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ROOTS TO ROOTS

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America's #1 Hair Scientist

What Ethnicity Shows About Your Hair



Roots to Roots: What Ethnicity Shows About Your Hair
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Hair Wellness, Hair Science, Cosmetic Science, Beauty Advice

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“Before I met Crystal, I was in a hair slump – breakage, dullness and blah. Crystal’s pointed questions led to simple and methodical changes. Crystal put me at ease with her respectful and nonjudgmental demeanor. It has been 8 months now and my hair has grown to lengths that I have not been able to achieve since I was in college. I usually do my hair myself but when I do visit the salon, I will be able to know if they do something that is not for me and request services that I need. I couldn’t ask for more insightful and honest advice – it works! Thank you!”

Nicole W. – Bolingbrook, IL

“During the colder months, I suffer from dandruff and flaking. I consulted Dr. Porter and she suggested incorporating an ingredient in my shampoo that has helped the problem tremendously. Thanks Dr. Porter! Your insight ended my quest to solve my problem through expensive trial and error product purchasing.”

Kenneth P. – Chicago, IL

“I enjoy experimenting with colors from blond to red to dark brown. Of course, coloring makes my naturally unruly hair even more dry and brittle. Dr. Porter recommended that I add the extra moisture that my hair craved. My hair is healthy, shiny and manageable. I now know what to convey to my stylist and it feels great to know what she does to get my hair to feel so great. I feel like I can relate to [my stylist] now. Thank you for your knowledgeable advice!”

Yelena D. – Buffalo Grove, IL

“I have a client with scalp flaking. We had been able to control the unseemly appearance from flaking but she still suffered from itching. Crystal was able to recommend a solution that, unlike other anti-dandruff remedies, is not drying and left the hair soft and supple. My client and I are very happy with her advice. Having guidance from Mane Insights definitely helped to keep my client coming back.”

Angie P. – Aurora, IL

Roots to Root: What Ethnicity Shows About Hair

Introduction

From an anthropologist viewpoint, hair is seen as a thermal regulator. But, to the layman, hair is an expression of oneself. Hair represents our ideas of beauty, health and wealth. It is political, social and emotional. Our hair makes us stand out or allows us to blend in. For many of us, the perception of beautiful hair is based on outside influences that direct our styles and grooming practices. We want whatever is fashionable, whether it's cut, color or weave. However, wanting and obtaining are two different things. In the world of hair, styles and maintenance are largely influenced by inherent biological and mechanical properties. Ethnic variations and structural characteristics create unique hair types. So, when considering that must have hair style on a magazine cover, one must also consider their individual hair story.

For most of us, this isn't easy. In the world of hair, this means that your individual hair story is wrapped up in a group of similar stories. Most of which are based on visual clues. Are you curly, kinky and coarse? Well, your story might be entwined with another curly, kinky story even if it's based on fine strands. How can this be? Historically, it has been the job of scientist to understand natural phenomenon by looking for trends and similarities that allow the organization of large groups into smaller sub groups for study. Early attempts to classify hair were mainly based on race, namely Negroid, Caucasoid and Mongoloid.¹⁻³ In more recent times, hair classifications have become a combination of race and ethnicity. Still, most research has been focused on Black, Caucasian and Asian.^{4,5} As a result, the term ethnic hair has been used to describe many different hair types. Some consider ethnic hair to be "afro" hair, some consider any non-Caucasian hair to be ethnic and still others feel that it is simply curly, kinky hair. The fact is, nothing about hair is that simple. Any of these definitions of ethnic hair does not encompass the full range of hair types just in the Black hair community, let alone begin to include multiracial individuals.

So, where do we begin? When we think of ethnicity, we think of not only racial similarities, but also cultural, religious, tribal and linguistic origins and background. By looking at the properties of hair from different ethnicities, we get a better understanding of the scientific components that influence hair. Looking at the differences in hair in cultures that are historically vegetarian or traditionally keep their hair covered when outside allow us to provide more specific, individualized information to create a personalized hair story.

Evolution of Curl

One of the first things we notice when looking at hair of different ethnicities is the variety in the degree of curl. The potential importance in the degree of curl forces us to consider why the difference exists. How did it evolve? What does it mean scientifically? Remember that we talked about hair as a thermal regulator? Well, anthropologist and other scientist have attempted to explain variations in hair curliness using the predominate theory of the evolution of the relatively hairless man.^{6,7} This theory is based on thermoregulation, sweating and the body's ability to cool itself, i.e. the loss of body hair allowed for more efficient cooling of the body.

