

The background features a light blue gradient with faint, semi-transparent icons and text. On the left, a smartphone icon is positioned above a laptop icon. In the center, there is a cloud icon and a server rack icon. On the right, a database cylinder icon is shown. Arrows indicate data flow: from the smartphone to the cloud, from the laptop to the cloud, from the cloud to the server rack, and from the server rack to the database. The main title and author name are overlaid on this background.

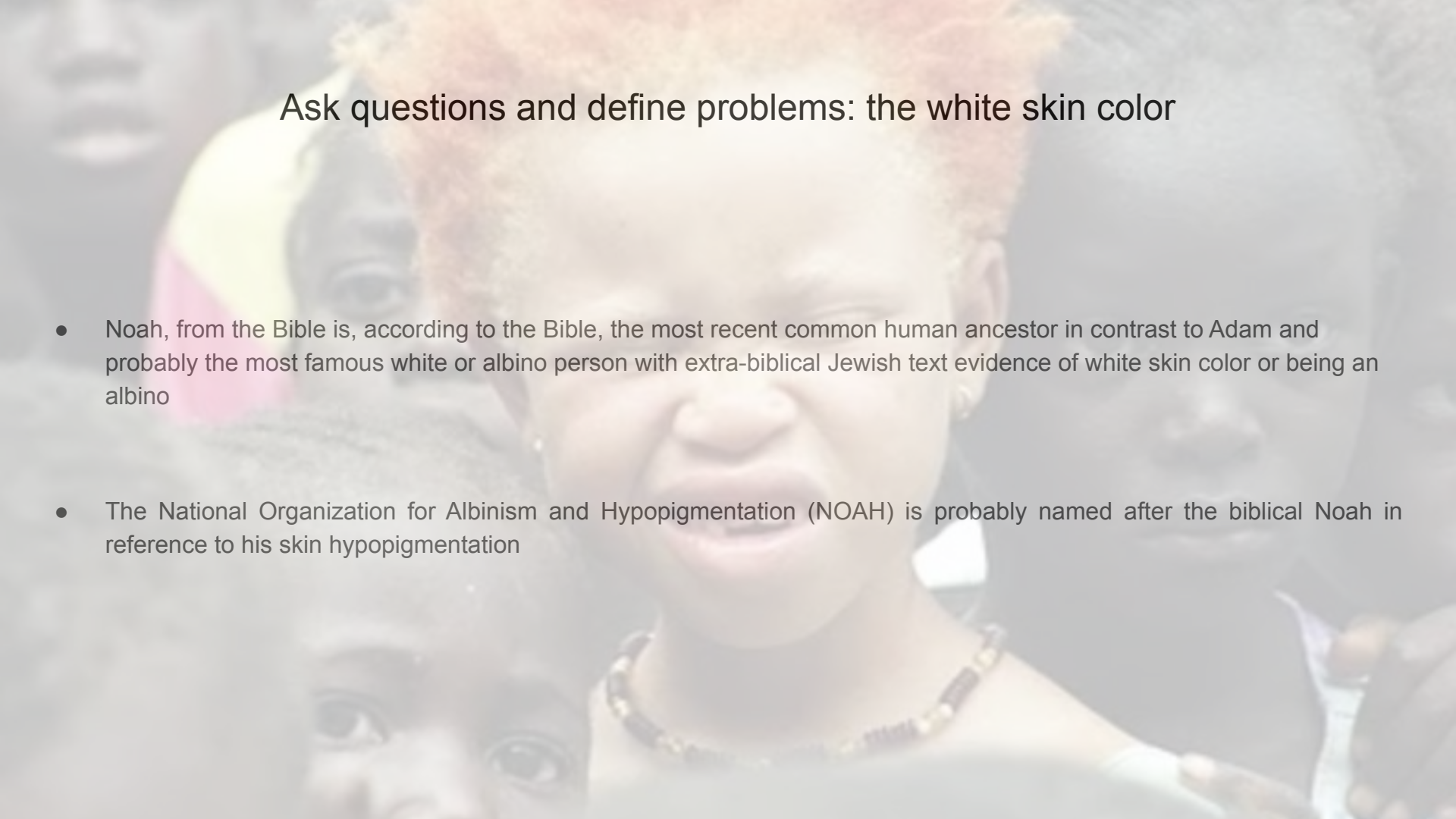
# **GERALDA: A Computational Database to Study Cancer Risk in "Admixed" Individuals**

Gepoliano Chaves (Ph.D.)

