



HIDRADENITIS SUPPURATIVA—PAINFUL BOILS THAT AFFECT MUCH MORE THAN SKIN

Ayodeji Ajayi^{1,2*}, Jillian Richmond², Ginette A. Okoye³ and Angel S. Byrd^{3*}

¹Department of Dermatology, Georgetown University School of Medicine, Washington, DC, United States

²Division of Dermatology, Department of Medicine, University of Massachusetts Medical School, Worcester, MA, United States

³Department of Dermatology, Howard University College of Medicine, Washington, DC, United States

YOUNG REVIEWERS:



BENJAMIN

AGE: 15



BREANNA

AGE: 12



CHI LOK

AGE: 12



GWENTH

AGE: 12



RICHARD

AGE: 15

There is a good chance that you know about acne, commonly known as pimples. But you may not be familiar with hidradenitis suppurativa (HS)! HS is a skin condition that can resemble acne in its early stages, but it has unique features that evolve over time, leading to chronic inflammation deep in the skin. HS causes painful bumps called boils in areas with many sweat glands and hair follicles, such as the armpits. Some patients may experience uncontrollable body odor because of their inflammation. The cause of HS is unknown, but there are many educated guesses as to what contributes to HS. The physical, mental, and emotional pain caused by HS makes its treatment complex. The goals of this article are to increase awareness and understanding of HS, and to empower people living with HS and those who care about them.

SEBACEOUS GLANDS

Oil producing gland and sebum.

Figure 1

The skin has three layers and contains sweat glands, sebaceous (oil) glands, and hair follicles (Figure created with BioRender.com).

HIDRADENITIS SUPPURATIVA

A condition characterized by inflammation of sweat glands and formation of pus.

HAIR FOLLICLE

The root or deepest part of the hair.

BOILS

A swollen area within body tissue and containing pus in the upper layer of the skin.

INFLAMMATION

Redness, swelling, and pain.

ABSCESS

A swollen area within body tissue and containing pus in the deeper layer of the skin.

OVERVIEW OF THE SKIN

The skin is the largest organ in the body, and it is made up of three layers (Figure 1). The skin also contains hairs, sweat glands, and oil glands (also called **sebaceous glands**). The major functions of the skin include protection from outside elements such as the sun or infections; production of sweat and oil; temperature maintenance; fat storage; synthesis of vitamin D₃; and sensory functions, like feeling touch, heat, and texture [1].

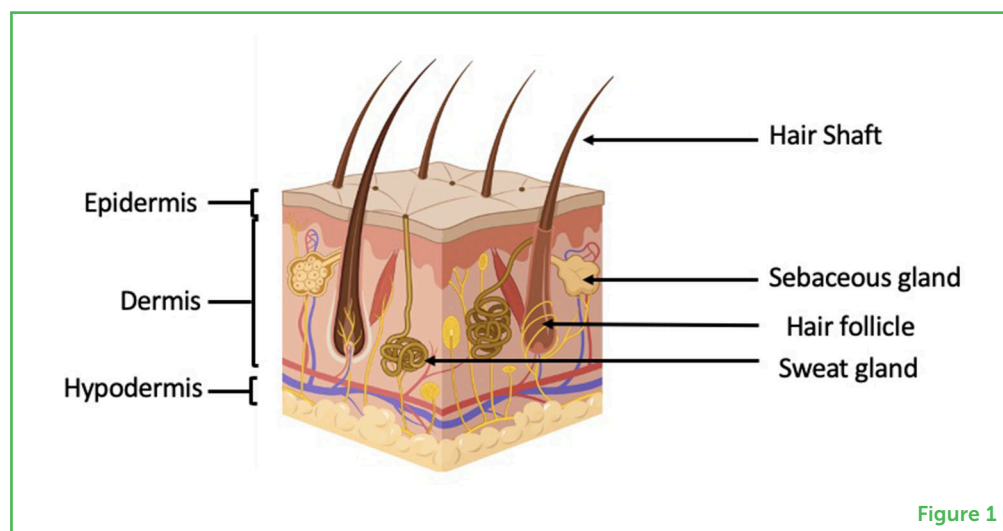


Figure 1

WHAT IS HIDRADENITIS SUPPURATIVA?

