Sickle Cell Today

USA Health Comprehensive Sickle Cell Center

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TABLE OF CONTENTS

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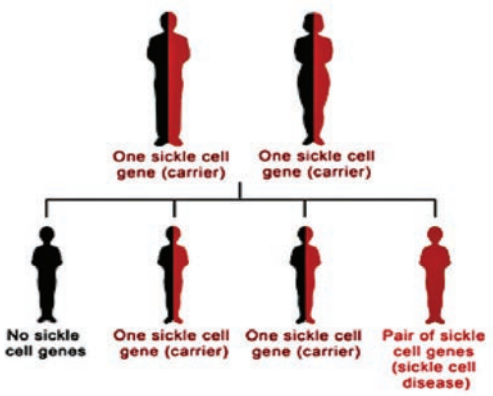
Sickle Cell Disease and Childbearing: A Personal and Individual Decision

Ardie Pack-Mabien, PhD, FNP-BC

Of the 138,000 individuals with sickle cell disease (SCD) in the United States, there are four commonly seen types of SCD: Hemoglobin (Hb) SS (Sickle Cell Anemia), Hb SC (Sickle-C), HbSβ+-Thalassemia (Sickle Beta plus Thalassemia), and HbSβ0-Thalassemia (Sickle Beta null Thalassemia). The Center for Disease Control and Prevention estimates 2,000 babies are born with SCD annually. This disease is an inherited hematological disorder that occurs when both parents are carriers of the sickle gene. SCD can affect every organ in the body, has been associated with severe, recurrent pain crisis, end organ damage, and early mortality. However, mandatory newborn screening for SCD in all babies born in the US, along with immunizations, antibiotic prophylaxis, Hydroxyurea therapy, and screening for stroke have led to a decrease in death rates and improved survival. Babies born with SCD are now living to become adults with the same hopes and dreams as other young adults. These hopes and dreams include the personal and individualized decision of childbearing during the reproductive years.

Although it is a personal and individualized decision, females with SCD who become pregnant may be at risk for both maternal and perinatal complications due to the hormonal and physiological changes



that occur during pregnancy. Potential complications include pre-eclampsia, pre-term or premature labor, intrauterine growth retardation, low birth weight infants, miscarriage and/or spontaneous abortion, acute chest syndrome, increase frequency and/or severity of vaso-occlusive pain crisis, and maternal death.

Couples who are carriers of the sickle cell gene and/or have SCD often have the desire to conceive similar to other young adults. With genetic counseling, prenatal screening, and surveillance by their sickle cell specialist and/or hematologist, primary care provider, and obstetrician, both mother and infant outcomes can be good. A conversation that addresses both maternal and fetal potential risks and chances of having a child with or without SCD or sickle cell trait should be included in the pre-conceptive planning phase. It is important that pre-conceptive

planning by the provider(s) be un-biased, judgmental free, and open, when communicating with the potential parents.

Sickle cell trait is relatively benign. Individuals born with sickle cell trait usually do not have any problems, are asymptomatic, and live a normal life but can pass the sickle gene on to their offspring. Prenatal testing (chorionic villus sampling and amniocentesis) is an option available to parents who wish to find out if their baby will have SCD or sickle cell trait. The obstetrician conducts these tests during the second trimester of the pregnancy. For additional information on genetic counseling, you can visit the U.S. National Library of Medicine, National Institutes of Health @ http://ghr.nlm.nih.gov.

What are some other possible concerns or questions the young adult with SCD and/or sickle cell trait may ponder and should address with their provider when planning a family?

Concerns:

- Because individuals with sickle cell trait usually have no symptoms and are unaware of their sickle cell status, preconception testing of the partners is highly advisable. The results will provide insight into the risk of having a child with sickle cell trait, sickle cell disease, or a child that is normal with no sickle cell genes.
- With the potential for SCD related complications during pregnancy, it is advisable that the female has routine scheduled visits with her hematologist or sickle cell provider in addition to her obstetrician. Close supervision by the hematologist and/or sickle cell provider, obstetrician, and primary care provider is vital for a healthy pregnancy and well-being of the unborn baby and mother.

