# PERSPECTIVES ON SICKLE CELL DISEASE AND RACISM

**RICHARD ALLEN WILLIAMS, MD, FACC,FAHA, FACP, DHL (Hon)**

**117th and Immediate Past President,**

**National Medical Association**

**Clinical Professor of Medicine, UCLA School of Medicine**

**Founder, Association of Black Cardiologists**

PRESENTED TO THE W. MONTAGUE COBB NMA HEALTH INSTITUTE
CONFERENCE ON RACISM IN MEDICINE
UNIVERSITY OF CONNECTICUT
OCTOBER 7, 2017

I HAVE NO DISCLOSURES

# OBJECTIVES

- **1. To review the history of sickle cell disease (SCD)**
- **2. To focus on the epidemiology and demographics of SCD**
- **3. To explain the pathophysiology of the disease**
- **4. To describe the misconceptions about SCD including racial and ethnic aspects**
- **5. To detail the impact of racism on management of SCD**
- **6. To discuss what needs to be done to erase racism from preventing a cure for SCD**

# BRIEF HISTORY OF SCD

- **1. DISCOVERY BY DR. JAMES HERRICK (1910)**
- **2. CLINICAL FOCUS ON SCD BY DR. LEMUEL DIGGS IN THE 1920s (MEMPHIS, TN)**
- **3. DESCRIPTION OF THE SICKLING PHENOMENON BY DR. LINUS PAULING IN 1950s**
- **4. IMPACT OF DEVELOPMENT OF ANTIBIOTICS**
- **5. SOCIAL AND POLITICAL CONCERNS ( NIXON AND SC ANEMIA CONTROL ACT; BLACK PANTHERS)**
- **6. NIH INVOLVEMENT IN 1972**

# EPIDEMIOLOGY AND DEMOGRAPHICS OF SCD

**. SCD IS THE MOST COMMON GENETIC DISEASE IN THE WORLD. IT IS A HERITABLE AUTOSOMAL RECESSIVE TRAIT.**

**. OVER 4 MILLION PEOPLE ARE AFFECTED WORLD-WIDE, 80 % IN SUB-SAHARAN AFRICA, MANY IN INDIA, THE ARABIAN PENINSULA, AND THE MEDITERRANEAN**

