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Is it possible for Izuku Midoriya to inherit All Might's powers by consuming his hair?

Authors (Michael Omoaka)

Natural Sciences (Life and Physical Sciences), School of Biological Sciences, University of Leicester

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Abstract

This paper researches the scientific link between hair and DNA. This paper attempts to investigate the possibility that Izuku Midoriya inherited his superpowers by consuming his teacher's hair. The paper will identify the biological factors of hair DNA. Based on the evidence from this study, it is impossible to gain power by consuming one's hair due to the acid in the stomach which breaks down the DNA into small molecules and the pH for the small intestine is between 6-7.5 which is hard to break the bonds in the hair molecular which is the keratin.

Keywords: Hair; DNA; Manga; TV; Digestive system; My Hero Academia; One for All; Biology

Introduction

'My Hero Academia,' is a manga production written and illustrated by Kōhei Horikoshi. The series is based around a Japanese society of superhero students, known as the quirks who possess a variety of powers such as increased strength and speed. However, the main character Izuku Midoriya (also known as Deku) belongs to 20% of the population who was born without a Quirk [1]. His goal is to become a superhero and attend the premier Japanese training school for the next generation of superheroes, U.A. High, run by the most powerful Quirk named All Might. The turning point for the protagonist begins when the two characters became friends, and All Might sees the passion in him to become a superhero. He then decided to pass on a Quirk power named, *One For All* to Midoriya by getting the Quirkless protagonist to consume some of his DNA via eating a strand of his hair [2]. This results in Midoriya inheriting All Might's powers and attending U.A. High. The aim of this study is to explore the possibility of obtaining powers by consuming someone's hair that contains DNA.

History of One For All and All For One

One For All has been passed down for nine generations, growing stronger with time. Yoichi was the origin of *One For All* and was the younger brother of All For One, who is a powerful villain [3]. He believed that Yoichi did not have a Quirk even though he was passing down powers to another person. *One*

For All was formed from the fusion of his given Quirk and the power stockpiling Quirk has forced upon him. Yoichi has a strong sense of integrity and did not stop fighting his evil older brother from doing bad deeds. The younger brother tried to end his older brother, All For One with his new Quirk but wasn't strong enough to do so [3].

For that reason, he had no choice other than to pass down *One For All* to his successor, hoping one day someone in the future would be strong enough to stop All For One [4]. The only way to get *One For All's* power is for the person obtaining it to accept that they want to pass it on to someone else. All Might decides to pass on his power to Deku by eating his hair which will allow him to inherit his power.

DNA

Deoxyribonucleic acid (DNA) is a long molecule that usually exists as a pair of strands that are held tightly together [5]. It is the hereditary material in humans and all living organisms and nearly every cell in a human body have the same DNA. The DNA is in the cell's nucleus, which is called nuclear DNA, but it can also be found in the mitochondria (mtDNA). Mitochondria are organelles located in cells that are the sites of energy production [11]. The image (figure 1) shows the DNA is stored as a code made up of chemical bases, Adenine (A), Guanine (G), Cytosine (C) and Thymine (T). The DNA consists of 3 billion

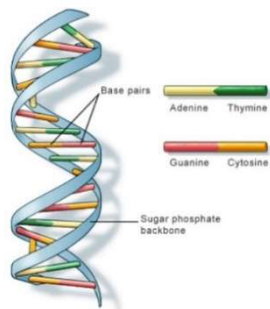


Figure 1 – DNA that is formed of a double helix attached to a sugar-phosphate backbone [5].

bases and the sequences, of these bases, determines the information for maintaining and building an organism [5]. DNA can replicate itself. Each strand can serve as a pattern for duplicating the sequence. This is vital when the cells are split because the cells must have a pattern sequence of the DNA present in the old cells. Perhaps this is why All Might instructed Deku to eat a strand of his hair since the DNA will start to duplicate in his system.

Hair

The hair on the top of your head is a keratinous filament that grows out of the epidermis (figure 2). It is mainly made of keratinized cells which is a protective and important structural function that is located in the epithelium [6].

A strand of hair is located in an epidermal penetration of the dermis called the hair follicle. The hair follicle secures each hair into the skin and forms its base from the hair bulb [7]. The hair bulb has living cells that divide and expand to build the hair shaft. Blood vessels nourish the cells in the hair bulb and send hormones that modify hair growth [7].

What kind of DNA can be produced from hair?

The hair grows outwards from the root. It is located under the surface of the skin and the roots contain nucleated cells and nuclear DNA which are produced from the root's hair. The hair grows when the roots are divided and reproduced [8]. During this process, the roots are then filled with protein keratin and eventually, their nucleus and genetic material within it are degraded and the cell breaks.

The three bonds that create Keratin protein are disulphide, hydrogen, and salt bonds. The Hydrogen and salt bonds are weak and can be broken down in the digestive system, whereas the disulphide bonds need a much stronger base to break it down or a

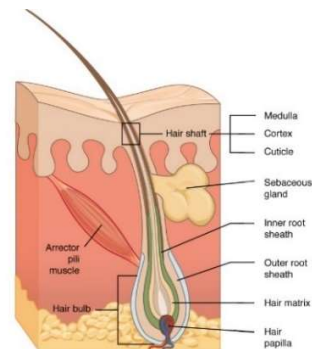


Figure 2 – Shows the hair follicles that are in the epidermis [6].

specialised hydrolyse, which our digestive system does not produce [9]. While our small intestine is basic to the pH level of 6-7.5, it is very difficult to break down those bonds. This is the case of Deku not being able to get powers as it is hard to keep the DNA to reproduce when being digested because the small intestine has a high level of pH which will instantly break the weak bonds and the red blood cells won't be able to circulate around its system.

Can we inherit powers by eating someone's hair?

The simplest answer to this question is no it is not possible to obtain powers from eating someone's hair. DNA is not transferable by ingesting people's hair. When ingesting the DNA, the stomach acid breaks it down into small molecules which effectively destroys the DNA. Moreover, DNA is not stable when it is not inside a cell. To prevent DNA from breaking down, it can be transferred by another organism such as a virus [10]. Incorporating All Might's DNA into a virus could be a good option as it is protected by the virus envelope. Therefore, instead of Deku digesting the DNA, All Might could extract the DNA from the hair follicle and incorporate it into a virus that could be directly injected into Deku; therefore the DNA would not be broken down, resulting in Deku inheriting his power.

Conclusion

Overall, it is not possible for Izuku to inherit All Might's powers by eating a strand of his hair due to DNA being destroyed in the digestive system which breaks the DNA and will not affect his genetic makeup. The strand of hair will be just left in his intestine as it is hard to break the bonds due to the strong packed protein (keratin). Instead All Might could his DNA and incorporate into a virus but this is not an ideal way as Deku could possibly get huge side effects depending on the virus.

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