Questions:

- Can an individual with sickle cell anemia have a child that does not inherit SCD?
  - Yes. However, there is a 100% chance of having a child with sickle cell trait with each pregnancy if the partner does not have sickle cell trait. If the partner has sickle cell trait, there is a 50% or 2 in 4 chance of having a child with sickle cell trait and a 50% or 2 in 4 chance of having a child with sickle cell anemia.
- Can a couple in which both individuals are carriers of the sickle cell gene have a child with sickle cell anemia?
  - Yes. There is a 25% or 1 in 4 chance the child will have sickle cell anemia or 50% or 2 in 4 chance the child will have sickle cell trait, and a 25% or 1 in 4 chance the child will be normal with no sickle cell genes. The chances of a couple in which both individuals are carriers of the sickle cell gene having a child with sickle cell anemia is depicted in the illustration above and possible with each pregnancy.
- If you are not aware of your partners sickle cell status, you have a couple of options:
  - Contact the local Sickle Cell Disease Association of America, Mobile Chapter at (251) 432-0301 for testing and counseling;
  - Your partner can contact his or her primary care provider for testing.
- If an individual is on a disease modifying therapy such as Hydroxyurea, Adakevo, Endari, or Oxbytra for the management of their disease, what should he or she do prior to conception?
  - Individuals with SCD (male and females) who are currently taking a disease modifying therapy should discuss with the hematologist and/or sickle cell specialist about their desire for family planning prior to conception. These therapies are contraindicated during pregnancy or were not studied in pregnant or lactating (breastfeeding) women, and if taken during pregnancy and/or at the time of preconception may cause harm to the unborn baby.
- If an individual is taking opioid analgesics for the management of their sickle cell pain crisis before pregnancy, should this individual continue taking these medications during pregnancy?
  - This will require a discussion with your hematologist and/or sickle cell providers who can explain and discuss the risks and benefits of these medications and aid you in making an informed decision about your health, and the health of your unborn baby. Studies suggest there is a link between taking opioids for pain management regularly during pregnancy and the risk that the unborn baby will develop withdrawal symptoms after birth, known as neonatal abstinence syndrome.
- Are there other medications that a female should be concerned about when preparing for a family?
  - Yes. Medications that should be avoided are:
    - Nonsteroidal Anti-Inflammatory Drugs, i.e., Naproxen, Advil, Aleve, Motrin, Ibuprofen, Mobic, and Toradol.

Continued on next page

- Angiotensin-converting enzyme inhibitors and angiotensin-receptor blocker, i.e., Monopril, Lisinopril, and Atacand.

Discuss your current medication regimen and complete list of medications to avoid during pregnancy with your hematologist and/or sickle cell provider and obstetrician.

- As a female with SCD, will I need a blood transfusion during my pregnancy?
  - Your hematologist or sickle cell provider in consultation with your obstetrician will determine the need for blood transfusion.
- How can the frequency and severity of a pain crisis during pregnancy be reduce or limited?
  - Attend all of your scheduled prenatal and hematologist/sickle cell appointments.
  - Drink plenty of fluids to stay hydrated.
  - Avoid caffeinated drinks and sodas.
  - Do not smoke or use illicit drugs.
  - Get plenty of rest.
  - Avoid extreme temperature changes such as hot or cold environments.
  - Take your prenatal vitamins as directed.
  - Only take medications prescribed by your obstetrician, hematologist and/or sickle cell provider, and primary care provider.
  - Contact your obstetrician, hematologist, and or sickle cell provider if you think you are experiencing a sickle cell pain crisis.

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Pediatric to Adult Care Transition Program: Highlighting Continuing Education

T'Shemika Perryman, RN-PACT Coordinator
Cimone Smith, Transition Coordinator, Study Facilitator

The Pediatric to Adult Care Transition Program (PACT) was started in 2012 to bridge the gap between the pediatric and adult healthcare systems for SCD participants between the ages of 13 and 21. The goal of PACT is to not only educate participants on their disease process, but also encourage them to obtain a higher education, even beyond high school, if that is their goals. Despite having a major, potentially debilitating illness, we are seeing our participants not only graduate from high school but also graduating from trade school and colleges.

We would like to congratulate our former PACT participants on their 2021 college graduation:

- Aliyah Moultrie, RN-BSN, University of South Alabama
- Lawrenesha Williams, BS Professional Health Sciences-Healthcare Management, University of South Alabama.