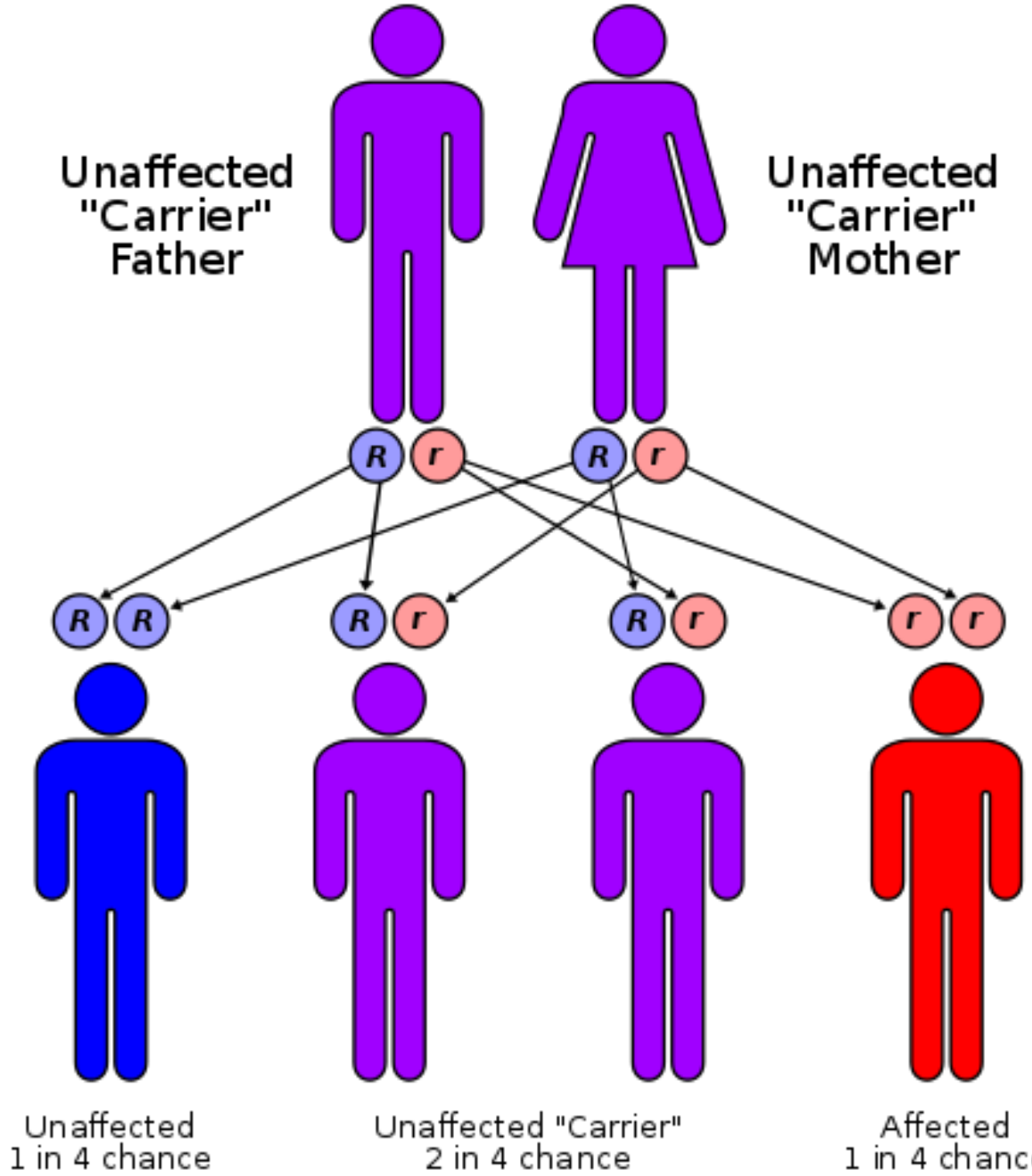
**. CAUSES OVER 100,000 DEATHS PER YEAR WORLD-WIDE**

**. ABOUT 100,000 AMERICANS, MOSTLY BLACK, HAVE THE DISEASE**

- **8-10 % OF THE BLACK AMERICAN POPULATION IS AFFECTED, MOST WITH SICKLE CELL TRAIT**

# PATHOPHYSIOLOGY, GENETICS, AND MOLECULAR BIOLOGY OF SCD

- **Basic genetic defect: A single nucleotide polymorphism (SNP) due to the substitution of valine for glutamic acid on the $6^{th}$ position of the beta chain of hemoglobin is responsible**
- **Polymerization of deoxygenated hemoglobin (HbS) leads to microvascular obstruction**
- **Conditions of low oxygen tension lead to sickling of normal RBCs, aggregation, and precipitation of HgS**