usuários

web

banco  
de dados



## Ask questions and define problems: the white skin color

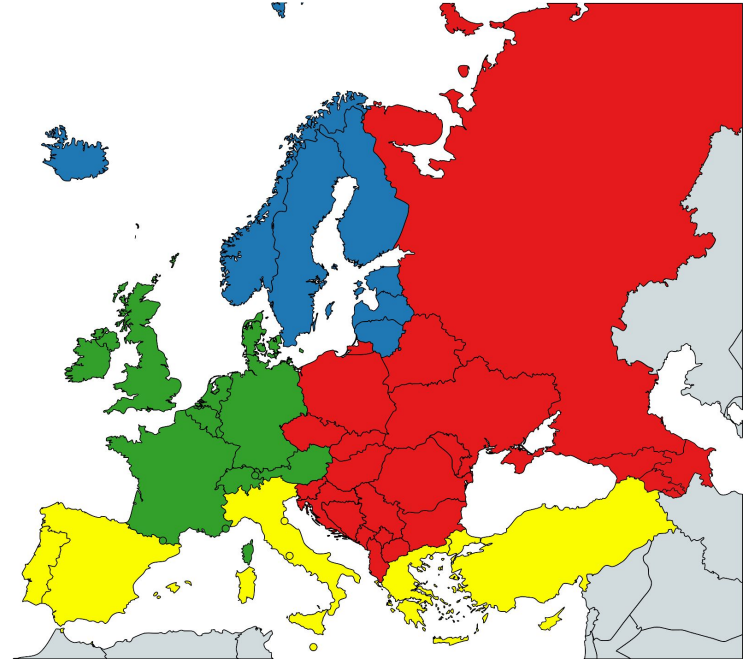
- Noah, from the Bible is, according to the Bible, the most recent common human ancestor in contrast to Adam and probably the most famous white or albino person with extra-biblical Jewish text evidence of white skin color or being an albino
- The National Organization for Albinism and Hypopigmentation (NOAH) is probably named after the biblical Noah in reference to his skin hypopigmentation

Ask questions and define problems: the white skin color and races

- Human races do not exist from the standpoint of biology
- How this concept was constructed and how it impacts our world today?
- Although physical differences exist, we share a **common** and **equal** human condition
- DNA (the genetic code) encodes and explains (all?) these differences

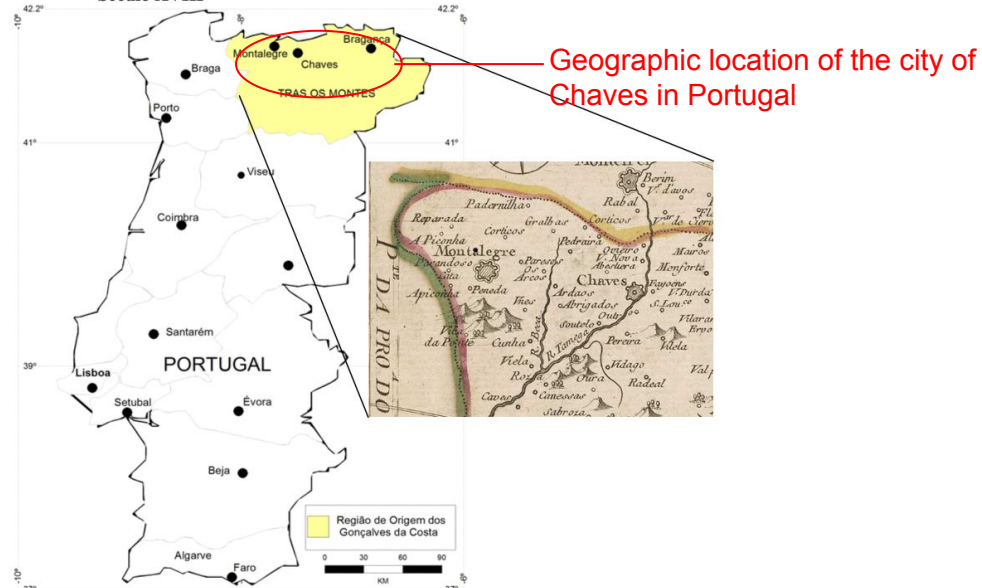
## Ask questions and define problems: the white skin color

- Eurocentrism, but different "white" races
- Southern Europeans are physically different compared to Northern Europeans
- **European "white" miscegenation in the USA**



Ask questions and define problems: our names and their continental (geographic) origin