We would also like to congratulate the Class of 2021 PACT participants on their graduation from high school:

Continued on next page

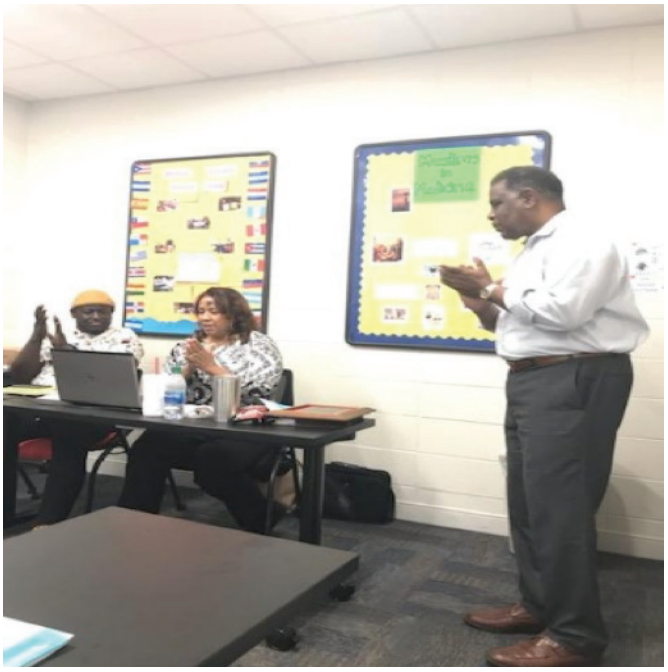
Lawrenesha Williams, BS Professional Health Sciences
Healthcare Management, University of South Alabama

- Jarvis Locke, Monroe County High School
- JaMarcus Landrum, Moss Point High School
- Carlesha Lenoir, Davidson High School.

"emPowering, enAbling, exCellence, Together"

USA Health Annual Sickle Cell Disease Practical Issues XVIII Conference 2021

Felicia L. Wilson, MD, FAAP
Professor of Pediatrics
USA Health Department of Pediatrics
Division of Hematology/Oncology



The mission of the USA Comprehensive Sickle Cell Center is to improve the lives of persons affected by sickle cell disease (SCD) through state-of-the-art clinical care, clinical research, and education. While the COVID-19 pandemic has forced us to use virtual platforms, the Center has continued to equip health care providers with current knowledge and skills to deliver enhanced care and improve the lives of individuals affected by SCD by presenting our annual conference. The conference theme addresses practical issues in medicine that impact the care of patients affected with SCD. Seventy-seven participants, consisting of physicians, PhD's, a Pharm D, physician assistants, nurse practitioners, registered and licensed practical nurses, social workers, and staff registered for the 2021 virtual conference entitled "What's in Your Genes? The Promise of a Cure" on May 15, 2021.

Ardie Pack-Mabien, PhD, FNP-BC, USA Health and Comprehensive Sickle Cell Center, led the conference agenda with "Sickle Cell 101" discussing the basics of SCD, its genetic inheritance, and the four current FDA approved disease modifying therapies. Franklin Trimm, MD, USA Health Associate Dean for Diversity and Inclusion and Assistant Vice President for USA Health Medical Affairs, discussed "Unconscious Bias: Impact on Healthcare". He enlightened participants about the science of unconscious bias, how bias and processes of the unconscious mind can impact critical decisions, and strategies for practicing more conscious awareness. Haidee Custodio, MD, USA Health Associate Professor in the Department of Pediatrics in the Division of Infectious Diseases presented "COVID-19 and Sickle Cell Disease". She highlighted the reasons why patients with SCD are considered high risk for severe COVID-19 disease based on the history of severe influenza in patients with SCD, comorbidities, and thrombogenic effects of both SCD and COVID-19. She also reviewed current data on COVID-19 cases in SCD globally, in the US, and in Alabama regarding comorbidities, hospitalizations, and death by race and ethnicity.