While you have probably heard of acne, you may not have heard of **hidradenitis suppurativa** (HS). HS is an inflammatory condition that affects the sebaceous glands and sweat glands in the skin, as well as the hair root, called the **hair follicle**. These structures are deep in the second layer of the skin, the dermis (Figure 1). The glands and/or hair follicles can get infected and form bumps under the skin. Sometimes they get clogged by proteins and fats that are normally made by the glands and hair follicles. The clogged follicles and glands cause **boils** (big bumps) to form. The body tries to fight this infection by activating its army—the immune system. Some of the “soldiers” overreact and cause damage to the skin. As the **inflammation** spreads, the bumps connect with each other and form a ropy network of debris within the skin [2]. When the body tries to heal, scarring occurs. Figure 2 shows the progression of HS inside the skin.

In its early stages, HS can look like acne, forming small red bumps on the skin. As it progresses, it can cause pus (dead white blood cells), **abscesses** (swollen areas within body tissue, containing pus), odor, inflammation, tunnels under the skin, scars, and impaired movement [3]. HS can be mistaken for other conditions, including ingrown hairs, herpes (a viral infection), or classic boils. The difference is that HS is a

Figure 2

HS has three stages, called Hurley Stages 1–3. Stage 1 is the mildest and stage 3 is the most severe (Figure created with BioRender.com).

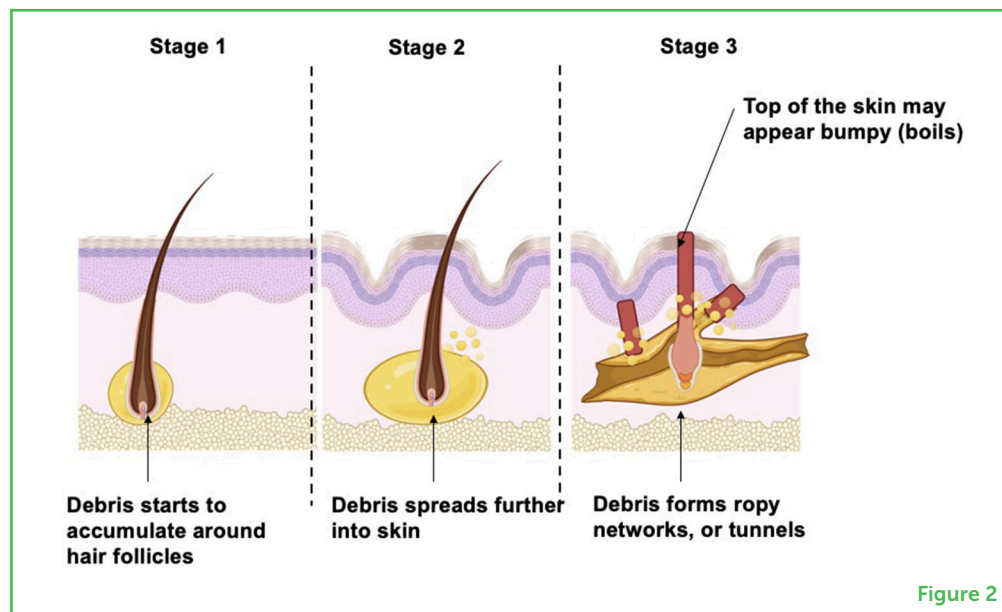


Figure 2

CHRONIC

A condition that lasts a long time.

chronic condition that often does not respond to the treatments used for these other conditions.

HS affects 4 in 100,000 people [4], and it can affect kids, teens, and adults. The average age of onset is 12.5 years, coinciding with the onset of puberty [5]. HS affects more females than males and tends to “flare” or get worse before menstrual periods, suggesting that hormones may play a role in HS. For unknown reasons, rates of HS are higher in African Americans compared to other races [5]. People with a family member who has HS have an increased risk of developing the condition, indicating a possible genetic cause. HS is not contagious, meaning that you cannot catch it from being in contact with someone who has it, and it cannot be passed on to others. HS is not due to poor hygiene and doctors have not found any specific products (soaps, deodorants, lotions) that can trigger HS. Like other inflammatory diseases, it is likely that HS can be triggered by different things in different people.

