Student Reflections:

I'm passionate about this because everyone uses some type of cosmetic whether that be makeup, sunscreen, lotion, deodorant, etc. Depending on the brand, a lot of these cosmetics may have shark products within it, however, a small percentage of consumers actually read the label of the product. Without the proper knowledge of squalene many will overlook the ingredient and purchase the product anyway. The higher the demand for the cosmetic product the more sharks will suffer for their livers. In addition, there is a lot of stigma around sharks. The media portrays them as machines, not living, breathing beings that actually do really improve the health of our aquatic ecosystems. Sharks clean our ecosystems by eating the diseased fish and they also maintain the food chain. If sharks (top of the food chain) were to go extinct, the food chain would collapse leaving bigger fish to prey on smaller fish and mollusk species eventually driving them to extinction. As well, all of the diseased fish would contaminate the waters killing or spreading diseases to other species and possibly humans too.

I would love to hear the opinion of the many brands (Fenty, Neutrogena, Aveeno) that continue to use squalene as an active ingredient with some of their products. I would like to discuss why they use squalene and if they understand that they are using squalene. Sometimes CEOs of major cosmetic companies hire scientists and company leaders to construct and create new products with new formulas. There is a chance that they may be using squalene as an ingredient and the CEO is unaware (mostly unlikely).

Continued on top of next page...

Raising Awareness About the Impacts of Squalene on the Well- Being of Individuals, Societies & the Environment!

Alexa Osterman

Grade 12 Chemistry

Cawthra Park Secondary School

Abstract

Before humans inserted themselves into the aquatic food chain, sharks were at the top maintaining balance and playing a crucial role on this earth. For hundreds of millions of years (even before the dinosaurs!) sharks have been shaping our underwater ecosystem and creating a foundation for life in all parts of the sea. Now with 95% of shark populations decreasing everywhere our health and the planet's health is at major risk. Shark livers contain an oil so hydrating and rich all cosmetic companies want to get their hands on it. This simple substance, also known as squalene, is found all around the world in the form of cosmetics (lotions, anti-wrinkle creams, sunscreen, foundations) and daily off the shelf supplements. With the serious lack of education about what's in our cosmetics, it makes it scary to think that almost all of us have been absentmindedly plastering on prehistoric predators on our body in the name of beauty.

Introduction

Squalene is an organic molecule that consists of 30 Carbons and 50 Hydrogens, scientifically named 2,6,10,15,19,23- Hexamethyl tetracosane (PubChem, n.d.). Although it is seen as a simple compound, Squalene plays a role within the cosmetic industry. Like cholesterol, it is secreted through the skin and is important in the Skin Surface Lipid (SSL) film that protects the body from the external environment (Examine.com, 2018, Para 1). Its fatty acid composition is a key moisturizing agent and is sourced mainly from endangered sharks. Of the 60 shark species fished

Continued from previous page...

As well, I would like to see if they would be willing to either stop using squalene altogether or switch to the more expensive option which would be transitioning to plant based squalene. In addition, I would like to know what their views are like when mentioning the environmental impacts shark livering has on aquatic ecosystems.

The hardest part about the primary research process was gathering enough data from multiple age groups. Because I was primarily looking at squalene in cosmetics, it's safe to say that people of all age groups use some form of cosmetics whether that be lotions, deodorant, makeup, or creams. By gathering information from those who are 40+ it would have been interesting to see if they have used products such as Estee Lauder, Dove, and L'Oreal before they stopped using squalene in 2008. As well, most of the time squalene is found in anti-aging/wrinkle creams. This extra information would have helped me with my action plan, as I would have been able to have a better understanding of those who are considered to be a more mature audience (how I would go about creating a platform to target/educate the older audience about squalene and its impacts).

My favorite question asked those taking the survey "which brands of cosmetics do they use or purchase".

