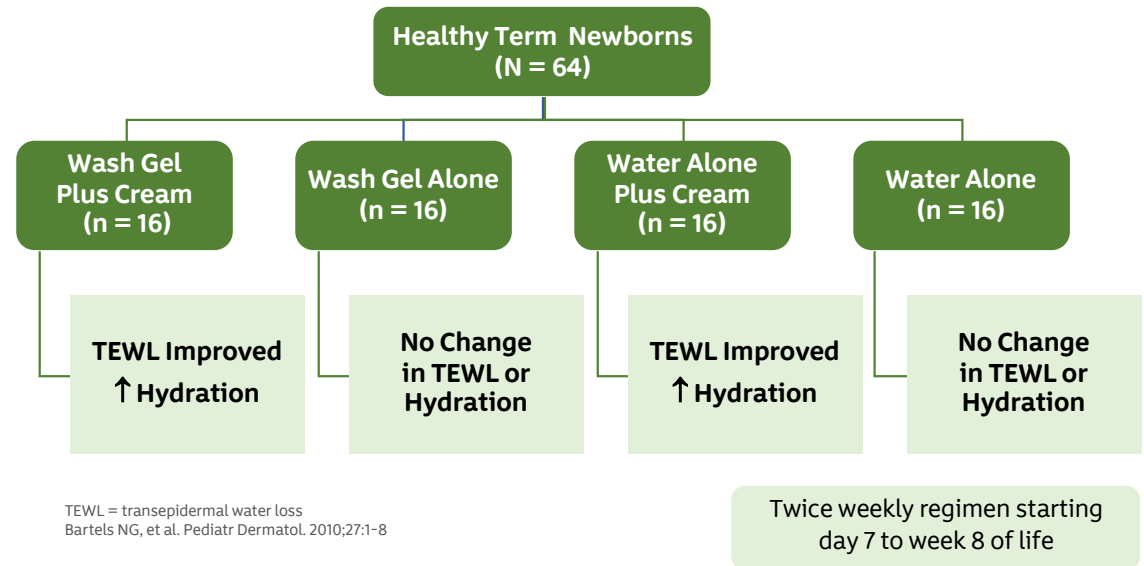
Lynde C. Skin Therapy Letter.com <http://www.skintherapyletter.com/2001/6.13/2.html>
© 2014 JJCCI - Image

What does the research show?

1. Research – Emollient and Skin Barrier

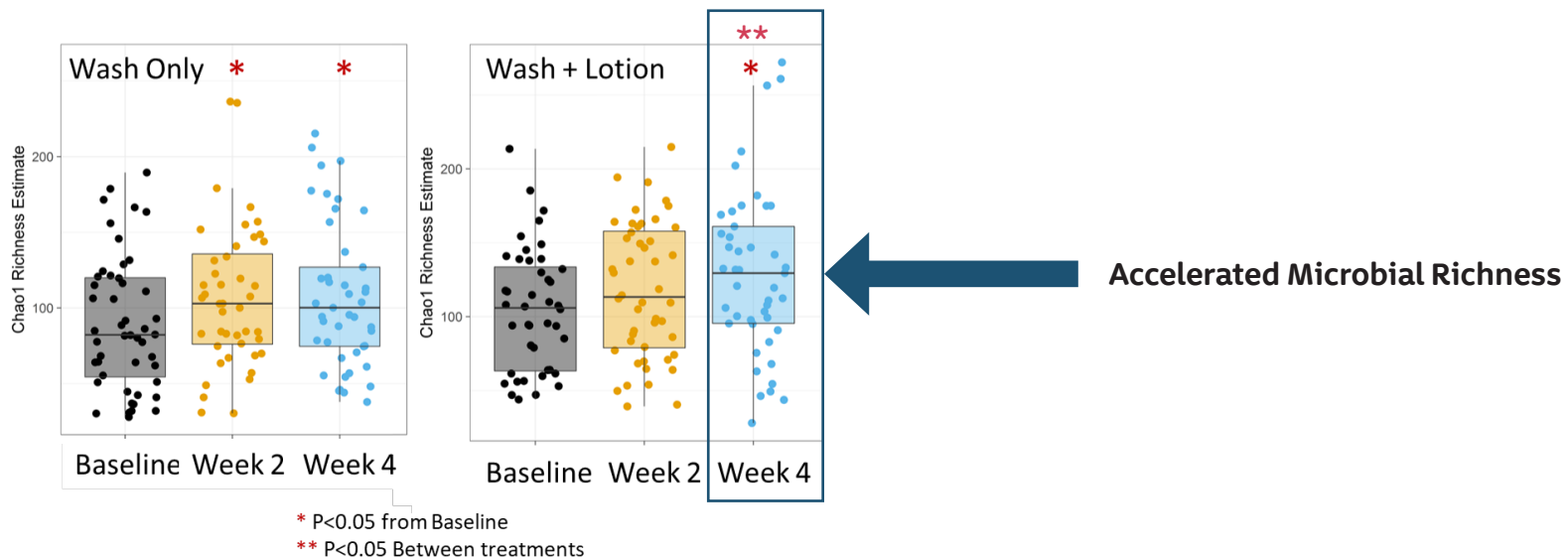
Emollient (cream) used after cleansing was shown to improve skin barrier function

- As compared to no cream use after cleansing with water alone or with mild cleansing wash
- As measured by TEWL and Skin Hydration



2. Research – Emollient and Skin Microbiome

When application of emollient (lotion) specially formulated for baby's skin was added to care routine after bath, baby's skin was shown to accelerate skin microbial richness*



*Shown in a clinical study
KA Capone, D Friscia, L Telofski, J Nikolovski, Presented at AAD 2019

What does the research show?