HOW IS HS DIAGNOSED?

Presently, there are no laboratory tests that can diagnose HS. Instead, diagnosis is based on a physical examination. Doctors identify HS by how the boils look, their locations, how frequently the boils come and go, and whether they leave scars [2]. There are three stages of HS, from mild to severe, known as Hurley Stages 1, 2, and 3 (Figure 2).

POTENTIAL CAUSES OF HS

The exact cause of HS is unknown, but there are several hypotheses. One possibility is that genetic mutations (changes in the DNA

blueprints in our cells) increase the risk of HS [6]. Another idea is that the immune system overreacts to bacteria normally present on the skin [6]. Researchers have found differences in the types of bacteria present on the skin of people with HS compared to people without HS [6]. Byrd et al. discovered that higher numbers of immune cells called neutrophils and B cells, and higher amounts of the substances these cells make, result in more severe HS [7]. Smoking is one of the biggest environmental risk factors in HS [6, 8, 9]. If HS patients can quit smoking, they can improve the course of their HS. Smoking increases inflammation, which is why doctors think it contributes to HS. These are only a few of the proposed causes of HS. Many researchers are dedicating their time and resources to identifying the main factors involved in HS and how they interact to cause the condition.

HOW IS HS TREATED?

Treatment of HS depends on the stage. The goal is to treat the current episode and stop new boils (Figure 3) from forming. Pain management is one of the biggest challenges for individuals with HS [8, 9]. Over-the-counter pain medication, like aspirin, Advil® or Tylenol® can help. Doctors can drain the boils to help relieve pain and reduce the risk of infection [6]. Doctors can treat infected HS boils with topical (on the skin) and oral antibiotics. Sometimes bleach baths with diluted bleach are also recommended. This kills bacteria and can reduce the number of HS boils. For severe HS in people over 12 years old, strong anti-inflammatory medications can be prescribed. The next level is laser treatment and surgery. With lasers, doctors can destroy the hair follicles and decrease the development of protein plugs. Laser treatment also helps prevent the growth of the ropy network. In severe cases, surgery to drain the pus from the boils might be the best approach.

Figure 3

A patient with HS, located in the armpit. Photo: Courtesy Dr. Ginette Okoye.



Figure 3

HOW DOES HS IMPACT THOSE AFFECTED?

HS can affect mental wellness, so it is important to make sure people living with HS have the social support they need. Many people have not heard about HS. Individuals with HS often do not discuss the condition because they are worried about being accepted, or whether others will even know what HS is. Presently, there is no cure for HS and treatment options are limited. The cycle of boils, abscesses, and rope networks causes scars. The smell can cause feelings of shame. Making and keeping friends might be difficult, which affects self-esteem [9]. Boils in the groin affect participation in sports or other activities because friction on the inner legs from walking or running can cause pain and discomfort [9].

Living with HS may impact academic performance, due to school absences during flares or because of doctor's appointments. The impact of all these difficulties can cause increased anxiety, depression, and suicide risk in individuals with HS [8].

To create a supportive environment for your peers who are living with HS, it might be helpful to talk to your school health provider and your teacher about what HS is. Efforts to increase awareness of HS have led to creation of support groups that can make life easier for people living with the condition.¹ Now that you are knowledgeable about HS, its causes, treatments, and mental and social impacts, you can be more compassionate to your peers who might be suffering from HS. Even better, you can spread the word about this condition, to empower others to support people with HS, too!

¹ One such support group is hopeforhs.com.

ACKNOWLEDGMENTS

We thank HS patients for their perseverance through this difficult disease.