However, this is not the case for head hair. It is believed that hair provided protection against UV radiation. Millions of years ago, as humans started to evolve into different races, tightly coiled hair became prevalent in the hotter, equatorial climate. The theory further suggests that the more tightly curled hair provided efficient cooling by providing a layer of trapped air between the scalp and the environment. This facilitated more efficient sweat evaporation than straight hair. While there is still debate on the evolution of curly hair, it is evident that ethnic origin plays a large part in discovering more about an individual head of hair.

Is curly hair nature or nurture? We know that over the generations humans have existed, our bodies have adapted to our environmental circumstances, and these evolutionary theories are based on that knowledge. However, there are also natural theories related to the differentiation in curly hair. Early research suggests a relationship between follicular shape and geometry of the emerging hair fiber.⁸ It is now thought that the configuration of hair is based on the geometry of the follicle from which it grows.⁹⁻¹² That is, curved follicles continue to produce curly hair, regardless of the in vitro dermal environment. Yes, the bulb exerts control over the process. So, when applying straightening techniques and other procedures to the visible hair follicles, you can understand how the bulb continues to grow from its origins.

Biology

Biology exerts significant control over hair, both in the differentiation in curl pattern as mentioned above and in the length of hair. There have been several studies done on hair growth patterns that include parameters for growth rate, density and telogen (the resting phase of hair follicles) count over the last five decades. In one of the most comprehensive studies, growth rate and density of telogen hairs from a worldwide sampling of individuals native to various countries were examined.¹³ In this study of over 1600 men and women, growth rates were determined to be between 0.8 centimeters/month to 1.3 centimeters/month with an inverse relationship between growth rate and degree of curliness. The lowest growth rate was observed for curly African hair and the highest for straight Asian hair. Now, whether the growth parameters are related to ethnic origin or

degree of curliness that is controlled by the follicle, or both remains a question for debate. However, there is certainly a basis for the belief that curved hair follicles have a slower growth rate. And, those individuals with ethnic backgrounds in which hair is curlier will probably agree.

Biology aside, one of the main qualifications for most people in assessing healthy hair is purely cosmetic. Everyone wants to hear, *your hair looks so healthy*, whether or not that's true is often irrelevant. For those who simply want to achieve the look of healthy hair quickly, knowing the value of hairs' surface properties is important.

Aesthetic Attributes

The most common consumer indicator of hair wellness is shine. Hair shine is a standard measurement in the cosmetics industry. Optical properties of hair are important to understand from both qualitative and quantitative perspectives. The shine in hair, that can either be simply perceived or accurately measured, is based on the amount of specular and diffuse light that is reflected towards the detector (human eye or another measuring instrument). Its intensity is related to hair color, surface properties and the geometry of the hair.

In the world of optics, lighter and brighter colors on flat dense surfaces reflect more light so they appear to be shinier. In this case, blond hair would seem to be in line to be considered naturally shiny. However, with hair, darker colors usually appear shinier than those that are lighter. We've all seen a woman with gorgeous thick, shiny black hair! Why is that? When light enters through lighter hair fibers, it is scattered off interior irregularities and diffuses which diminishes shininess. The amount of diffusion of hair decreases in darker hair due to the fibers absorption of light, thereby increasing the amount of shine.^{14,15} Therefore, hair from the Scandinavian region, which has a large population of people with blond hair, is perceived to be less shiny when compared to hair with darker pigments like those from African and Asian descent.

Color aside, the most noticeable difference in hair is its geometrical appearance. Asian hair is typically straight, circular in cross section and has a thick diameter that is fairly uniform along its length. Natural African hair is on the opposite end of the spectrum in that it is curly, elliptical in cross section and is relatively thinner with more variability along its length. Caucasian hair is usually between these two extremes. Imagine a typical straw for Asian hair and an oval shaped crazy straw for African hair. The extreme difference in this geometry is important to understanding the need for individual attention to each in order to obtain healthy hair.

Individual attention and appreciation of the hair is important because these extremes are just that – extremes. While many are able to embrace these generalities in geometry and curl from the most commonly compared ethnic groups, the world is much more diverse.

Adjectives such as straight, curly, wavy, frizzy and woolly that have been used in the past can be confusing and often inaccurate because of their subjectivity. In addition, the reference to racial groups can sometimes be an issue because it is inadequate when describing curl in hair.¹⁶ The development of a curl classification that uses single fiber measurements to quantify the degree of curl in hair with no reference to race, ethnicity or subjective terminology has led to more objective research.^{17,18}

The classification system objectively measured curl diameter, curl index, number of twists and number of waves from single fibers and averaged the results from four fibers from each individual's head in the ensuing study. After the results were processed, eight (8) distinct curl types were identified from straightest to curliest. Type I was the straightest and type VIII was the curliest (Figure 1). There are trends that indicate that the majority of people within the subgroups of Asian and African countries have curl types that are typically more straight or curly, respectively. However, there are always exceptions. Because of mixed heritage, there is still a need to further define distinct curl types of populations with a wide curl distribution. On the whole, these measurable geometric hair attributes, that are based on genetics added to the different cultural perception of beauty influence how different people of the world, particularly women, chose to care for their hair. Keeping this biology and geometry in mind, let's discuss these grooming practices and hair care.