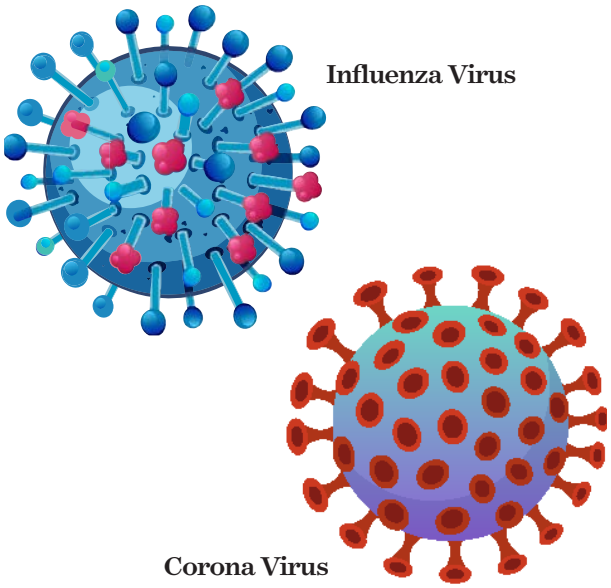
The second half of the conference focused on curative options for SCD. The Dr. Cecil L. Parker, Jr., Sickle Cell Disease Distinguished Lecture was presented by John Tisdale, MD, Branch Chief of the Cellular and Molecular Therapeutics Branch of the National Heart, Lung, and Blood Institute and Director of the Trans-National Institutes of Health Intramural Sickle Cell Program. He lectured on "The Long and Winding Road Toward Molecular Cures of the First Molecular Disease". He highlighted the search for better treatments and a cure for SCD. Dr. Tisdale's clinical trial at the National Institutes of Health (NIH) is using gene therapy to reduce the debilitating complications of this disease. If effective, gene therapy would improve treatment options for individuals with SCD. NIH has a legacy of science addressing the burden of SCD, and it was enlightening to hear about these advances and the promising opportunity for a potential cure. A highlight of the conference was Mr. Lynndrick Holmes' compelling story of "Gene Therapy from a Patient's Perspective". He discussed his life with SCD, and his experience in the gene therapy clinical trial at NIH. He discussed the unpredictable nature of pain crises interrupting school functions, family vacations, and times he spent in the hospital. He discussed how gene therapy has made him free of SCD and how amazing his life is now.

Fred Goldman, MD, University of Alabama at Birmingham, Professor of Pediatrics, Division of Hematology/Oncology; Director, Blood and Marrow Transplant Program, Children's of Alabama Birmingham, presented "Bone Marrow Transplant in Sickle Cell Disease: Updates and Options". He discussed data on the effect of age on the outcome for bone marrow transplant (BMT) in SCD using matched sibling donor, unrelated bone marrow and cord blood transplant for severe SCD. These myeloablative transplants provide the only approved cure for children with SCD, but transplant related early and late morbidity remains a challenge. He then presented data on non-myeloablative conditioning in matched related donor transplants as well as haploidentical BMT for SCD using reduced intensity preparation. He concluded with data showing overall survival by donor type, and data showing that age at transplant correlated with outcome for all donor types. The conference concluded with Tim Townes, PhD, University of Alabama at Birmingham School of Medicine, Department of Biochemistry and Molecular Genetics, Professor Emeritus, Schools of Medicine and Dentistry, Birmingham presenting "Modified CRISPR/Cas9 Gene Editing for Sickle Cell Disease". His laboratory has produced a modified CRISPR/Cas9 complex that can be electroporated into primary hematopoietic stem cells and correct the sickle mutation with high efficiency. His hope is to identify newborns with SCD, collect their umbilical cord blood hematopoietic stem cells, correct the sickle mutation using CRISPR/Cas9, assure the efficiency/safety of the cells, and transplant them back into the newborn baby by 3 months of age. In this approach, the child is cured with their own cells before developing any tissue or organ damage from SCD. He believes this technology is more efficient, safer, and more cost effective than other approaches and is applying to the FDA for approval.

The conference concluded with presentation of Distinguished Service Awards to the guest lecturers, and the Outstanding Service Award presented to Ms. Sherry Parnell. With full participation in the conference, attendees were eligible to receive 7 inter-professional continuing education credits for learning and change. We are thankful for the financial support from the USA Health System, Novartis Pharmaceuticals, Inc., Global Blood Therapeutics, Inc., Medunik USA, and Emmaus Medical, Inc. This support has been vital in keeping the cost of conference registration affordable and enabling the USA Comprehensive Sickle Cell Center to continue providing education for healthcare providers in the communities we serve. We hope to see you at our annual conference in 2022.