REFERENCES

1. Marieb, E., and Hoehn, K. 2010. *Human Anatomy and Physiology, 8th Edn*. San Francisco, CA: Pearson Education.
2. Saunte, D. M. L., and Jemec, G. B. E. 2017. Hidradenitis suppurativa: advances in diagnosis and treatment. *JAMA*. 318:2019–32. doi: 10.1001/jama.2017.16691
3. *Common Misdiagnoses of Hidradenitis Suppurativa*. Available online at: <https://hsdisease.com/misdiagnosis> (accessed March 29, 2022).
4. Garg, A., Lavian, J., Lin, G., Strunk, A., and Alloo, A. 2017. Incidence of hidradenitis suppurativa in the United States: a sex- and age-adjusted population analysis. *J. Am. Acad. Dermatol.* 77:118–22. doi: 10.1016/j.jaad.2017.02.005
5. Garg, A., Kirby, J. S., Lavian, J., Lin, G., and Strunk, A. 2017. Sex- and age-adjusted population analysis of prevalence estimates for hidradenitis suppurativa in the

- United States. *JAMA Dermatol.* 153:760–4. doi: 10.1001/jamadermatol.2017.0201
6. Seyed Jafari, S. M., Hunger, R. E., and Schlapbach, C. 2020. Hidradenitis suppurativa: current understanding of pathogenic mechanisms and suggestion for treatment algorithm. *Front. Med.* 7:68. doi: 10.3389/fmed.2020.00068
 7. Byrd, A. S., Carmona-Rivera, C., O'Neil, L. J., Carlucci, P. M., Cisar, C., Rosenberg, A. Z., et al. 2019. Neutrophil extracellular traps, B cells, and type I interferons contribute to immune dysregulation in hidradenitis suppurativa. *Sci. Transl. Med.* 11:eaav5908. doi: 10.1126/scitranslmed.aav5908
 8. Thorlacius, L., Cohen, A. D., Gislason, G. H., Jemec, G. B. E., and Egeberg, A. 2018. Increased suicide risk in patients with hidradenitis suppurativa. *J. Invest. Dermatol.* 138:52–7. doi: 10.1016/j.jid.2017.09.008
 9. Choi, E., Ting, O. X., and Chandran, N. S. 2020. Hidradenitis suppurativa in pediatric patients. *J. Am. Acad. Dermatol.* 86:140–7. doi: 10.1016/j.jaad.2020.08.045

SUBMITTED: 24 September 2021; **ACCEPTED:** 22 December 2022;
PUBLISHED ONLINE: 20 January 2023.

EDITOR: [Bergithe Eikeland Oftedal](#), University of Bergen, Norway

SCIENCE MENTORS: [Bingyun Li](#) and [Ronald Yu](#)

CITATION: Ajayi A, Richmond J, Okoye GA and Byrd AS (2023) Hidradenitis Suppurativa—Painful Boils That Affect Much More Than Skin. *Front. Young Minds* 10:782192. doi: 10.3389/frym.2022.782192

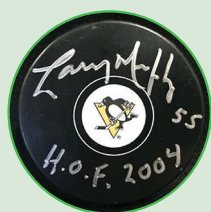
CONFLICT OF INTEREST: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

COPYRIGHT © 2023 Ajayi, Richmond, Okoye and Byrd. This is an open-access article distributed under the terms of the [Creative Commons Attribution License \(CC BY\)](#). The use, distribution or reproduction in other forums is permitted, provided the original author(s) and the copyright owner(s) are credited and that the original publication in this journal is cited, in accordance with accepted academic practice. No use, distribution or reproduction is permitted which does not comply with these terms.

YOUNG REVIEWERS

BENJAMIN, AGE: 15

When I was introduced into this world, I first lived in an apartment with my dad and mom. Life was great, I had no responsibilities to take care of. Three years later, my sister joined us. After 5 years, I left that apartment to live in a house. This was also when I was introduced to hockey. When I started my middle school, we moved into a giant house, after that our life has been going smoothly.