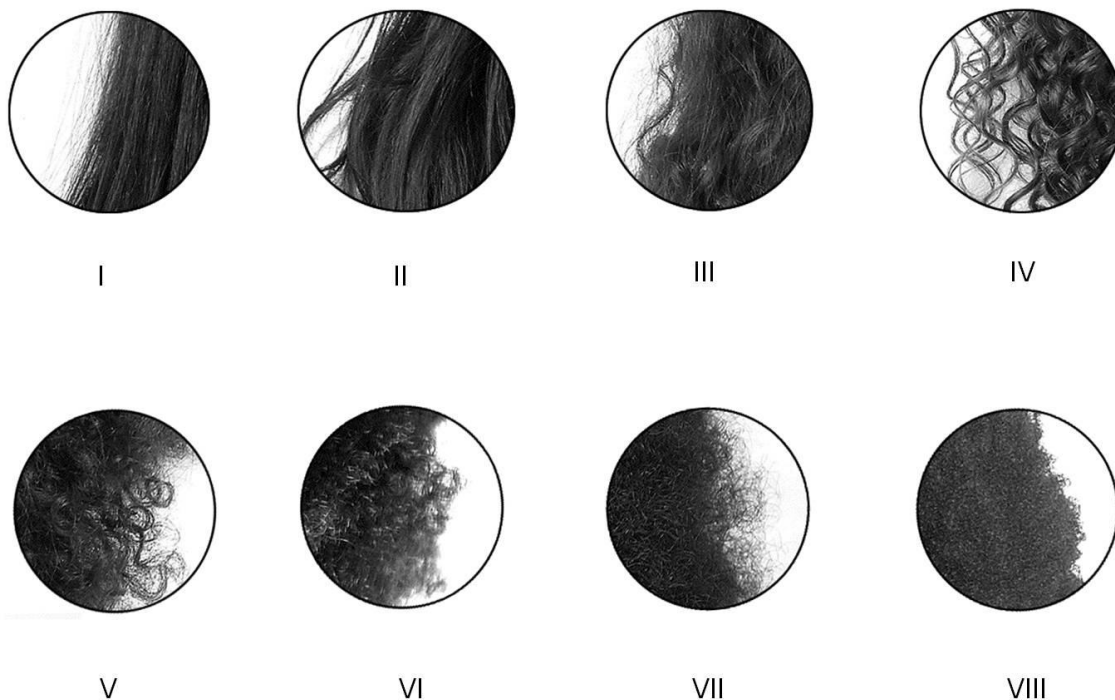


Figure 1: Curl classification types to differentiate the degree of curl in hair.

Grooming

We know that curl pattern, cultural styles and tools all contribute to how we groom our hair. From an ethnic standpoint, there are varying techniques, tools and products that differentiate hair types. How often hair is washed, whether oils are used, etc. are often dictated by culturally expected norms.

Asian

Straight hair styles are extremely popular within the Asian culture. Of course, this is likely due to the natural conformation of hair from that region that is relatively straight. Many Asian women gravitate toward their hair's natural tendency, thus, the straight style remains popular and desired by the population. In fact, despite the natural inclination of the hair to be straight, there is a desire to achieve "super" straight hair styles. To achieve this look, women use a blow dryer in conjunction with a hair brush. Or, for "controlled" straight hair, where all fibers are uniform, women use this heated technique or a flat iron after application of a thiol treatment to permanently straighten the hair. A little less than one-third of the population use thiol treatments to add permanent waves for curl and style versatility. Also popular are color treatments that add flair to straight styles.

When considering hair of Indian origin, it is often an extension of personal care. Beautiful hair of this culture is portrayed as long, dark, thick, shiny tresses. To help achieve these desired attributes, women use natural oils, especially olive oils, as they are thought to be the best for the hair and scalp. Natural elements and treatments are important to women of this culture. Even in the use of hair color practices, henna, a natural hair coloring, is prevalent, while other types of coloring agents are not widely used as they are thought to be unnatural and bad for the hair.