Don't Let the Flu Bug Get You Down

Ardie Pack-Mabien, Ph.D., FNP-BC



According to the Centers for Disease Control and Prevention (CDC), the influenza virus infects thousands of Americans each year. From September 1, 2020 through July 10, 2021, CDC surveillance found the percentage of individuals presenting to healthcare facilities with influenza like illnesses was 3.1 in Region 4. This region encompasses Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, and Tennessee. During the last flu season, this was the third highest percentage of individuals presenting to healthcare facilities with influenza like illnesses in the nation.

Additionally, the CDC reported during the 2020-21 flu season there was an estimated 38 million influenza like illnesses, 18 million medical visits, 405,000 hospitalizations, and 22,000 deaths of which 199 were pediatric deaths.

Given these facts from the CDC, the flu virus is one of several highly contagious respiratory illnesses, caused by many different types of viruses, and changes constantly over time. To prevent the spread of the flu virus, researchers review and update annually information to match the circulating flu virus with a vaccine that will provide protection against 3 to 4 viruses that will likely be the most common for the upcoming flu season. For the 2021-2022 flu season, the vaccine will provide protection against four of the most common forms of the virus and be available for those individuals with and without allergies to egg. The 2021-2022 vaccine will provide coverage for influenza A (H1N1 and H3N2) and two of the Influenza B viruses (B/Victoria and B/Yamagata lineage).

Typically, the flu season begins in the month of October, usually peaks in the United States between December and February, and may end between April and May. The CDC recommends individuals start receiving their flu shot during the months of September and October. However, individuals may get the flu shot as long as the flu viruses are circulating. Individuals with the flu often miss days from work or school, pay costly co-pays for medical visits and medications, and may spread the virus to family members, coworkers, and public.

All persons ≥ 6 months of age, unless contraindicated, should obtain the flu vaccine as a measure of prevention. This vaccination is particularly important for individuals who are at an increased risk for severe complications from influenza, or are at higher risk for influenza-related outpatient, emergency department, or hospital visits such as individuals with sickle cell disease (http://www.cdc.gov/flu/about/season/flu-season-2021-2022.htm). It is recommended that you see your healthcare provider to discuss the potential risks and benefits of this vaccine.

Health care providers usually begin offering the influenza vaccine soon after it becomes available and continues through the month of May or as long as the influenza virus circulates throughout the community. Of note, children ages 6 months through 8 years who are receiving the influenza vaccination for the first time should receive two doses of the vaccine at least four weeks apart (http://www.cdc.gov/flu/about/season/flu-season-2021-2022.htm). The vaccine is offered only as an injection (a shot) this flu season and can be obtained from your health care provider, health departments, clinics, urgent care centers, pharmacies, college health services, and employers. See your health care provider sooner rather than later to receive your vaccination. Do not to miss out on the benefits or possible shortage of this vaccine. Please keep this in mind as the availability and supply of vaccinations may be limited due to growing demands by the general public.

No, the influenza vaccine does not cause an individual to develop the flu. However, there are some short-term and mild side effects of the influenza vaccine (http://www.cdc.gov/flu/about/season/flu-season-2021-2022.htm). Additionally, exposure to an individual(s) with the influenza virus prior to receiving the vaccination may increase your risk of developing flu-like symptoms or the flu (http://www.cdc.gov/flu/about/season/flu-season-2021-2022.

htm). Potential side effects of the influenza vaccine include soreness, redness, or swelling at the injection site, low-grade fever, and generalized aches.

Given, the COVID 19 pandemic has not disappeared, the Delta variant of this virus is more contagious, and vaccination rate is below the national average for the state of Alabama, one may have several questions.

First, what is the difference between the flu and coronavirus (COVID-19)?