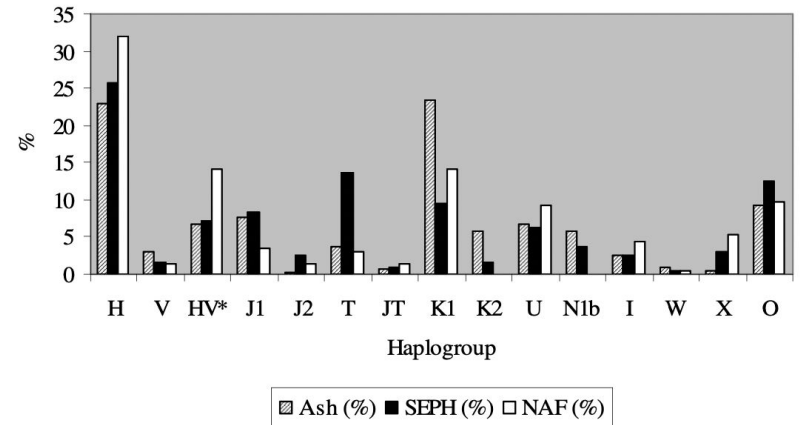
Mapa 1 – Trás-os-Montes – Portugal – Território de Origem dos Gonçalves da Costa  
Século XVIII



Fonte: Elaborado pelo Autor com base em documentos oficiais do Arquivo Historico ultramarino (2013)

# Ask questions and define problems: the white skin color in Southern Europe

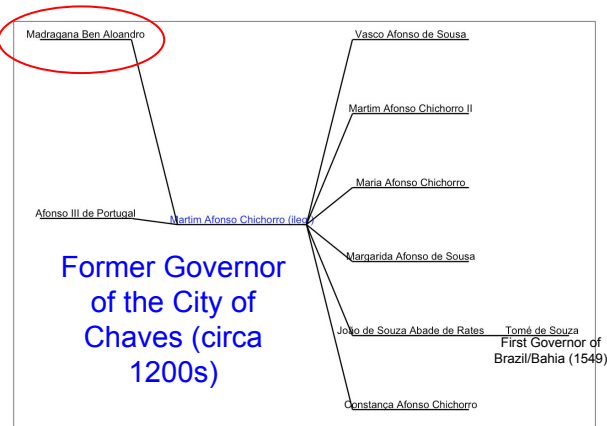
- Catholic Iberians (Portugal and Spain) have a history of persecution of Jews (Sephardic Jews) and Muslims
- The word for Spain in Hebrew is Sepharad (Mediterranean European Jewish human type = Sephardic Jew)
- **Racial miscegenation in Portugal/Brazil can be traced back to expulsion of Muslims from Iberia and *limpeza* or *limpieza de sangre***
  - **Formation of the National State of Portugal (Galiza and Northern Portugal)**
  - **Conversion of *cristãos novos* (both Muslims and Jews)**
  - ***Portuguese and Spanish blood allegiance* practices in Europe and in America**
- Haplogroup H is the most common mitochondrial haplogroup in Sephardic Jews and Europe(?)



Mt Haplogroup distribution in the three Jewish populations (Feder 2008)

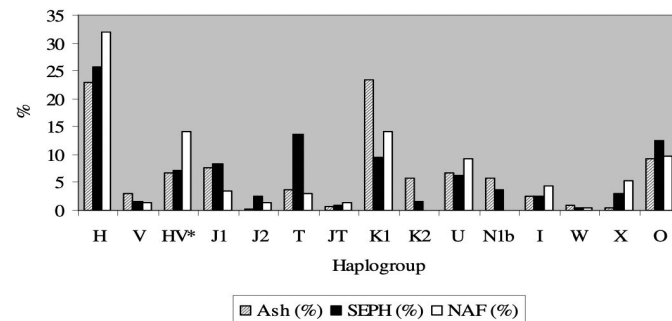
# Ask questions and define problems: the white skin color in Southern Europe

cristã-nova = converted Muslim



- Catholic Iberians (Portugal and Spain) have a history of persecution of Jews (Sephardic Jews) and Muslims because of the Muslim invasion
  - Spain in Hebrew = Sepharad
- Racial miscegenation in Brazil (and Latin America) can be traced back to *limpeza or limpeza de sangue*
  - **Blood allegiance** in Europe and in America
  - Conversion of Muslims and Jews as **cristsãos novos**

- Iberia became imprinted (or vice-versa) with the DNA of Sephardic Jews as haplogroup H is the most common mitochondrial haplogroup in Sephardic Jews and Europe(?)