European/American (Caucasian)

The Caucasian population exhibits a variety of hair styles that are tailored toward personality, season and fashion trends. Change is common. Experimentation with length, color and curl are all important parts of hair maintenance. This ethnic group uses the most types of products in grooming. From thiol treatments to change curl pattern, to flat irons for a straight look and mousses and gels for sculpture, styles can change at any moment. Overall, as long as the hair appears healthy and has shine and body, any look is widely accepted.

Hispanic

This group of people, as defined by the US Census Bureau, represent those from Mexican, Puerto Rican, Cuban, Central American, South American or other Spanish culture or origin. This grouping is unique in that they can be of European or African descent and thus, they have a wide range of cultures and styles. Overall, people of Hispanic origin

prefer longer hair and are comfortable in casual styles such as ponytails and other styles that gather the hair up. If worn, loose, the hair is generally worn straight. However, when the inherent hair is curlier, as in Latin and South America, there is more versatility in the styles and preferences.

Brazilians have a unique culture that celebrates diversity that is evident in their embracing of various hair processes and treatments. This is largely due to the extreme variation in curl types. This variety influences the products and tools used when styling Brazilian hair. Those who do not choose to chemically alter their hair's natural curl pattern often use thermal appliances or resin-based styling products to temporarily effect change. Regardless of how the natural hair is physically manipulated for styling, anti-humidity products are always used. Environmentally, the humidity in the tropical climate influences the use of these products. For those who wish to have long lasting straight hair styles, a thiol-based Brazilian treatment or relaxers, which are hydroxide-based treatments, are often used. Despite the natural or chemically created differences in curliness, a common cultural theme is the desire to have long tresses that are accented by color.

African descent (North America and Black African Countries)

The most diverse hair grooming practices stem from cultures with the curliest hair (Figure 2). As expected, there is a high need for a variety of practices to manage and maintain hair that can be difficult to control due to its curly nature. Often, maintenance of curly hair (types V – VIII), such as shampooing, styling, product use, processes and treatments, focus on increasing the manageability of curly hair. Differences between curly and straight hair abound. One of the most concrete differences is the desire for oil. While the appearance of oily hair is undesirable in people of Asian and European descent, oil actually aids in the grooming practices of curlier hair types. Oil, when used as a lubricant is essential to curlier hair types to decrease friction and tangling. Thus, curlier hair types generally shampoo their hair less frequently to avoid dry, brittle and unmanageable hair. After it's shampooed, curly hair is often manipulated in the wet state for easier detangling.



Figure 2: Examples of common hair styles for people of African descent. A) cornrows, B) micro-braid hair extensions, C) twists, D) curly hair extensions, E) locs and F) relaxed style with color highlights

For those who want to maintain their hair's natural curliness, there are many creative styles, such as plaits, cornrows and twists that can last from a week to a month. One can even choose to *lock* their hair, which is to intentionally entangle sections of hair so that they are contained in configurations known as 'locs'. When keeping the natural curl, heat implements such as flat irons or hot combs can be used to straighten the hair temporarily. Much like with naturally looser curls, these styles can be reversed under humid conditions or when they come in contact with water. A more permanent method of straightening the hair is through a relaxer, a widely-used treatment for ease of manageability. This process can be used in high concentration to completely straighten the visible hair or in a lower concentration that lessens the curl without removing it. Regardless, both techniques permanently alter the visible hair.

Hair extensions and weaves are popular with this ethnic group. Since the natural quality of hair is important to some, extensions are a way to change styles or textures without chemicals. Natural hair is braided in a protective style and purchased real or artificial hair is added to create longer lengths, color or volume. Also, this technique is considered as a

way to give natural hair a break either when there is a history of treatments and processes that can damage the hair or the desired style would be detrimental to overall hair health.

Common Problems

Just as the grooming techniques of various ethnicities differ, so do the perceptions of hair damage. In most cases, hair structure and culture, the same things that influence grooming practices, also dictate hair problems. Across the board, dryness is an issue. No matter the culture or ethnicity, dry, brittle hair is unacceptable as it leads to breakage and lack of manageability. Everyone wants luxurious, shiny tresses!

If we are culturally specific, we see that beliefs and practices are inherent in the causes of damage. In Japan, the top two concerns are dryness and change in color. Because of the cultural desire for straight hair, the consistent use of heating implements and other environmental effects that dry and discolor hair are evident. In India, women complain about dryness as it relates to lack of shine. This issue could be remedied by the use of conditioners and leave-in products, however cultural beliefs in these perceived unnatural elements prevent their use. The demand for extreme lengths of hair also makes detangling a priority for these women. In Brazil, where humidity and frizz are a constant factor, products that moisturize the hair such as oils, paraffins and waxes are commonly used to define curl.

