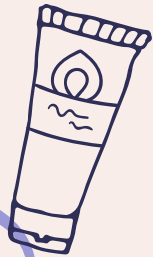


Measuring Which Product Works Best to Keep Skin Moist

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Research Question

Which kind of skin moisturizer works best to keep a model of human skin moist?

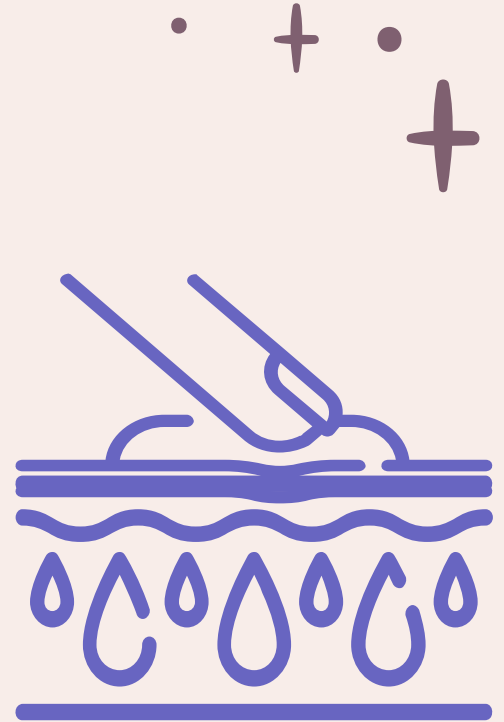




Background Information

I want to test the efficacy of different skin moisturizing ingredients in hydrating human skin. The skin, the body's largest organ, plays a crucial role in protecting against infections, sun exposure, and extreme temperatures. Healthy skin is essential for overall well being, as dry skin is a common issue that can be indicative of underlying conditions like psoriasis and dermatitis. Doctors often recommend three main types of moisturizers to address dry skin:

- **Occlusive agents:** Form a protective barrier on the skin surface to retain moisture. Examples include petroleum jelly, oils, and waxes like beeswax.
- **Emollients:** Smooth out skin roughness and seal tiny cracks. Many emollients also act as occlusive agents.
- **Humectants:** Attract moisture from the deeper skin layers to the surface epidermis, helping in hydration. Common humectants include honey, glycerin, and urea.



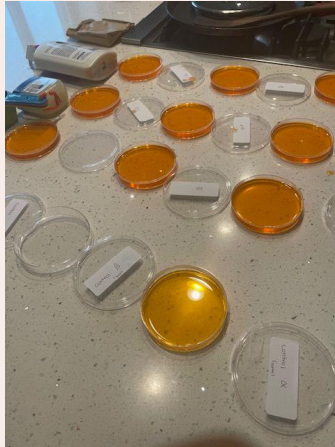
Hypothesis

I predict that the humectant-based moisturizer will work best. Humectants are hygroscopic substances, meaning they have a strong affinity for water molecules. When applied to the skin, humectants draw moisture from the environment or deeper layers of the skin and bind it to the outermost layer, known as the stratum corneum. The stratum corneum is made up of dead skin cells and plays a vital role in regulating skin hydration. By attracting water to this layer, humectants help to restore and maintain optimal hydration levels in the skin.



Materials

- Permanent marker
- 3 different skin moisturizers to test
- Petri dishes, 100 mm diameter x 15 mm deep (12, or three dishes for each skin moisturizer you test plus three more for controls)
- JELL-O® gelatin dessert
- Stove
- Measuring cup
- Cooking pot
- Clock or timer



- Stirrer
- Measurer for mL
- Refrigerator
- Paper towels or rags
- Scale, which must be able to accurately measure 0.1 g increments
- Measuring tablespoon
- Ruler, metric
- Place to jot down data

Procedures

1. In your lab notebook, also assign a number to the control samples that contain only the gelatin dessert. Label three petri dishes for each skin moisturizer you want to test, plus three dishes for the gelatin dessert-only controls.
2. Follow the instructions on the gelatin dessert packaging to prepare at least 50 milliliters (mL) of gelatin dessert for each petri dish.
3. Pour 50 mL into each petri dish.
4. When you have poured 50 mL of gelatin dessert into all the dishes, put their lids back on and carefully move them to a shelf in the refrigerator where they will not be disturbed for four hours.
5. Weigh each petri dish and record its weight (as "JELL-O Alone Before Adding Moisturizer")
6. Using a ruler, measure the height (in centimeters) of the JELL-O in each dish, including the controls Record this data (as "JELL-O Alone Before Adding Moisturizer").
7. Add 2 tablespoons (tbsp.) (30 mL) of the correct skin moisturizer to each petri dish.
8. Weigh each petri dish again and record its weight as "0 hours". Also measure the height of the gelatin dessert (*not* including the moisturizer) in each petri dish again and record the height as "0 hours".
9. Again weigh, and measure the height of the gelatin dessert in the dishes at one, two, three, four, eight, and 16 hours after you added the skin moisturizer. Write their weights and gelatin dessert heights in the corresponding data tables in your lab notebook.
10. Then continue to weigh, and measure the gelatin dessert heights of, the dishes every 24 hours (after adding the skin moisturizer) and write the dishes' weights and gelatin dessert heights in the corresponding data tables for 10 days.
11. Make two separate line graphs for the data tables.
12. Analyze your graph.