Unaffected
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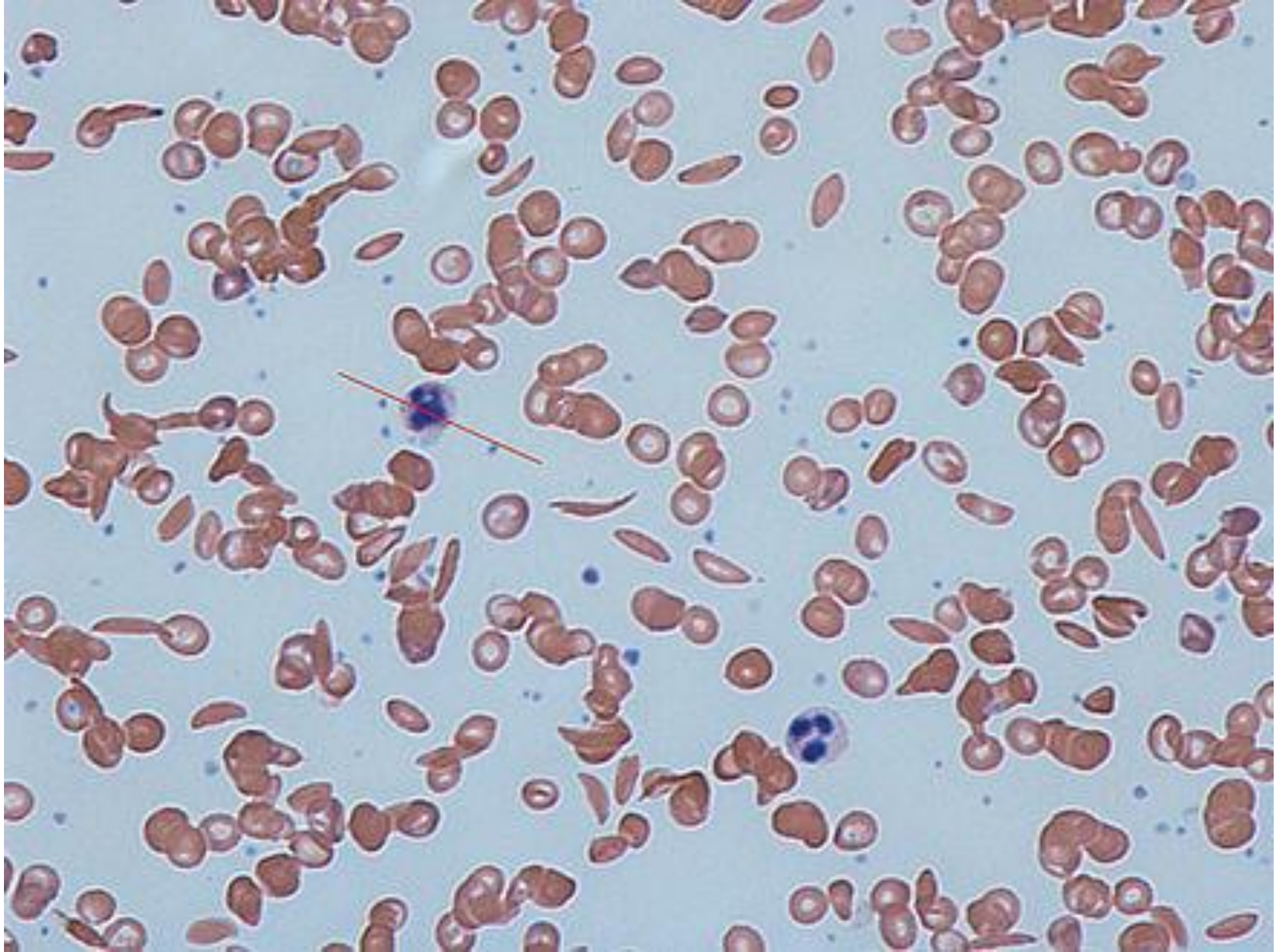
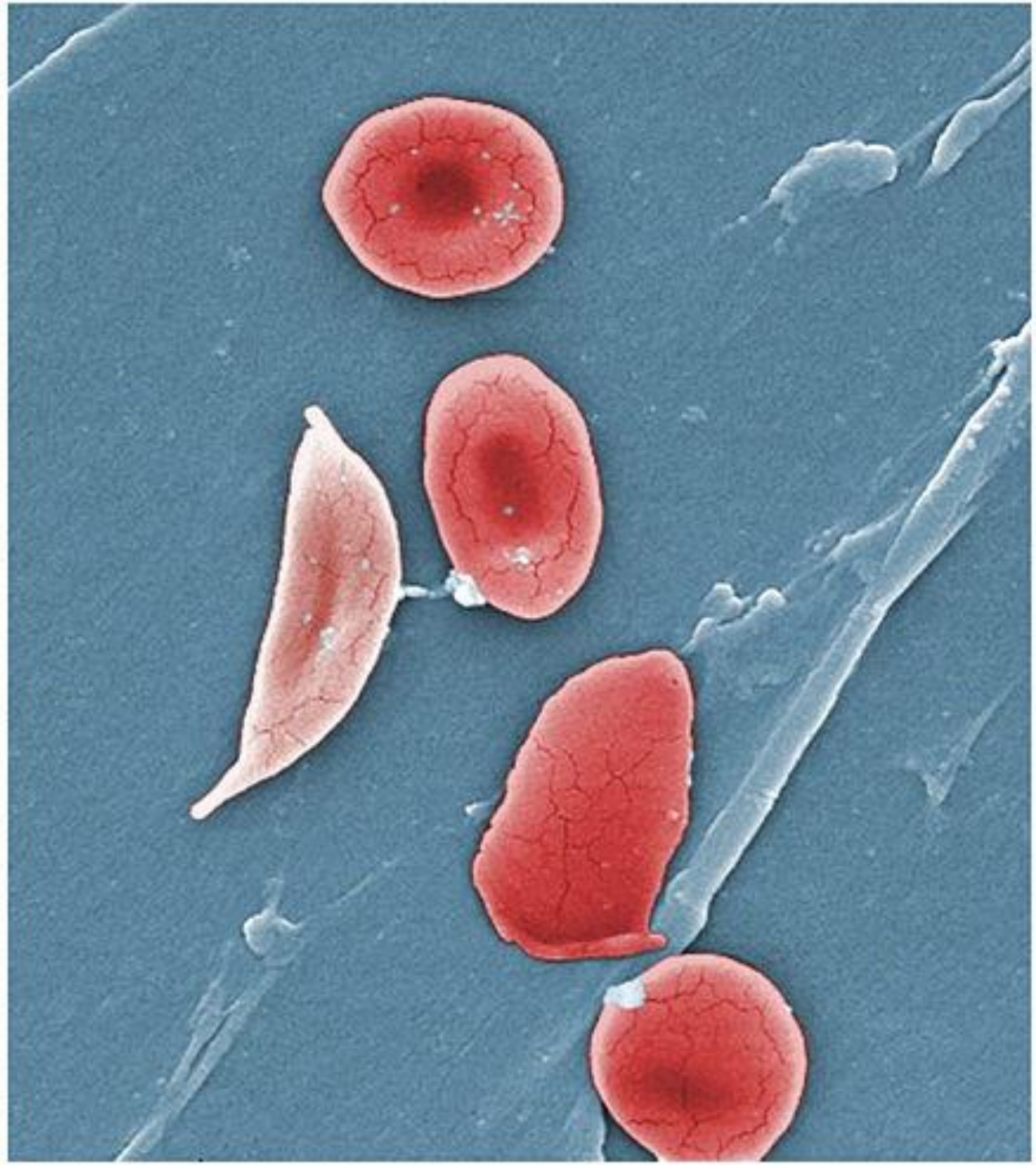