Continued on top of next page...

for their oil, 26, including the *leaf scale gulper shark*, are listed as vulnerable to extinction by the International Union for Conservation of Nature. The removal of shark liver, better known as shark livering, is a practice that targets multiple deep-water shark species. Deep-sea sharks are particularly vulnerable to overfishing as they are slow-growing, long-living and produce few young (Roth, A., 2008). The excessive targeting of these sharks has caused dramatic population declines of certain species like some of the gulper and dogfish sharks which live over 3000 feet below sea level. Some components from liver oil are also used in alternative medicines for healing wounds and reducing pain. Although shark-sourced squalene can be found in other types of consumer goods, such as vitamin supplements and vaccines, as much as 90 percent of shark squalene produced is sold to cosmetic (Roth, A., 2008). Sources that focused on the health benefits of squalene (cosmetics, pharmaceutical, cancer related, food) demonstrated all of the ways squalene benefited human beings in more ways than one. Some websites that were pro-squalene including *examine.com* actually encouraged people to use products, medications, food containing squalene as it would better their lifestyle.

In fact, those who are prone to certain types of cancer are encouraged to take squalene supplements and eat food that contains squalene. With many of these sharks being targeted for their fins (100 million sharks killed every year for their fins), the race to ban ALL shark products from being used within many well-known industries increases. The issue for manufacturers is that plant alternatives possess significantly lower quantities of the oil. It takes more effort to harvest plant-based squalene and, as a result, costs around 30% more. These two factors - price and potency - make shark squalene the most desired source in the market, and act as a driving force behind the continuation of shark livering (Sharkwater Extinction, 2018).

Study

Before diving into my primary research, I already had two questions come to mind. The first asked, how educated are people when regarding squalene? As well as, do people really know what's being used in their cosmetic products? These questions assisted in the formation of eight survey questions that were accessible to the public. Although the goal for the number of people participating in the survey was not reached, 44 different individuals were able to participate. The questions ranged from asking about age to how well respondents know what's in their cosmetic products. However, the top 3 questions that had the most interesting results included:

- "Which age range applies to you?"
- Do you know what squalene is?
- Which brand of cosmetic do you regularly purchase? Example: L'Oréal, Estée Lauder, Dove, etc.

Questions #2-8 were answered by 44 people, and the findings were rather interesting.

Continued from previous page...

Because there is extremely limited information on the web about brands that use squalene within their products, I had to do some deep searching myself to see if the products people use, actually contain squalene. It was a very time-consuming job, but it turned out to be very rewarding, as I discovered that some very well-known brands did use squalene within some of their popular or "most sold" products. In addition, I feel this question and the results shocked people the most, due to the fact that when I was presenting and showed my audience which brands contain squalene, almost everyone either raised their eyebrows or looked down. The shocked look on their faces confirmed that squalene is not a topic people know or speak about, many came up to me afterwards saying that they felt bad because they have used multiple brands that contained squalene. What made me ecstatic was the fact that some made an effort to ask which brands did not include squalene which I was happy to answer, but this just goes to show that when people are educated on a topic they will make an effort to make sure they are doing the right thing.

Findings

It was predicted that most of the people doing the survey would be around 15-19 years of age (teenagers), due to the fact that the survey link was posted and shared with Cawthra students. It was also surprising to see that there were a couple people who were between the ages of 20-30 as well as 40+. Gathering information from different age groups was difficult yet beneficial because it's always good to have different opinions, especially since some people have had more life experience and have seen more trends that have happened within society. The difference that age groups can make was reflected in other questions such as "which products have you purchased within the last year". There were more people who have bought lotions and makeup (younger teenagers) while there were very few people who said they have bought anti-aging, anti-wrinkle cream (older age groups). The older age groups as well may have used products in the past that use to have squalene as an active ingredient (L'Oréal, Estee Lauder, Dove). Therefore, collecting this data will help educate those who have or may have used products containing squalene, making them aware of this compound and where it may be found. When asking "do you know what squalene is?", unsurprisingly, almost 90% of those who did the survey were not familiar at all with squalene. As well, they were unable to determine where squalene is found. Only three people in total had either been extremely or very familiar with squalene.

Do you know what Squalene is?

Answered: 44 Skipped: 0

Figure 1: Data collected from the public is represented through a bar graph, showing their knowledge about squalene

When was the last time you checked the label on your cosmetic product?

Answered: 44 Skipped: 0

Figure 2: Over 50 % of those who did the survey have never checked their cosmetic labels

Student Reflections:

When researching brands that still use squalene in their products to this day, I was unable to find specific details. The only information I could find that related to cosmetic brands and squalene, were articles that discussed the fact that well-known brands such as L'Oreal, Estee Lauder, and Dove no longer use squalene in their products. I found it very interesting that brands would only share the positive information about their products and would rarely mention ingredients that they used (unless completely organic and plant based). I myself had to go on a website (EWG.ORG) and search each individual brand and sometimes product, just to see if they used squalene or not. It did take me awhile but eventually I was able to make a list of brands that still use squalene (or its cosmetic form squalane) to this day.