Hair challenges are not only country specific, but specific within ethnicity. Ethnic groups surveyed within the US were asked to report all of their hair problems and indicate which was the most bothersome. While all but 6% of the 1200 participants responding indicated they experienced hair problems, the number and type of problems varied. On average, the women reported four (4) hair issues most often with breakage, split ends and dry scalp leading the way with more than 30% each. However, across ethnicities, the most important concern varied.

African-Americans – breakage and dry scalp

Caucasians – gray and no-body

Chinese – split ends and dandruff

Mexicans – split ends and too frizzy

Even while not geographically specific, the pattern of problems reported is consistent with the historic origin and biology of the hair in its ethnic group.

Interestingly enough, African Americans and Mexicans reported a higher number of problems on average. In fact, 29% of African Americans reported that slow growth was a significant hair issue, while 9% said it was their biggest problem. This correlates well with

studies that indicate a slower growth rate for hair with a higher curl pattern as in African and African American hair.

Hair Manipulation

In addition to grooming practices and style, the way in which hair is manipulated has much to do with its perception of growth, presentation and overall health. Not only does the manner in which hair is manipulated with a comb or brush a factor, but the environment and curl type also influence the process. It takes more energy and a greater amount of force to comb through curly hair—much more so than straight hair. If not done with the proper consideration, combing and brushing can attribute to continuous damage.

When considering combing or brushing curly hair, we can go back to the biology of the hair fiber. Due to the inter- and intra-fiber entanglements prevalent in curly hair, forcing the comb or brush through the hair can cause breakage. Since we know that humidity and moisture allows the curl to loosen, curly hair that is wet is more pliable. However, you should still be careful! Wet, curly hair can also be more compromised due to a weakened surface. Pulling through tangles in this weakened state can cause breakage. Conditioners used to lubricate the cuticle, the outermost component of the hair, are important and can help prevent damage. When curly hair is properly moisturized and the curl is relaxed, tangles untwist more readily and the impact of force from a comb or brush is decreased significantly.

The same can't be said for straight hair. Wet straight hair can be more difficult to comb. Straight hair becomes more volumetrically compact when wet and the hair fibers tend to stick together. The force needed to comb and separate the fibers is much higher than when the hair is dry and the fibers are loose (Figure 3).