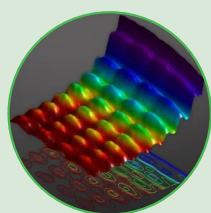


**BREANNA, AGE: 12**

Hello! I am a sixth grader! I am very funny when I am with friends. I like watching movies and I read books when I am bored. I like drawing and I love watching on my phone. I have a brother, a helpful mom and dad, and my best friend dog. My house has a surrounding of many trees and beautiful birds. My favorite foods are ice-cream, banana bread, and pasta. I like being myself!

**CHI LOK, AGE: 12**

My name is Chi Lok, and I am twelve. I have an interest in science, maths, cybersecurity, and coding, and like to spend my free time reading and playing piano. I am the medal winner of ICAS Science, champion of national cybersecurity competition, reviewer for Frontiers for Young Minds, and have published several science articles in Australian Mensa Journal TableAus.

**GWENYTH, AGE: 12**

A random year 8 student that likes math and plays hockey.

**RICHARD, AGE: 15**

My name is Richard, I am 15 years old. I enjoy learning about why things are the way they are. I have an interest in building communities and music.

AUTHORS**AYODEJI AJAYI**

Ayo is a recent graduate of Georgetown University who is training to become a dermatologist at Mayo Clinic Florida. She has previously worked as a clinical trial monitor and has conducted research in hidradenitis suppurativa. Her research focus in Dr. Richmond's lab is wound healing and hidradenitis suppurativa. Ayo is interested in improving access to dermatology services within under-resourced communities, and she is interested in tropical and pediatric dermatology. In her time of rest and relaxation, she likes to travel, and experience new cultures. [*ama423@georgetown.edu](mailto:ama423@georgetown.edu)

**JILLIAN RICHMOND**

Jillian is an assistant professor of dermatology at the University of Massachusetts Medical School. She earned her B.Sc. in molecular and cellular biology from Johns Hopkins University and her Ph.D. in immunology and pathology from Boston University School of Medicine. Her laboratory studies the role of the immune system in skin diseases. Jillian is passionate about teaching and mentoring students in the classroom and the laboratory and discovering new treatments for patients through her research. She enjoys spending time with her kids, baking, and gardening.

**GINETTE A. OKOYE**

Dr. Okoye is Professor and Chair of Dermatology at Howard University College of Medicine. Her areas of clinical and research expertise are in cutaneous disorders that disproportionately affect people with pigmented skin, including scarring alopecia, hidradenitis suppurativa, cutaneous T-cell lymphoma, and cutaneous sarcoidosis, as well as health disparities in dermatology. Dr. Okoye earned her Medical Degree from Columbia University College of Physicians & Surgeons and completed her dermatology training at Yale University, where she also served as Chief Resident. Dr. Okoye has been recognized by the American Academy of Dermatology (AAD) with a Presidential Citation and a Volunteerism Award, as well as multiple student and resident teaching awards. She has been the recipient of research grants from the Skin of Color Society and the Dermatology Foundation. She currently sits on the Research Committee of the Skin of Color Society, and serves as an Associate Editor at JID Innovations, and on the Editorial Boards of the Journal of the National Medical Association and the British Journal of Dermatology.

**ANGEL S. BYRD**

Dr. Byrd is an assistant professor of dermatology at Howard University College of Medicine and adjunct assistant professor at Johns Hopkins University School of Medicine (JHUSOM). Born and raised in Edwards and Jackson, Mississippi, she obtained her B.S. from Tougaloo College and M.D./Ph.D. from Warren Alpert Medical School of Brown University. She completed an ethnic skin postdoctoral fellowship at JHUSOM under the direction of Dr. Ginette Okoye. Currently, she is establishing tissue biobanks to understand skin conditions affecting skin of color patients, particularly among African-American patients with hidradenitis suppurativa. Her main research focus is elucidating the roles of neutrophils in inflammation. She continues to “pay it forward” along her journey, devoting time to training and investing in the next generations of scientists and physician scientists as well as engaging in community outreach. She was featured on the BET 33rd Annual UNCF An Evening of Stars® international program, recognizing her as one who is “changing the face of science, one mind at a time.” *angel.byrd@Howard.edu