I chose these two actions because after I collected all of my data from my primary research, I noticed two things. The first being that people are very unaware of this topic. In the website I would state which product specifically uses squalene and over time I would continue my research and add to the page. The second portion of my action plan is to convince brands that may use or no longer use squalene, to input a little product label on the packaging or container that states that there were no shark products used within the formula of the product itself. I myself have already created the simple design (see Prezi).

The question regarding different products (specific brands) was the most interesting. Using the website <https://www.ewg.org/skindeep/>, I was able to search each of the 26 brands (through a long lengthy process) that were given through the survey. I was then able to see every single ingredient used. Out of the 26 brands, 10 including Anastasia, Aveeno, Fenty, Tarte and Too faced (5 well-known brands) had products that included squalene or its cosmetic form, squalane. If the three cosmetics that use to include squalene as an active ingredient (Dove, L'Oréal, Estee lauder) were included with the 10 that presently use squalene in their products, then half of the products listed on the survey would include squalene. This implies that there is a very large population that either knows about these brands or buys their products. People who are uneducated about squalene seem to not recognize the oil if it is stated on the products ingredient list. In fact, when asked when the last time they checked labels on cosmetics, more than half of the people doing the survey have never checked the label on the cosmetic brands they purchase. This can be extremely dangerous due to the fact that there are some compounds and chemicals used within products that can be very harmful to one's respiratory system, skin etc. In respect to squalene, those who do not read the ingredients will be unaware of this compound if it is used in the product. Thus, contributing to the environmental impact squalene has on our aquatic ecosystem.

Action Plan

The action plan chosen was comprised of two parts: building a website and secondly, creating a product label. These two actions were chosen because of the noticeable trends seen within the primary research.

The first trend showed that people are very unaware of squalene, what it is, where it is found, and how it impacts the environment. The website includes information that discusses what squalene is, the difference between shark oil squalene and plant-based squalene, and a page that has the name of the brands that use squalene within their products will be included. This specific page will be constantly updated with all products containing squalene, and as time goes on hopefully fewer products will be added.

The second portion of the action plan consists of reaching out to well-known brands such as Neutrogena, Fenty, Too Faced etc. via email. The purpose of this is to convince brands that may use,

or no longer use, squalene to potentially input a little product label on the packaging or container that states that there were no shark products used within the formula. I myself have already created the simple design (see embedded photo above). Its main purpose is to help the customer identify that the product does not use shark products without having to read the long list of ingredients.

Conclusion

In 5 (or 10) years, I hope to see more cosmetic brands either discontinuing all products with squalene (or at least making an effort to) or switching to plant based squalene which is a much faster renewable resource. This will hopefully lessen the amount of deep-water sharks that are being killed yearly for their livers, and hopefully we will also see shark populations beginning to increase slowly but steadily. On a more personal note, I plan to do multiple excursions in the future that will allow me to travel around the world and work with scientists to gather data on specific shark species that are being targeted for their fins and livers.

References:

Characterization of shark liver oils. (2003, October 14). Retrieved from <https://www.sciencedirect.com/science/article/pii/S016578369290041Q>

Examine.com. (2018, October 01). Squalene: Proven Health Benefits, Dosage, and more. Retrieved from <https://examine.com/supplements/squalene/>

Meikle, J. (2008, January 30). Face cream firms stop using shark liver oil. Retrieved from <https://www.theguardian.com/environment/2008/jan/30/conservation.wildlife>

Roth, A. (2018, July 23). There Might Be Shark in Your Sunscreen. Retrieved from <https://www.nationalgeographic.com/animals/2018/07/sharks-news-cosmetics-squalene-health/>

The Deadly Truth About Squalene & Squalene. (n.d.). Retrieved from <https://axiologybeauty.com/blogs/our-blog/everything-you-need-to-know-about-one-of-the-cosmetic-industrys-deadliest-ingredients-squalene>

There's a Shark In my Lipstick?! | Sharkwater Extinction. (2018, October 04). Retrieved from <https://www.sharkwater.com/help-save-sharks/theres-a-shark-in-my-lipstick/>