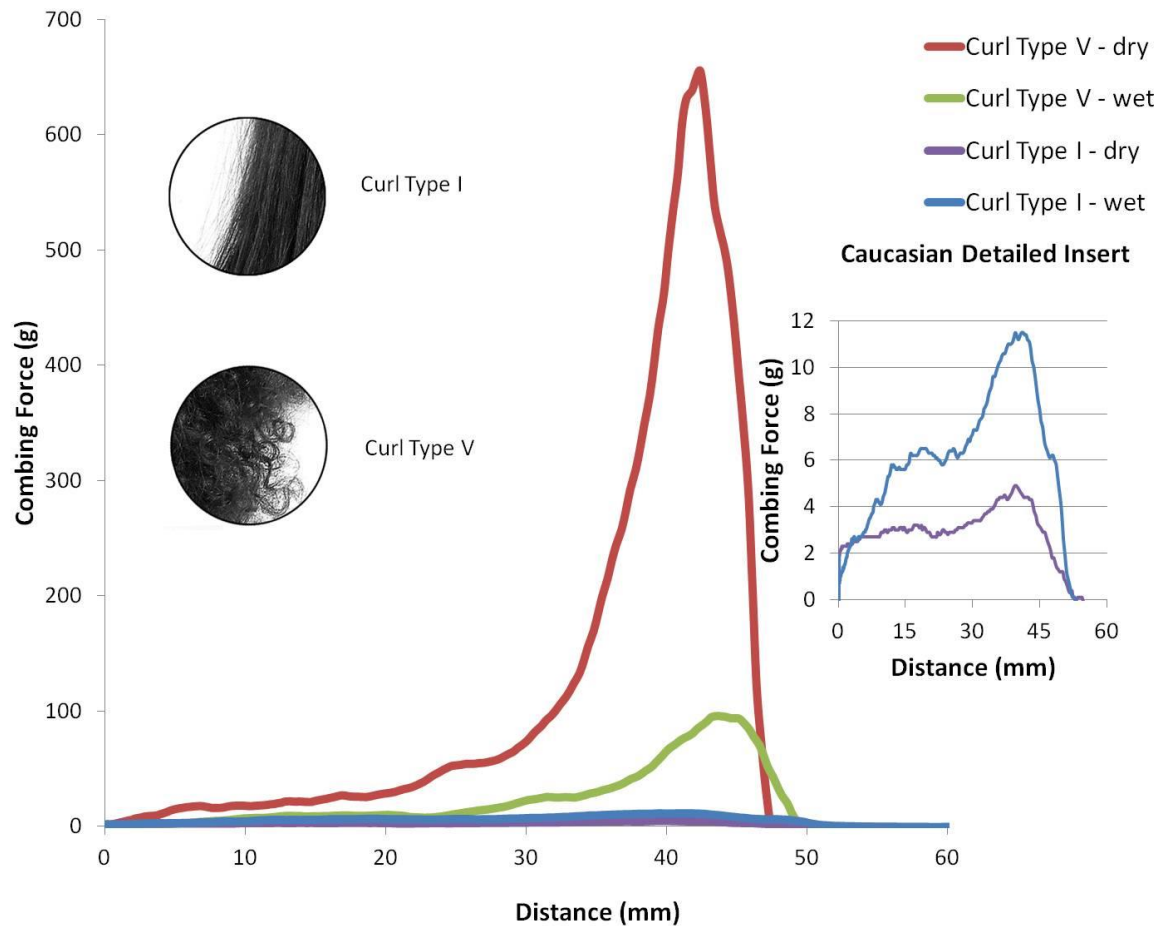


Figure 3: Combing force profiles for straight and curly hair.

The less interaction between the hair fibers, the less damage made from combing and brushing. These combing differences show how the practice of manipulating curly hair when wet and straight hair when dry increases manageability and lessens breakage for each type. In either case, gentle handling is still vital to overall hair health.

For many women of African descent, relaxer treatments are used to obtain a straight look. The relaxer treatment alters the mechanical integrity of the hair and allows for the use of less combing force when hair is either wet or dry. Of course, by changing the mechanical integrity of hair with a relaxer, hair is weakened. Many women of African descent have chosen to revert back to their natural, untreated hair. While for many this is a simple style decision, for others, it is based on the inherent strength of their natural hair. However, when considering the original and biological characteristics of curly hair, we are faced with the curly hair paradox:

Which is better to prevent breakage?

Making hair straight with a relaxer which weakens its fibers, but requires much less force to manipulate

Or

Keeping strong natural curly fibers that require more force to comb and manipulate?

When both types of hair swatches, relaxed and natural, were used in an experiment, the results were on target with our thoughts. The first day of combing naturally curly hair resulted in the largest amount of breakage, which gradually decreased as the days of combing increased. This type of breakage was not observed in the treated straightened hair. Because the straight hair had less of a propensity to tangle compared curly hair, it was much easier to manipulate and less likely to break during combing. In addition, results showed that non-lubricated relaxed hair was less likely to experience breakage than lubricated natural curly hair (Figure 4).