Data Tables

Time	1a	1b	1c	2a	2b	2c	3a	3b	3c	Cntl. α	Cntl. β	Cntl. γ
Jell-O alone before adding moisturizer	43	44	44	44.9	45	43	44	44.4	44.5	43.9	44.2	44.6[
0 hours	60.2	57.5	58	55.8	56.8	57	55.5	55.4	55.2	43.9	44.2	44.6
1 hour	60	57.5	58	55.8	56.8	57	55.5	55.4	55.2	43.9	44.2	44.6
2 hours	60	58	55.8	56.8	57	55.5	55.4	55.2	55.2	43.9	44.2	44.6
3 hours	59.8	57.9	55.8	56.8	56.8	55.5	55.4	55.2	55.2	39.7	39.5	38
4 hours	58	57.9	55.7	55.7	56.8	55.4	55.3	55.2	55.1	36.1	39.1	36.2
8 hours	58.1	57.8	55.7	55.8	56.8	55.2	55.2	55.1	55.1	36	36.5	35
16	58	57.8	55.7	55.6	56.7	55	55	55.1	55.1	35.4	34.3	33.2
24	57.9	57.5	55.6	55.7	56.5	54.3	54.2	55	54.9	24.2	21.2	20.4
48	56.8	56.9	55.8	54.5	56	54	53.2	54.5	54.7	16.4	17	18
72	56.9	56.5	55.7	54	55.5	53.2	53	54.2	54.6	11.9	14.7	12.3
96	55.8	56	55.7	53.5	54.8	52.5	52.9	53	54.5	7.3	6.8	6.5
120	54.2	55.2	55.4	53.4	53.2	51	48.5	51.2	52.8	7.2	6.2	6.2
144	52.1	54.9	55	47	49	45	46.2	48	49.3	6.4	6	5.6
168	50.6	53	54	43	45.3	43.2	43	45.3	49.4	5.1	5.3	4.3
192	49	52.4	52.9	39.5	38	39.4	41	42.1	42.4	4.9	4.8	3.7
216	47.2	51.7	50	35.1	35.6	34.1	38.7	40.9	40	3.4	3.7	2.8
240	45	50.3	49	29.5	31.8	30.5	35.2	38.7	38.7	3.2	2.1	1

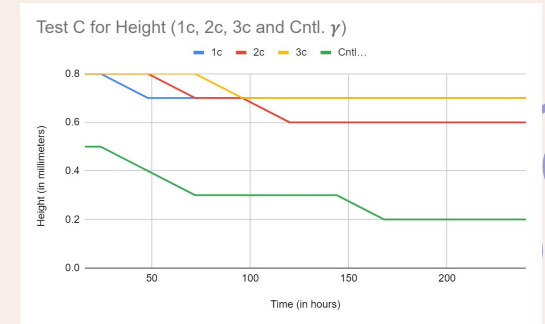
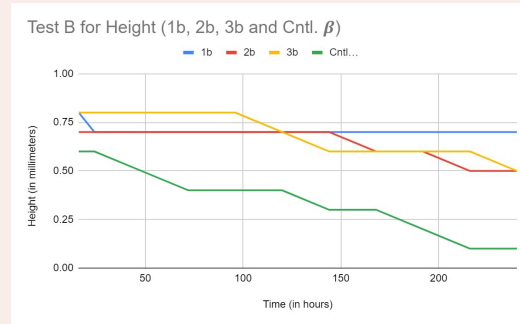
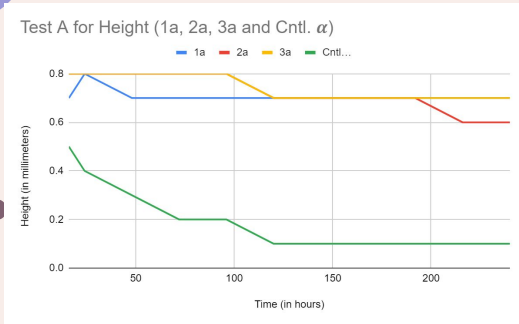
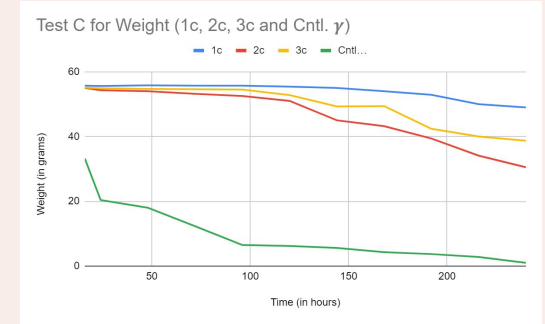
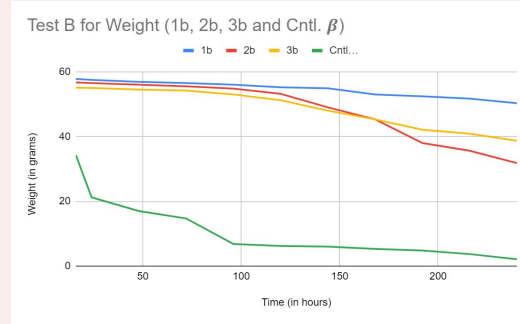
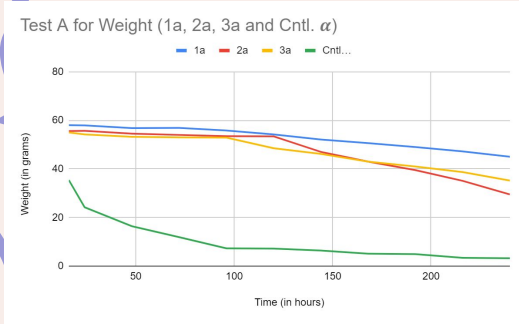
Weight Data

