



# What Can Zap That Zit?

## Effectiveness of Acne Spot Treatment on Model Organism *Staphylococcus aureus*



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### Background Information

According to the American Academy of Dermatology, over 50 million Americans suffer from some form of minor acne every year; and of those 50 million, 85% are between the ages of 12 - 24<sup>1</sup>. Acne is caused by a variety of different factors such as genetics, hormones, infections, diet, stress, environmental factors, and even certain medications.

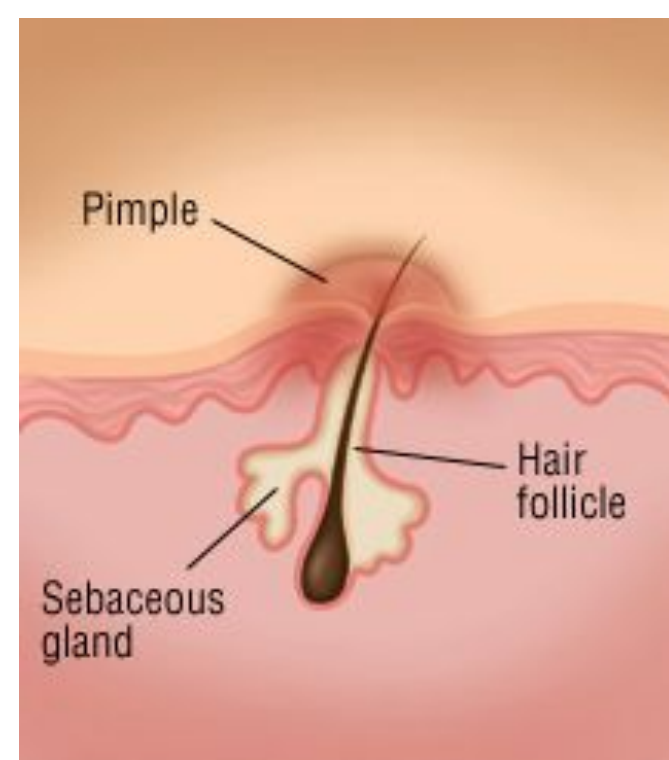


Figure 1: Diagram showing the oil from the sebaceous gland clogging the pore and creating a pimple.

The type of bacteria that causes acne is *Propionibacterium acnes*; however, due to the fact that this bacteria grows best in anaerobic environments and takes several weeks to even visualize colonies, we chose to use *Staphylococcus aureus* because it also grows on human skin and has been shown to contribute to causing acne<sup>2</sup>.

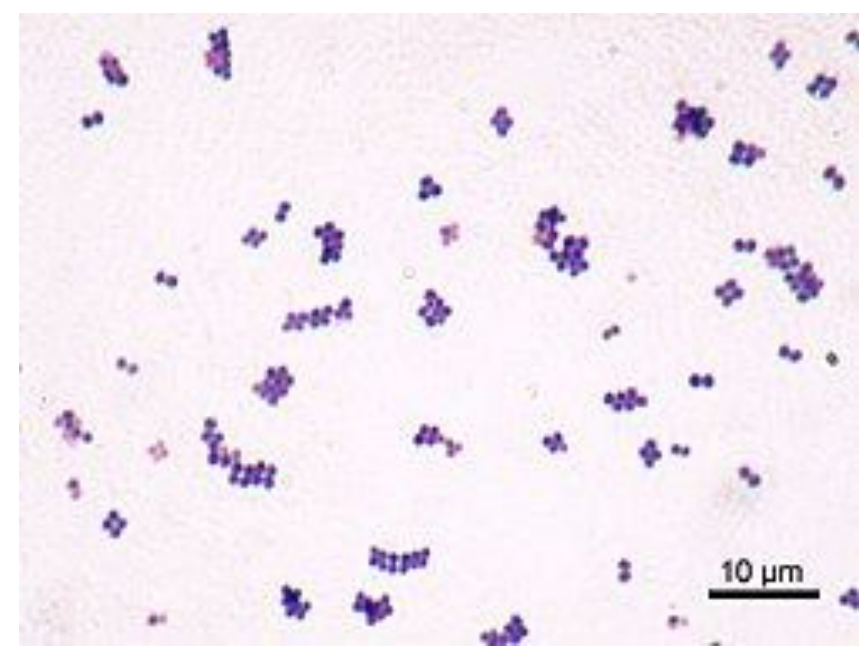


Figure 2: *Staphylococcus aureus* seen under a microscope

### Research Question

**Question:** Which spot treatment is more effective at treating acne.

**Hypothesis:** We hypothesize that the Differin Gel containing Adapalene will create the largest clearing due to previous research articles.