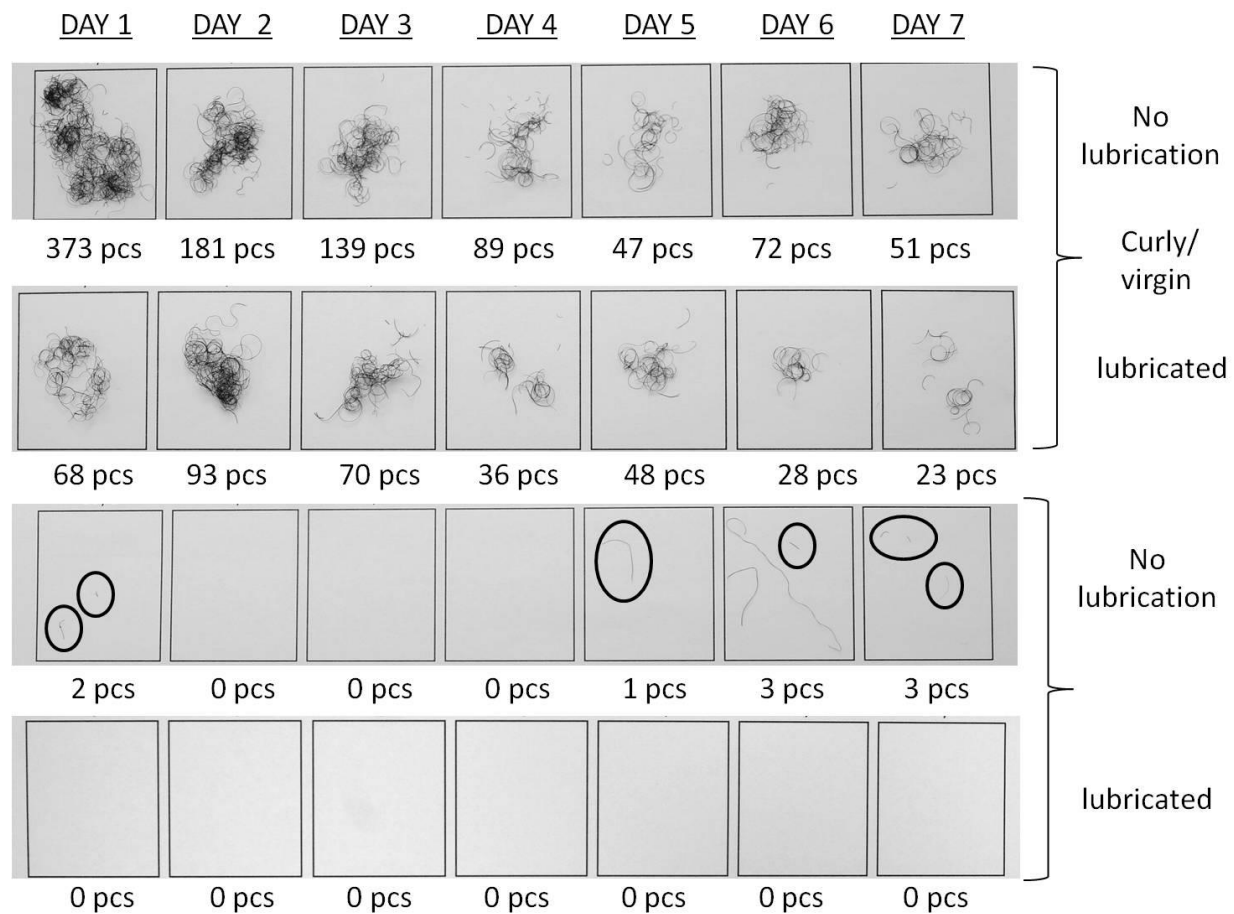


Figure 4 Example of resulting hair fiber breakage for one out of three hair swatches. Hair was subjected to combing 100 times per day at a rate of 1.4 passes/second. Virgin and Relaxed hair was lubricated with 0.08 and 0.05 g of a hair product, respectively. All initial hair swatches 250 mg in mass and 7 cm in length.

This experiment supports the theory that degree of curl is the predominant factor in reducing combing force and lessening breakage. Even though curly hair in its natural, untreated state is physically stronger, it does not reduce breakage when combing more

than relaxed straight hair. Therefore, grooming practices and curl type must be considered when determining appropriate hair care treatments.

Further still, despite the strength of natural curly hair, it is still considered weak in comparison to the most commonly studied ethnic groups. Of the three most studied, hair strength increases as follows: African descent, Caucasian and Asian (Table 1).

Table 1 Typical physical characteristics of hair from different ethnic groups. Numeric values are expressed as mean \pm confidence interval (CI) at 95%. Ellipticity = maximum/minimum diameter.

	Cross-Sectional Area ([μm]² \pm CI	Ellipticity \pm CI	Break Stress (MPa) \pm CI	Typical Colors
Asian (n=173)	5063 \pm 179	1.29 \pm 0.03	209.7 \pm 2.5	Dark-brown, Black
Caucasian (n=171)	4079 \pm 170	1.41 \pm 0.03	202.3 \pm 2.2	Blonde, Red, Brown, Dark-brown
African American (n=251)	4210 \pm 122	1.66 \pm 0.02	189.3 \pm 2.0	Dark-brown, Black

The fragile nature of hair of African descent has been seen in fatigue studies. In these studies, hair is subjected to repeated relatively-low tensile forces and the number of cycles until the hair breaks down is recorded. Results from these tests show that the chance of breakage was higher for hair classified as Afro compared to that of Caucasian.¹⁹

Physical Characteristics

Studies on the effect of ethnicity have gradually been expanded to include more ethnic groups where curl classification have been determined. The ethnic groups and distribution of curl from one study can be seen in Table 2.

Table 2 Curl type and ethnic distribution for natural hair assessments. Note: Numbers within each curl type are not representative of the population distribution within their respective countries.

	Type II	Type III	Type IV	Type V	Type VI	Type VII	Type VIII	Total
Caucasian American	5	21	16	0	0	0	0	42
Brazilian	2	26	48	30	26	12	1	145
African American	0	0	3	50	7	15	0	75
Jamaican	0	0	0	10	32	7	1	50
Ghanaian	0	0	0	0	22	10	3	35
Liberian	0	0	1	2	26	4	1	34
Kenyan	0	0	0	2	29	9	7	47
Total	7	47	68	94	142	57	13	428

The results in Figure 5 reveal that strength in hair increases as Kenyan < Liberian = Ghanaian < Jamaican = African American < Brazilian < Caucasian American.