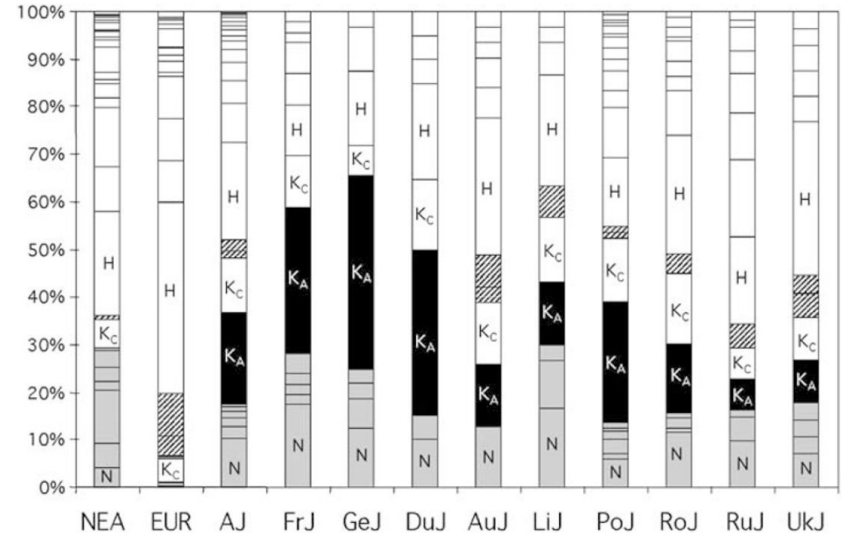


Mt Haplogroup distribution in the three Jewish populations (Feder 2008)

# Ask questions and define problems: the white skin color in Northern Europe



- Sophie Charlotte de Mecklenburg-Strelitz (1744-1818), first queen of England descendant of Africans
- Northern Europe, home of the Martin Luther's Protestant Reformation experienced tolerance of Jews in contrast to Southern European Catholic Christians
- The word for **Germany** in medieval Hebrew was **Ashkenaz**
- Jews from Eastern and Central Europe refer to themselves as Ashkenazi Jews (Northern European Jewish human type)



MtDNA haplogroup frequencies in Ashkenazi Jewish (AJ) and non-Jewish populations from Europe (EUR) and the Near East (NEA) (Behar 2004)





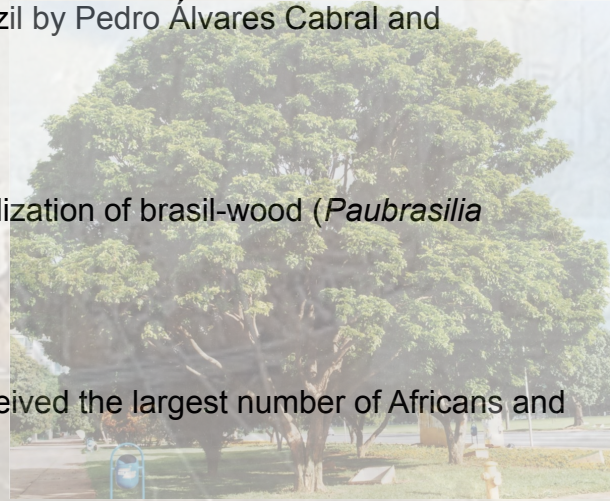
# Summary

- Northern and Southern Europe have two different "types" of white skinned people
- Northern Europe, including the UK, that colonized the USA, is predominantly Protestant and Germanic, isolated from Southern Europe, Latin and Roman Catholic
- Northern Europe originated populations of white skin in Anglo-Saxon America while Southern Europe originated populations of white skin in Latin America



# Ask questions and define problems: colonization of Brazil

- Colonization of Brazil started officially in April 22nd, 1500, with the Discovery of Brazil by Pedro Álvares Cabral and Portuguese sailors
- Portugal was interested in the newly discovered territory because of the commercialization of brasil-wood (*Paubrasilia echinata*), which gives the country its name
- During the Portuguese colonization and after, as an independent country, Brazil received the largest number of Africans and was the last country in America (the continent) to abolish slavery, in 1888



