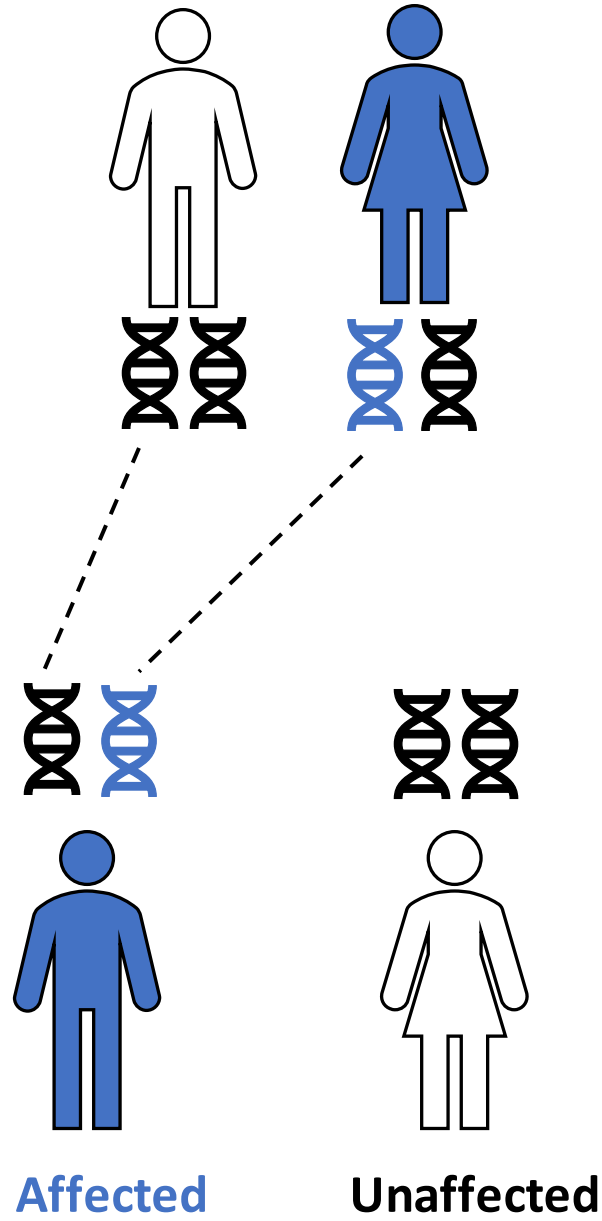


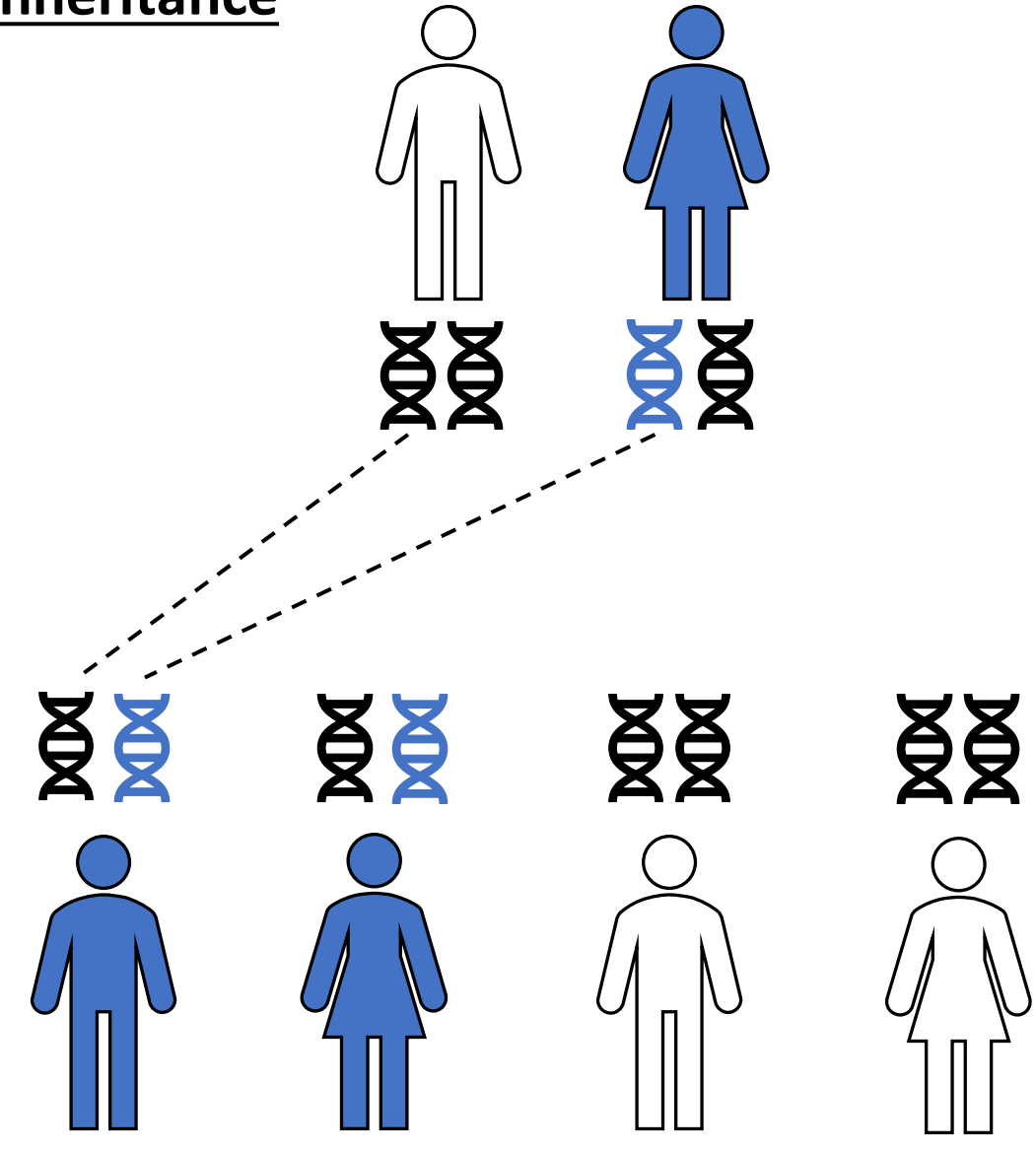
# Autosomal Dominant Inheritance

Mother with PD