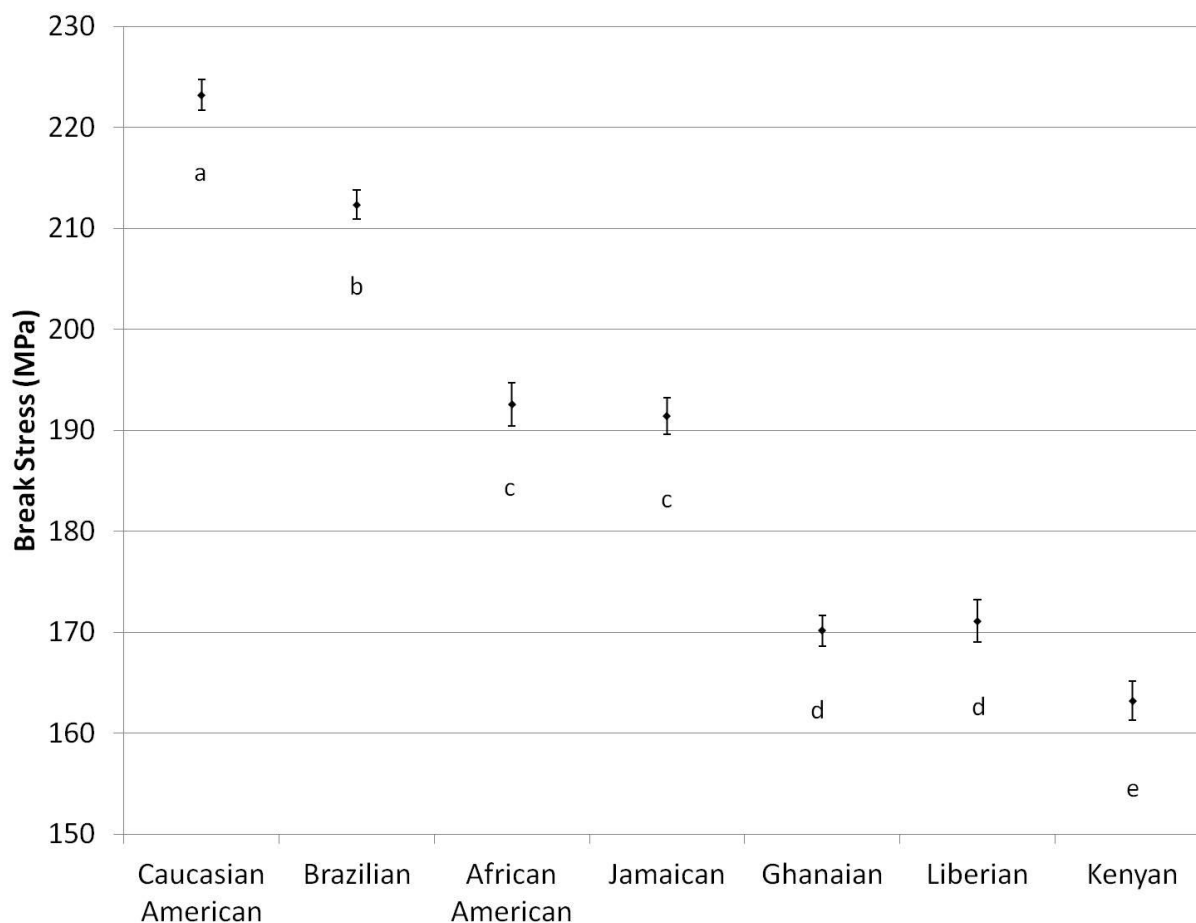


Figure 5 Break stress of hair according to ethnicity; mean \pm confidence intervals at 95%; ethnic groups with the same letter designation are statistically the same; results are from 428 subjects and 21,400 fibers.

Just as ethnicity affects curl classification, it also influences the geometrical properties of hair. As expected, Caucasian hair was the least elliptical, followed by Brazilian. All hair from African descent was the most elliptical. Further observation of physical properties from the same study indicated that curl types II through IV were the strongest, while types VI through VIII were the weakest. Curl type V was the thickest. When the degree of curl deviated more or less from this type by becoming looser or curlier, the value of hair thickness decreased.

Summary

What does this mean for you? The properties of hair have been studied for decades and while great strides have been made in the relationship of biology, origin and structure of hair, the fact remains that hair still needs to be individually assessed. There are certain things that we know that aid in the process of honing in on general issues based on ethnicity, curl pattern, etc; however, the most accurate measurement for an individual is still the study of their particular hair fiber. The knowledge of an individual's ethnic origin, environment, grooming practices and combining that with a scientific knowledge of hair's

inherent structural properties and relationship to chemicals, food and environmental triggers is vital to a complete understanding of their hair.

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