3. Research – Effects Based on Formulation Type



3 Different Lotion Formulation Types Were Tested

- Two different non-ionic, oil-in-water emulsions
- One cationic, oil-in-water emulsion

Effect Was Shown to Vary With Formulation Type



Assessment After 6 Weeks, 2X Daily Use (n=51, 3-12 mo)	Lotion A	Lotion B	Lotion C
Barrier Function (TEWL)	Improved	Improved	No Change
Skin Hydration (SCH)	No Change	Improved	No Change

TEWL, Transepidermal Water Loss
SCH, Stratum Corneum Hydration as measured by skin conductance
Stamatas GN, Tierney NK. Update on infant skin with special focus on dryness and the impact of moisturizers. In: Lodén M, Maibach HI, eds. Treatment of Dry Skin Syndrome. Heidelberg, Germany: Springer-Verlag; 2012;295-310.
Telofski, et al. Dermatol Res Pract. 2012;2012:198789.

What does the research show?

4. Research – Appropriateness of Oil-Based Emollients

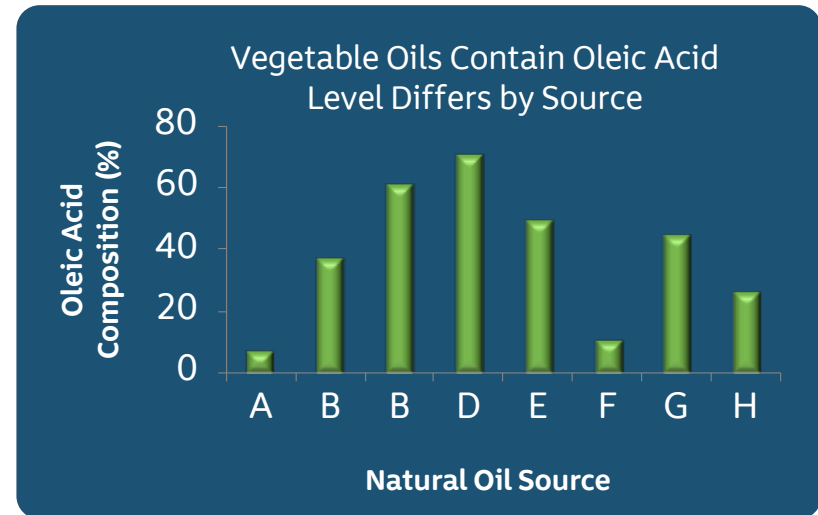
Olive Oil Was Shown to Damage Skin Barrier

- Increased TEWL* and protein removal (w/tape stripping)
- Decreased stratum corneum thickness
- Increased erythema (vs. baseline)
- No effect - stratum corneum hydration or skin pH

Randomized Controlled Trial evaluating effect of topical olive oil application, N=19, adults with history of atopic dermatitis, Danby SG et al. *Pediatr Dermatol.* 2013;30:42-50.

Study conclusions recommend against olive oil for topical use on infants (e.g., as emollient, for massage) and challenge potential consideration of any and oil natural oils as being appropriate for infant skin

*TEWL = transepidermal water loss



Daquan EMA, et al. *IPCBE.* 2011;14:31-34. Ayorinde FO, et al. *Rapid Commun Mass Spectrom.* 2000;14:608-615.

Olive Oil (D) contains oleic acid which has been shown to disrupt skin barrier structure and function.

Jiang S, Zhou X. *Biol Pharm Bull.* 2003;26:66-68., Boelsma E, et al. *Toxicol in Vitro.* 1996;10:729-742

Research shows appropriately formulated mineral oil effective and safe for use on skin barrier

Efficacy	Safety
Partially occlusive: does not block pores and does not fully prevent TEWL	Demonstrated safety history
History of use for dry and eczematous skin, including for or Atopic Dermatitis	Inert, not likely to degrade
	Does not contain oleic acid, which has been shown to damage the stratum corneum
	Shown not to disrupt the skin barrier
	Low potential to irritate skin
	Non-comedogenic



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Purified and refined paraffin oil; used in personal care products over 100 years

*TEWL = transepidermal water loss

1. Rawlings AV, Lombard KJ. *Int J Cosmet Sci.* 2012;34:511-518.
2. Lynde C. *Skin Therapy Letter.com* <http://www.skintherapyletter.com/2001/6.13/2.html>.
3. Patzelt A, et al. *Skin Res Tech.* 2012;18:364-369.
4. DiNardo JC. *J Cosmet Dermatol.* 2005;4:2-3.

Key Take-Aways

- 1. Infant skin is different than adult, and skin care routines should strive to maintain and support the integrity of the skin barrier and its microbiome**
- 2. Appropriately formulated emollients have been shown to:**
 - Improve skin barrier function and hydration
 - Support the skin microbiome
- 3. Not all emollients are the same or appropriate for infant skin**
 - Effects can be formulation dependent
 - Not all oil-based emollients may be considered appropriate for use