Time	1a	1b	1c	2a	2b	2c	3a	3b	3c	Cntl. α	Cntl. β	Cntl. γ
Jell-O alone before adding moisturizer	.8	.8	.7	.8	.7	.8	.8	.9	.8	.7	.8	.8
0 hours	.8	.8	.8	.8	.7	.8	.8	.9	.8	.7	.8	.8
1 hour	.8	.8	.8	.8	.7	.8	.8	.9	.8	.7	.8	.7
2 hours	.8	.8	.8	.8	.7	.8	.8	.9	.8	.6	.7	.7
3 hours	.8	.8	.8	.8	.7	.8	.8	.9	.8	.6	.7	.6
4 hours	.8	.8	.8	.8	.7	.8	.8	.9	.8	.6	.7	.6
8 hours	.8	.8	.8	.8	.7	.8	.8	.8	.8	.5	.7	.6
16	.7	.8	.8	.8	.7	.8	.8	.8	.8	.5	.6	.5
24	.8	.7	.8	.8	.7	.8	.8	.8	.8	.4	.6	.5
48	.7	.7	.7	.8	.7	.8	.8	.8	.8	.3	.5	.4
72	.7	.7	.7	.8	.7	.7	.8	.8	.8	.2	.4	.3
96	.7	.7	.7	.8	.7	.7	.8	.8	.7	.2	.4	.3
120	.7	.7	.7	.7	.7	.6	.7	.7	.7	.1	.4	.3
144	.7	.7	.7	.7	.7	.6	.7	.6	.7	.1	.3	.3
168	.7	.7	.7	.7	.6	.6	.7	.6	.7	.1	.3	.2
192	.7	.7	.7	.7	.6	.6	.7	.6	.7	.1	.2	.2
216	.7	.7	.7	.6	.5	.6	.7	.6	.7	.1	.1	.2
240	.7	.7	.7	.6	.5	.6	.7	.5	.7	.1	.1	.2

Height Data



Height and Weight Graphs



(where Group 1 is occlusive, Group 2 is emollient, and Group 3 is humectant)



Observations



Weight

- + As time progressed, the rate at which the JELL-O lost its mass increased. The control group lost an average 97.5% of its weight over ten days, whereas the occlusives (the best performing group) lost an average of 15.5% of their mass over the course of the same ten day period.

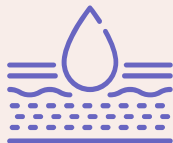
Height

- + Height stayed consistent until about 120 hours (5 days), then gradual decreases in height were noted. The control group loss an average of 75% of their height, whereas the occlusives lost an average of 12.5% of their height over the span of ten days.

Summary

Conclusion

In conclusion, the experiment showed that the occlusive moisturizer was the most effective at keeping the skin moist. This may be due to the fact that occlusive moisturizers create a barrier on the skin, preventing water loss and locking moisture in, while humectant and emollient moisturizers may not be as effective at maintaining hydration in the long term.



Continuations

Building off of this experiment, future studies could explore the effectiveness of different combinations of moisturizer types to determine if a synergistic effect exists in maintaining skin hydration. Furthermore, studying the long-term effects of occlusive moisturizers on skin health and barrier function could provide valuable insights into their potential as a skincare solution. Overall, these continuation experiments could further our understanding of how to best care for and protect the skin.