Both are highly contagious respiratory illnesses that are caused by different viruses. The flu is an infection caused by one of many different types of influenza viruses. The coronavirus is an infection caused by the coronavirus called SARS-CoV-2. Although the symptoms may be similar, there are some noted differences. One noted different is the loss of taste and smell seen in individuals with COVID-19. Another difference is that it may take individuals longer to develop symptoms of COVID-19 than if they had the flu. It may takes between 1 to 4 days to develop flu-like symptoms after being exposed to the influenza virus. In comparison, an individual may develop symptoms of COVID-19 five days after being infected with the SARS-CoV-2 virus. However, COVID-19 symptoms may appear as early as 2 days after infection or as late as 14 days from an exposure. Additionally, an individual with COVID-19 may be contagious for a more extended period of time as opposed to the flu. In general, most individuals with flu are contagious for at least one day before they themselves become symptomatic and are most contagious during the first 3-4 days of this illness but can be contagious up to 7 days. Individuals with COVID-19 can spread the virus for up to 2 days before experiencing symptoms and remain contagious for at least 10 days after the first symptom appear. Because the symptoms are similar, testing may be warranted to confirm a diagnosis. For a complete listing of the difference, you can visit http://www.cdc.gov/flu/symptoms/flu-vs-covid19.htlm

Second, is there a certain amount of time I must wait between obtaining the flu and COVID 19 vaccination?

According the June 2021 CDC press release, there is no minimal interval or waiting period between the COVID-19 vaccination and the other vaccines. However, you should contact your primary care provider for medical advice and further instructions. For additional information on the simultaneous administration of the flu and other vaccines, go to https://www.cdc.gov/vaccines/covid-19/clinical-considerations/covid-19

To help prevent the spread of the flu and COVID-19, the CDC recommends:

- Observe Stay-At-Home or Stay-in-Place orders as mandated by your local officials,
- Practice COVID -19 social distancing and wear a mask as recommended by the CDC,
- Proper handwashing with soap and water for 20 seconds,
- If hand washing is not an option; apply hand sanitizer to your hands and rub for at least 30 seconds,
- Turn your head and cough or sneeze into the sleeve of your elbow or napkin,
- Avoid touching your eyes, nose, and mouth with your hand (washed or unwashed),
- Stay at home if you are sick with the flu or COVID-19,
- Avoid contact with people such as kissing, hugging, sharing food or drinks, and shaking hands,
- Use disinfectant to clean door handles, light fixtures, remote controls, and toys,
- See your health care provider for your influenza vaccination, and contact your health care provider for flu-like or COVID -19 symptoms:
  - Cough
  - Chest Pain
  - Shortness of Breath
  - Sore Throat
  - Runny Nose, Stuffiness or Congestion
  - Fever
  - Fatigue
  - Headache or Body Aches
  - Diarrhea and vomiting although more common in children
  - Loss of taste and smell
- Contact your health care provider to schedule your vaccine.
- Individuals with SCD should speak with their sickle cell provider before obtaining the COVID-19 vaccine to discuss which vaccination is the preferred choice based on your medical history.

Remember, it is better to be ahead of the game than trying to play catch-up!

For additional information about the influenza virus, spread, prevention, and vaccine go to the Centers for Disease Control and Prevention website at https://www.cdc.gov/flu/prevent/index.html

Center of Disease Control and Prevention Travel Advisory

Jessica King, MSN, FNP-BC

The Center for Disease Control and Prevention (CDC) currently recommends that all individuals delay travel within the United States and U.S. territories until they have been fully vaccinated in order to prevent the spread of COVID-19. A person is considered to be fully vaccinated two weeks after they have completed either a second dose in a 2 dose COVID-19 vaccine series, such as the Pfizer or Moderna, or two weeks after receiving a single dose vaccine, such as Johnson and Johnson's COVID-19 vaccine.

In addition, the CDC recommends that individuals whom are considered moderately to severely immunocompromised, aged 65 years and older , residents in longer-term care settings, people aged 18 to 64 years with underlying medical conditions, who are at increased risk for COVID-19 exposure and transmission because of occupation or institutional setting should receive an additional dose of mRNA COVID-19 vaccine after the initial two doses. Please see your healthcare provider to discuss timing of your third dose.

Listed below are examples of moderate to severe immunocompromised conditions:

- Receiving active cancer treatment
- Received an organ transplant and are taking medicine to suppress the immune system
- Received a stem cell transplant within the last 2 years
- Advanced or untreated HIV infection
- Active treatment with high-dose corticosteroids
- Active treatment with drugs that may suppress the immune system such as Hydroxyurea used to treat sickle cell disease

Regarding travelers whom are fully vaccinated, current CDC travel recommendations include the following:

- Wear a mask over the nose and mouth during all public transportation (plane, bus, train, taxi), and while in airports, bus, or train stations,
- Practice good hand hygiene often by either handwashing or using hand sanitizer with at least 60 percent alcohol,
- Practice social distancing – allow at least 6 feet between yourself and others,
- Consider wearing a mask in crowded outdoor areas and during activities with others whom are not fully vaccinated,
- After travel if you are fully vaccinated continue to self-monitor for COVID-19 symptoms such as fever, headache, sore throat, cough, diarrhea, body aches, loss of taste, and loss of smell and if you develop symptoms, isolate and get tested.