# Ask questions and define problems: colonial racial relationships

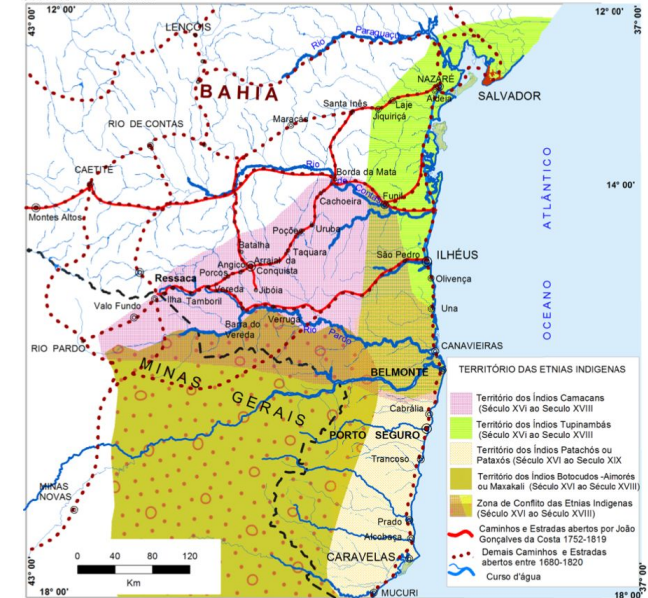
- The English language took the Brazilian Portuguese term "negros da terra" (Native Brazilians)
- In the Letter to King Manuel, however, Pero Vaz de Caminha refers to the skin of Native Brazilians as **pardo**, not Negro
- Eugeny, scientific racism, social darwinism and determinism relate slavery and inferiority of people on the base of skin color
- Native Brazilians and Africans were enslaved in colonial Brazil, leading to the question whether Indigenous Brazilians can be considered Black or in Brazilian Portuguese, Negros
- I see Black Brazilians refer to themselves as Negros, but I have never seen African Americans refer to themselves as Negro Americans



# Ask questions and define problems: colonial racial relationships

- In a legal *regimento* of 1755, Marquis of Pombal determined the Portuguese **assimilationist** policy that encouraged "interracial" marriage in Brazil
- Vilas like Prado, Alcobaça and Caravelas were founded in the Captaincy of Porto Seguro (Extreme South of Bahia) for colonization and *aldeamento* of indigenous Brazilians
- The *regimento* criminalized prejudice against descendents of Portuguese and Indigenous Brazilians but not admixed whites (Portuguese) and Africans
- African slavery would only be banished more than 100 years later, in 1888

Mapa 2 – Território das Etnias Indígenas que povoavam o Centro Sul da Bahia entre os Séculos XVI a XIX



Fonte: Arquivo Histórico ultramarino – Biblioteca Nacional – Brasil (2013). Livro Viagem ao Brasil de Maximiliano – 1817 (1940)

Native Brazilian ethnicities in Southern and Southwestern Bahia  
(Amaral Rocha 2018)

# Ask questions and define problems: colonial racial relationships

- Miscegenation in Brazil, encouraged the emergence of Brazilians of white skin
- With a **tri-hybrid, sexually asymmetric** genetic inheritance, white Brazilians have European phenotypes (Southern Europe)
  - skin, eye and hair colors
  - hair texture
  - nose and lip shape
- European phenotypes are mainly inherited from the **male European colonizer** while maternal ancestry is equal from Europe, Africa and America



# Ask questions and define problems: ancestry and cancer protection

- This is probably true for the other skin colors in Brazil, because of *branqueamento* or *embranquecimento* (whitening) of Brazil
- Interestingly white skin Brazilians with Ashkenazi mitochondrial haplogroup have protection against neuroblastoma (a cancer of the nervous system).





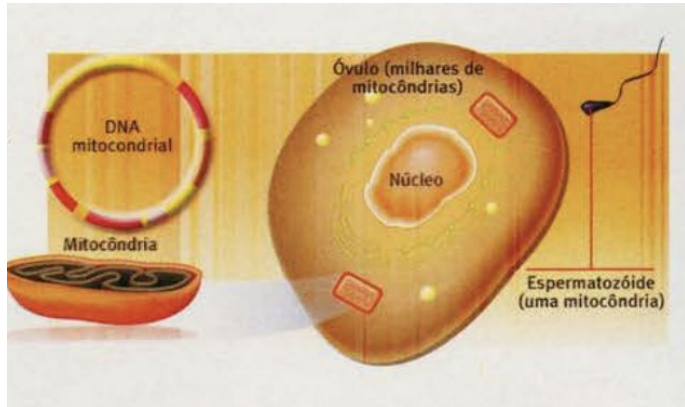
# Ideologies of Skin Color and Race: Scientific Racism