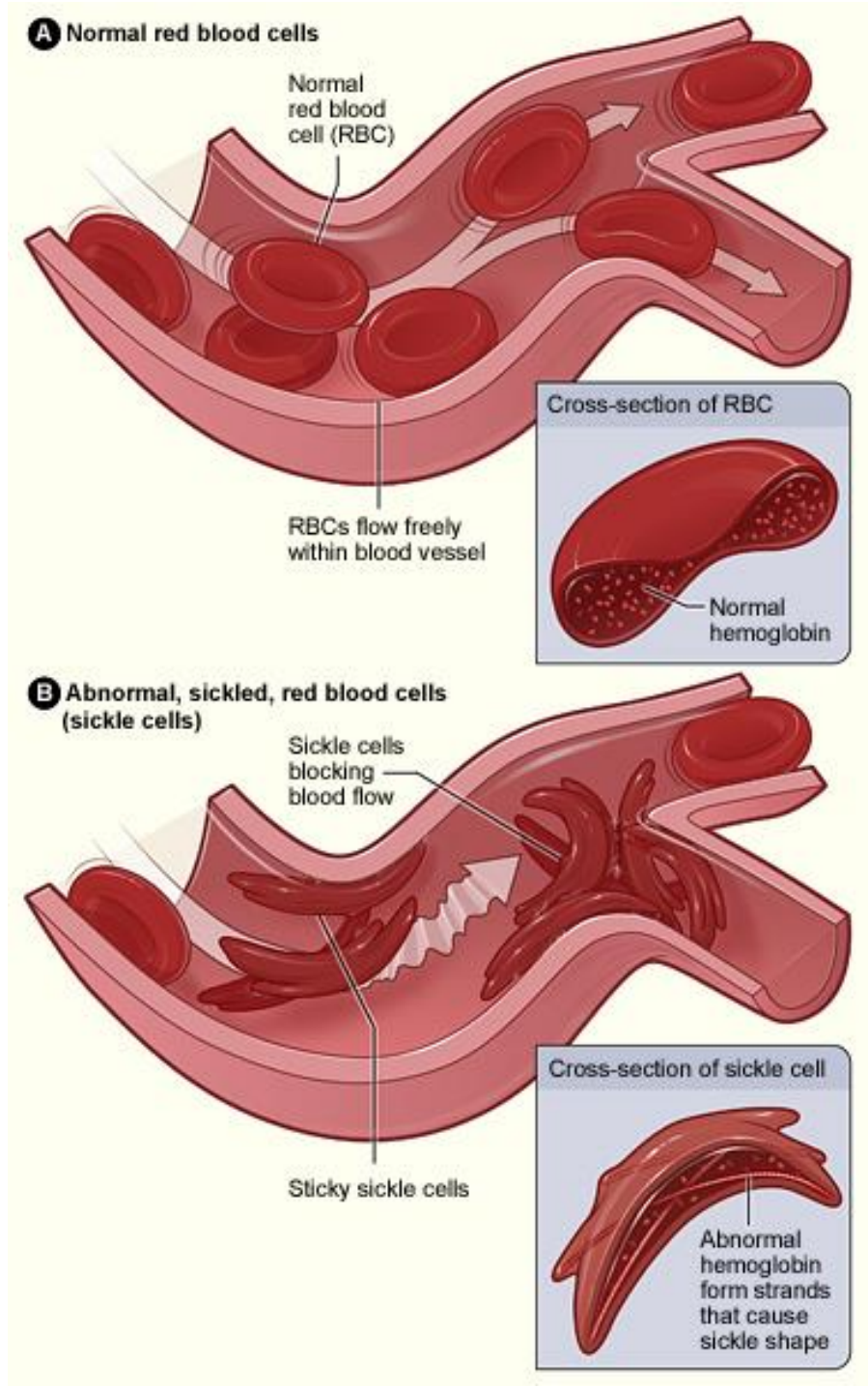
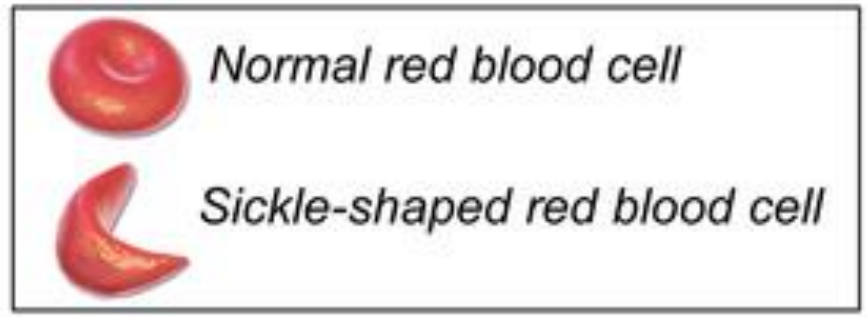