Regarding travelers whom are not fully vaccinated and must travel, listed below are the additional CDC travel recommendations:

- Get tested for COVID-19 one to three days before travel,
- After travel, get tested in three-to-five days and stay home and self-quarantine for seven days even if you test negative for COVID-19,
- If you test positive for COVID-19 isolate and self-quarantine to avoid infecting others,
- After travel, if you elect not to get tested for COVID-19, self-quarantine at home for 10 days, and avoid being around individuals whom are at increased risk for developing severe illness for 14 days.

Listed below are some criteria which place individuals at increased risk for developing severe COVID-19 illness:

- Age 65 years and older
- Diabetes
- Chronic lung disease
- Heart Disease
- Stroke
- Chronic kidney disease
- Chronic liver disease
- Cancer and or receiving active cancer treatment
- History of organ or stem cell transplant
- Down's syndrome, dementia, or Alzheimer's disease
- HIV
- **Sickle cell disease or Thalassemia**
- Pregnancy
- Currently taking medications that suppress the immune system
- Smoking
- Obesity

Additionally, the CDC recommends that everyone avoid traveling when sick, have tested positive, have a known exposure, or pending test results for COVID-19. For additional information regarding CDC travel recommendations you may log onto: https://www.cdc.gov/coronavirus/2019-ncov/index.html.

References:

1. Centers for Disease Control and Prevention. (2021, August 25). *Domestic Travel During Covid 19*. Retrieved September 1, 2021, from cdc.gov: cdc.gov/coronavirus/2019-ncov/travelers/travel during covid 19

Proclamation

By the Governor of Alabama

WHEREAS, sickle cell anemia and sickle cell disease, used interchangeably, refer to a group of inherited disorders that affect red blood cells; and

WHEREAS, sickle cell disease is a disease in which a person's body produces abnormally shaped red blood cells that resemble a crescent or sickle and that do not last as long as normal, round red blood cells, which leads to anemia; and

WHEREAS, the sickle cells also get stuck in blood vessels and block blood flow, resulting in vaso-occlusive crises, which can cause pain and organ damage; and

WHEREAS, sickle cell disease is a genetic disorder where individuals with the disease are born with two sickle cell genes, each inherited from one parent; and

WHEREAS, an individual with only one sickle cell gene has a "sickle cell trait," which occurs in 1 out of every 13 African Americans and in 1 out of every 100 Latinos in the United States; and

WHEREAS, the United States Centers for Disease Control and Prevention estimates that sickle cell disease affects approximately 100,000 Americans, and occurs among about one in every 365 Black or African-American births and one out of every 16,300 Hispanic-American births, and it is estimated that 2,500 African-Americans in Alabama have sickle cell disease; and

WHEREAS, while there is no widely available cure for sickle cell disease, one-time gene therapies, including gene editing therapeutic approaches, are being developed and may offer potential cures for some patients;

NOW, THEREFORE, I, Kay Ivey, Governor of Alabama, do hereby proclaim September 2021, as

Sickle Cell Disease Awareness Month

in the state of Alabama.

Given Under My Hand and the Great Seal of the Office of the Governor at the State Capitol in the City of Montgomery on the 17th day of September 2021.

Kay Ivey

Kay Ivey, Governor

Make a gift to the University of South Alabama Comprehensive Sickle Cell Center

I am a: (Please check all that apply) ❑ Friend ❑ Parent ❑ Grandparent ❑ USA Employee ❑ USA Alumni

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I wish to make a gift to the University of South Alabama as follows:

Gift Purpose: ***(check all that apply)***

❑ I designate my gift to: Dr. Cecil L. Parker, Jr. Sickle Cell Disease Distinguished Lectureship Endowment

❑ This gift is in Honor/Memory (circle one) of: Please notify: _____

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"Break The Sickle Cycle"®

SCDAA®

September is National
Sickle Cell Awareness Month