- #1
- Clean + Clear Persa-gel 10
- Active Ingredient: Benzoyl Peroxide 10%



- #2
- Differin Gel
- Active Ingredient: Adapalene Gel 0.1%



- #3
- Nature's Bounty Tea Tree Oil
- Active Ingredient: Pure Australian Oil 100%



- #4
- Acne Free Severe Terminator 10
- Active Ingredient: Micro-Benzoyl Peroxide 10%



- #5
- Burt's Bees Acne Solutions
- Active Ingredient: Salicylic Acid 0.75%



- #6
- Alba Acedote
- Active Ingredient: Salicylic Acid 2.0%

### Materials and Methods

#### GROWTH OF BACTERIA AND CREATION OF PLATES

- Plates made with Difco Tryptic Soy Agar
- Plated with *S. aureus*
- Inoculate disks with acne spot treatments

#### KIRBY-BAUER ASSAY



### Results and Discussion

Table 1: Average inhibition zones of acne spot treatments shown on *S. aureus*.

	Average of Diameter of Inhibition of Sample 1 in cm	Average of Diameter of Inhibition of Sample 2 in cm
Clean & Clear	0.83	0.93
Differin	0	0
Tea Tree Oil	2.93	2.16
Acne Free	0.67	0.83
Burt's Bees	1.53	0.9
Alba	0	0.9

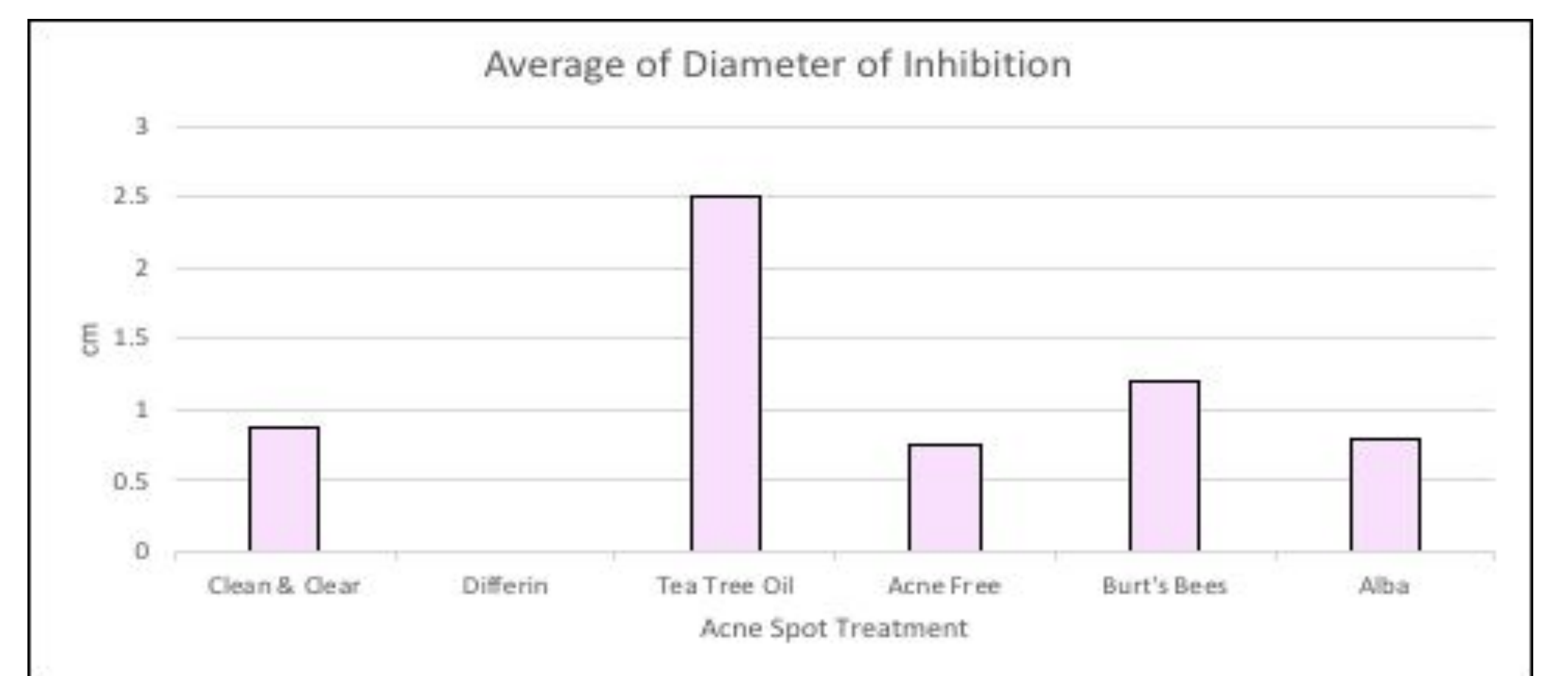


Figure 1: Inhibition zones of active ingredients in acne spot treatments shown on *S. aureus*.