- In Brazil, IBGE define Negro as the sum of Mixed Race individuals (Pardos) and Black individuals to make an argument that Brazil is a Black or Negro country
- In the USA, the skin color line border is explained by Thomas Guglielmo in his book, *White on Arrival: Italians, Race, Color, and Power in Chicago in the context of the Italian immigration*
- The problem of Italians being of the white skin color, but not of the white skin race as Anglo Saxon Americans, exemplifying to other European ancestries, the American problem with white supremacy
- These two contexts illustrate the white skin color classification in the former European colonies in America (the continent)

# Ideologies of Skin Color and Race: Scientific Racism

- Jewish and other ethnic (racial) identities are studied using the genetic inheritance of the mother, not the father
- Mitochondrial DNA sequence is the genetic material that children inherit from the mother only, not from the father

# (Maternal) Mitochondrial Genetic Inheritance



# Objectives

- Understand cancer protection mechanisms present in the Ashkenazi haplogroup K in contrast to L1 mitochondrial haplogroup, both found in Brazilians of white skin
- Hypothesis: If they develop cancer, individuals that carry the Ashkenazi mitochondrial haplogroup K will be affected by hot tumors, treatable with immunotherapy, **while other ancestries will not be treatable**

# Plan and carry out investigations

- Evaluate the incidence of haplogroup K in hot and cold tumors
- To test the literature suggestion that neuroblastoma hot tumors have a higher incidence of the haplogroup K (this is our hypothesis), the Ashkenazi Jewish haplogroup present in white self-identifying Brazilians

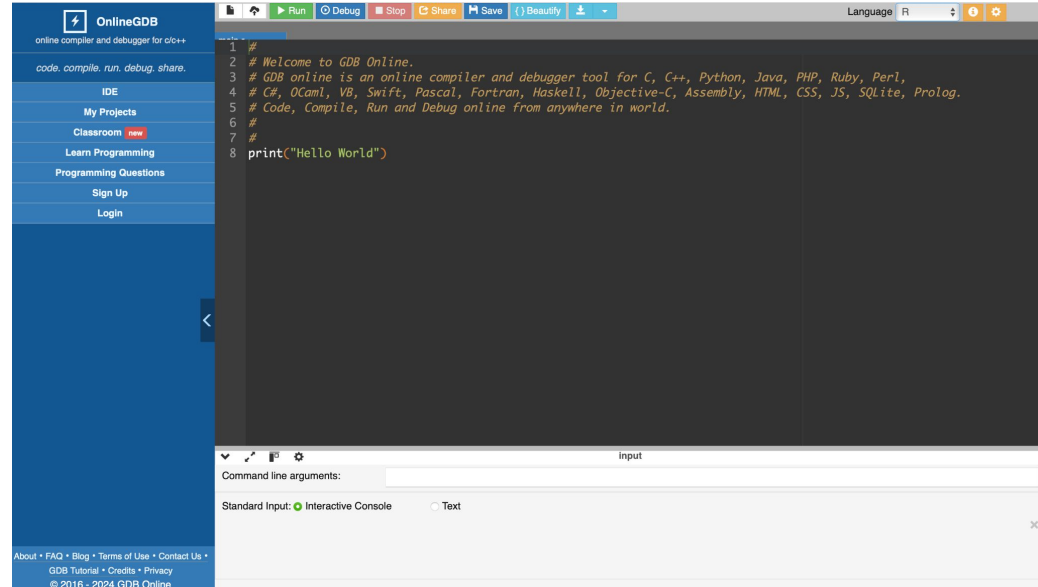
# Develop and use models

- We can develop a medical test (solution) to diagnose people who may benefit from immunotherapy



# Use mathematics and computational thinking

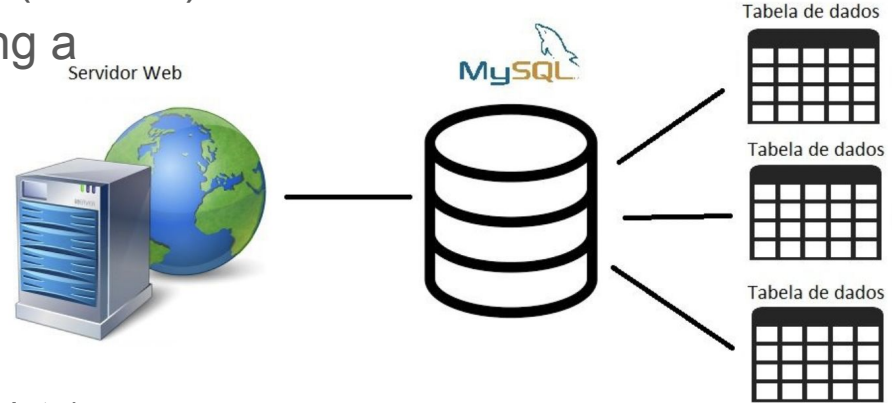
- Models and algorithms developed with computer language R
- IDE (Integrated Development Environment)
  - Tool: Online GDB



# Analyze and interpret data

- A database is a collection of information (text file) that can be accessed and analyzed using a computer.