A Normal red blood cells
Normal red blood cell (RBC)
RBCs flow freely within blood vessel
Cross-section of RBC
Normal hemoglobin
B Abnormal, sickled, red blood cells (sickle cells)
Sickle cells blocking blood flow
Sticky sickle cells
Cross-section of sickle cell
Abnormal hemoglobin form strands that cause sickle shape




Normal capillary

**Sickle Cell Anemia**

# PHENOTYPICAL AND CLINICAL FEATURES OF SCD

- **Prototypical patient has a thin lean body habitus and a “tower skull”**
- **Signs and symptoms may appear in first year of life**
- **Pain crises caused by vascular obstructions in organs and bones may be first presentation**
- **Other clinical manifestations are splenic sequestration, acute chest syndrome, jaundice due to hemolysis, anemia, and heart failure from increased cardiac output**
- **Frequent infections may occur including pneumonia which is often fatal**
- **Lifespan is now increased to 40 to 60 years**

# DIAGNOSIS, MANAGEMENT, AND TREATMENT OF SCD

- **Diagnostic screening test is done at birth followed by electrophoresis if necessary**
- **Testing may also be performed later in life in individuals with suspicious symptoms**
- **Hallmarks of management involve decreasing frequency of pain crises through adequate hydration, avoidance of low oxygen pressure, blood transfusions, and use of hydroxyurea. Opioids and other pain relievers may be used.**
- **Rapid and vigorous treatment of infections can be life-saving**
- **Splenectomy is sometimes performed to decrease hemolytic anemia**
- **CVD management can be critical (heart failure with diastolic dysfunction is common)**

# OLD AND NEW DRUGS USED FOR SCD

- **Cyanate**
- **Hydroxyurea (Carbamate), used to increase hemoglobin levels and decrease pain crises**
- **Methadone for pain crises---Caveat: may increase QT interval and predispose patients to arrhythmias and sudden cardiac death**
- **Endari (Emmaus Medical), an oral L-glutamine amino acid powder designed to supplement depleted glutamic acid and reduce sickling. First medication approved by the FDA in 20 years to reduce SCD complications**
- **GBT 440 (Global Blood Therapeutics), designed to increase hemoglobin levels**
- **Crizanlizumab (Selexys Pharmaceuticals), an antibody that down-regulates and decreases the adhesion molecule p-selectin, thus decreasing and preventing pain crises**

# IS THERE A CURE FOR SICKLE CELL ANEMIA?

- **A FEW PEOPLE HAVE BEEN CURED BY BONE MARROW TRANSPLANT**
- **STEM CELL IMPLANTS MAY OFFER A CURE FOR A SELECT FEW**
- **DRUG THERAPY THROUGH THE USE OF NEWER MEDICATIONS**
- **ELIMINATION OF BIAS AGAINST SCD MUST OCCUR**

# MISCONCEPTIONS REGARDING SCD

- 1. **IT IS A ”BLACK DISEASE”**
- **2. VICTIMS OF SCD SHOULD BE STIGMATIZED AND DISCOURAGED FROM PROCREATING (EXAMPLE: LINUS PAULING’S RECOMMENDATION FOR TATTOOS TO BE PLACED ON SCD VICTIMS’ FOREHEADS)**
- **3. MORE FUNDING SHOULD BE MADE AVAILABLE FOR DISEASES THAT AFFECT WHITES (EXAMPLE: CYSTIC FIBROSIS FUNDING IS 4X THAT FOR SCD ALTHOUGH THE INCIDENCE OF CF IS MUCH SMALLER)**
- **4. SCD VICTIMS SHOULD BE CONSTANTLY MONITORED AS POTENTIAL DRUG ABUSERS BECAUSE OF THEIR HIGH USAGE OF OPIOIDS**

# CONCLUSION

- RACISM IMPACTS OUR ABILITY TO TREAT AND MANAGE SCD
- MORE CLINICAL TRIALS ARE NEEDED TO DETERMINE THE EFFECTIVENESS AND SAFETY OF NEW DRUGS AND APPROACHES TO CURING SCD
- INCREASED GOVERNMENT FUNDING IS IMPERATIVE TO CONTROL SCD
- MORE COMPASSION SHOULD BE GIVEN TO VICTIMS, ESPECIALLY REGARDING CONTROL OF PAIN
- MORE EFFORTS SHOULD BE MADE TO PREVENT THE DEADLY COMPLICATIONS OF SCD, SUCH AS BETTER CONTROL OF INFECTIONS AND HEART DISEASE