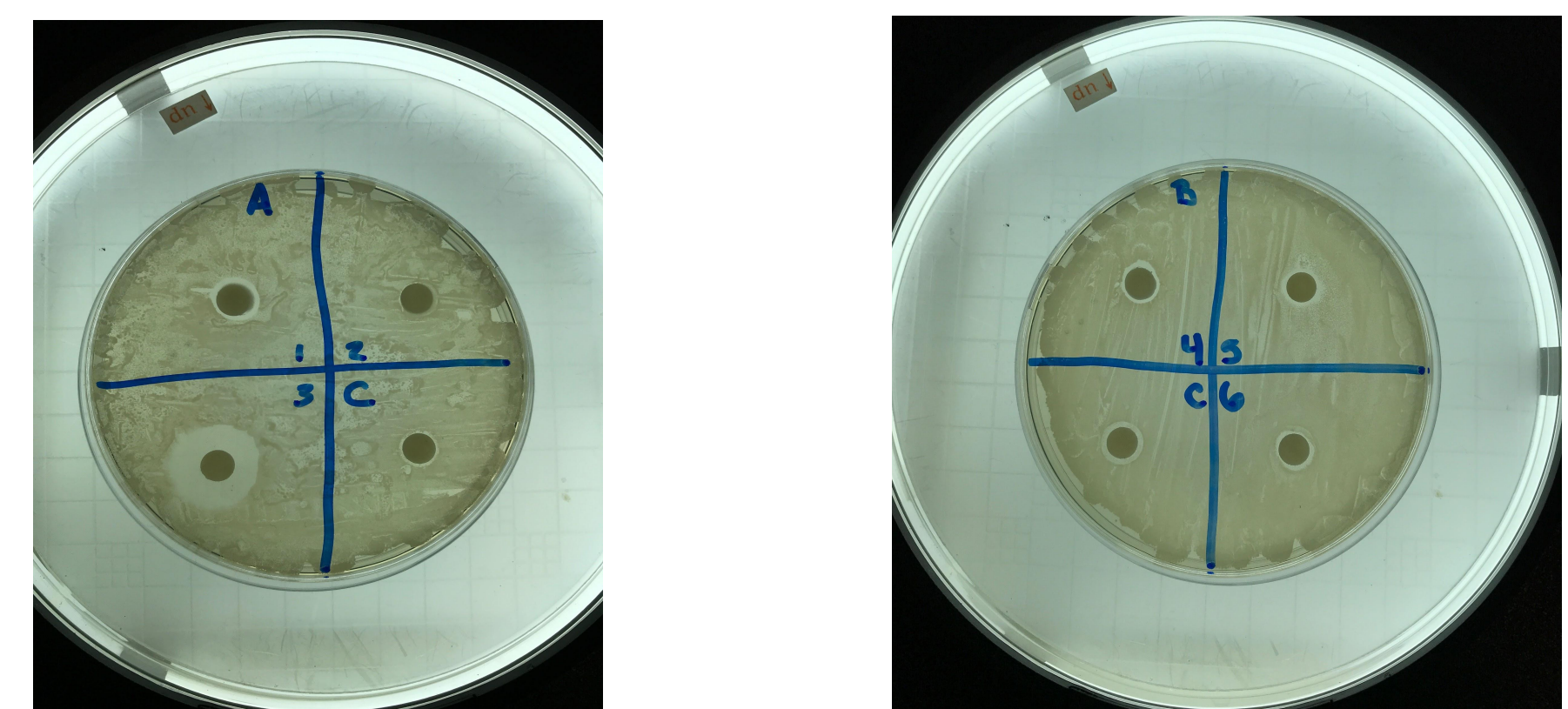


Figure 2: Visual results of the inhibition zones of 6 acne spot treatments and control shown on *S. aureus*. The plate labelled A is one isolated strand of *S. aureus* that has spot treatments 1-3 on it and the control of water. The plate labelled B is another isolated strand of *S. aureus* that has spot treatments 4-6 and our control.

### Literature Cited

<sup>1</sup>Science Buddies Staff. 2018 "Which Acne Medication Can Really Zap That Zit?" *Science Buddies*. [cited 2018 Nov 8]. Available from [https://www.sciencebuddies.org/science-fair-projects/project-ideas/MicroBio\\_p019/microbiology/acne-zits-medication](https://www.sciencebuddies.org/science-fair-projects/project-ideas/MicroBio_p019/microbiology/acne-zits-medication).

<sup>2</sup>Jain AK, Jain A, Garg NK, Agarwal A, Jain A, Jain SA, Tyagi RK, Jain RK, Agrawal H, Agrawal GP. Adapalene loaded solid lipid nanoparticles gel: An effective approach for acne treatment. *Colloids and Surfaces B: Biointerfaces*. 2014;121:222-229. doi:10.1016/j.colsurfb.2014.05.041

<sup>3</sup>Chularojanamontri L, Tuchinda P, Kulthanan K, Varothai S, Winayanuwattikun W. A double-blinded, randomized, vehicle-controlled study to assess skin tolerability and efficacy of an anti-inflammatory moisturizer in treatment of acne with 0.1% adapalene gel. *Journal of Dermatological Treatment*. 2015;27(2):140-145. doi:10.3109/09546634.2015.1079298

What kinds of bacteria cause pimples? | Acne. Sharecare. [accessed 2018 Nov 20]. <https://www.sharecare.com/health/acne-skin-pimples/what-bacteria-cause-pimples>

Skin conditions by the numbers. Employment and benefits | American Academy of Dermatology. [accessed 2018 Nov 20]. <https://www.aad.org/media/stats/conditions/skin-conditions-by-the-numbers>