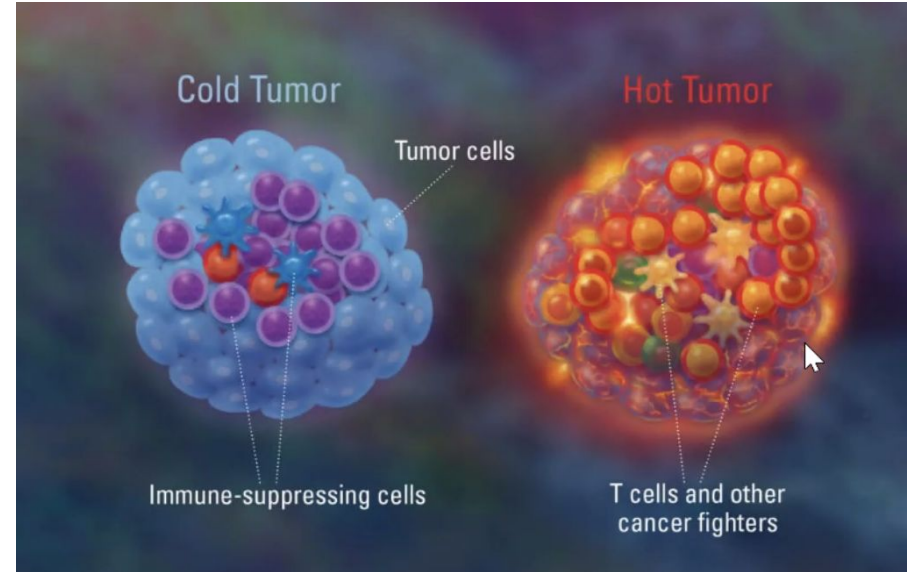
- We will develop two databases:
  - Mitochondrial database (Brazilian mtDNA)
  - Neuroblastoma database (Public tumor DNA data)





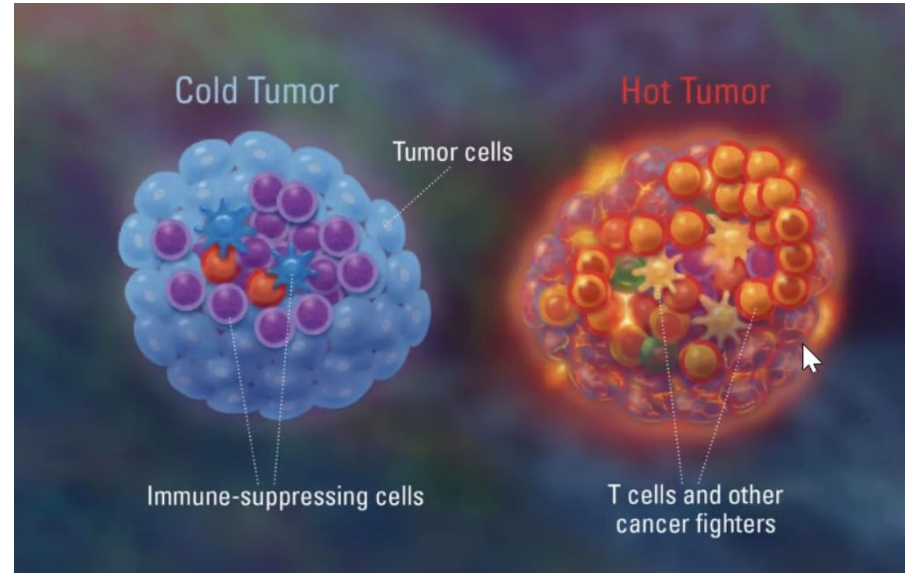
# Engage in an argument from evidence

- Haplogroup K is related to greater immunological activity or specific metabolic processes in tumor cells.
- Hot tumors should have more K haplogroups than cold tumors



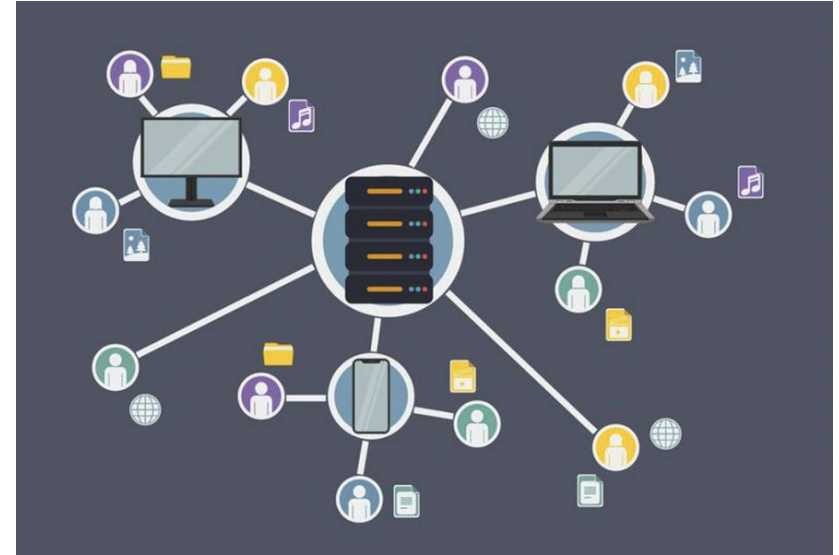
# Construct explanations and design solutions

- People with haplogroup K may have greater immune activity in tumor cells
- They present a higher frequency of this haplogroup in hot tumors.



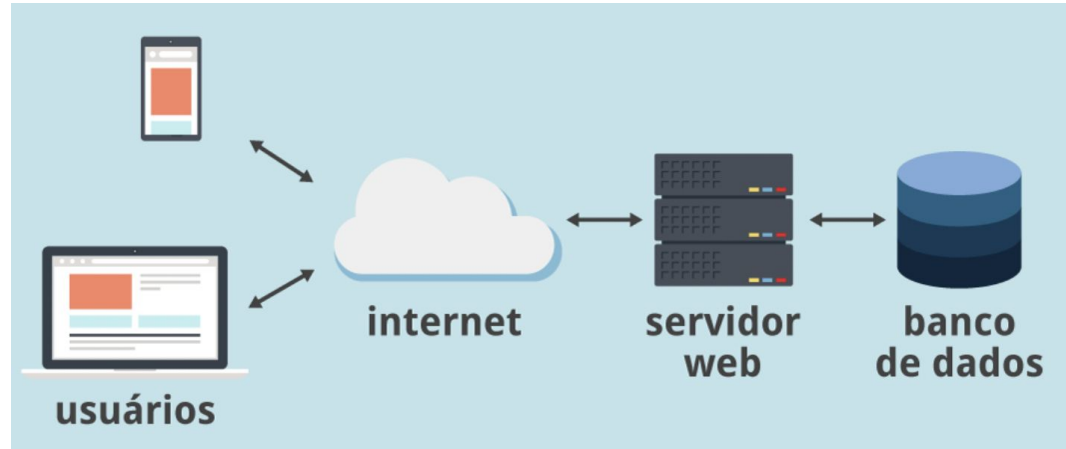
# Obtain, evaluate and communicate information

- Process of collecting data or information, critically analyzing it to validate it.
- The model will be discussed and tested using the neuroblastoma database.



# GERALDA (Minimum Viable Product)

- Portuguese: *Gerenciamento Algorítmico de Dados* (GERALDA) (**Algorithmic Management of Data**)
- Database that can be accessed on the internet (as the UCSC genome browser)
- VCF files aligned to the UCSC human genome reference 19 (hg19)
- Integrate public health/SUS information and Brazilian genealogic information



# Conclusions

- In Brazil racial miscegenation generated people of light skin and African ancestry that identify as white (raça/cor)
- Raça/Cor is the variable that the public health system of Brazil (SUS) uses to "prevent discrimination" from happening
- **The Ashkenazi ancestry, has potentially lower neuroblastoma risk, as if these people develop cancer, they are predicted (we predict) to develop hot tumors instead of cold tumors**
- Hot Tumors Could Help People Fight Cancer
- Cold Tumors Are More Dangerous to People
- Computer Could Help Diagnose Hot and Cold Tumors

**Thank you!!!**