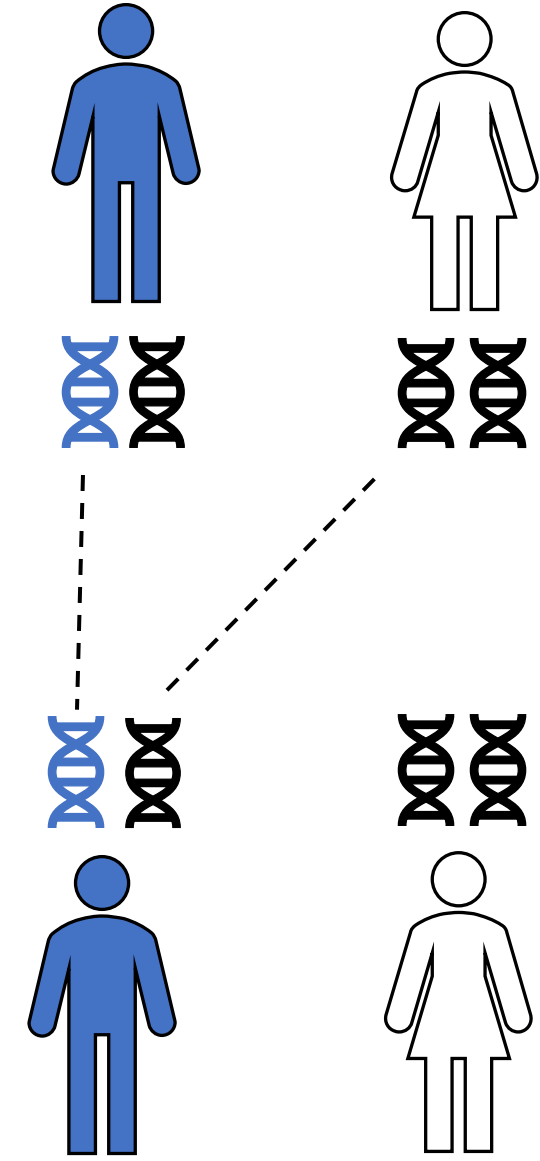
# Autosomal Dominant Inheritance

Mother with PD



# Autosomal Dominant Inheritance

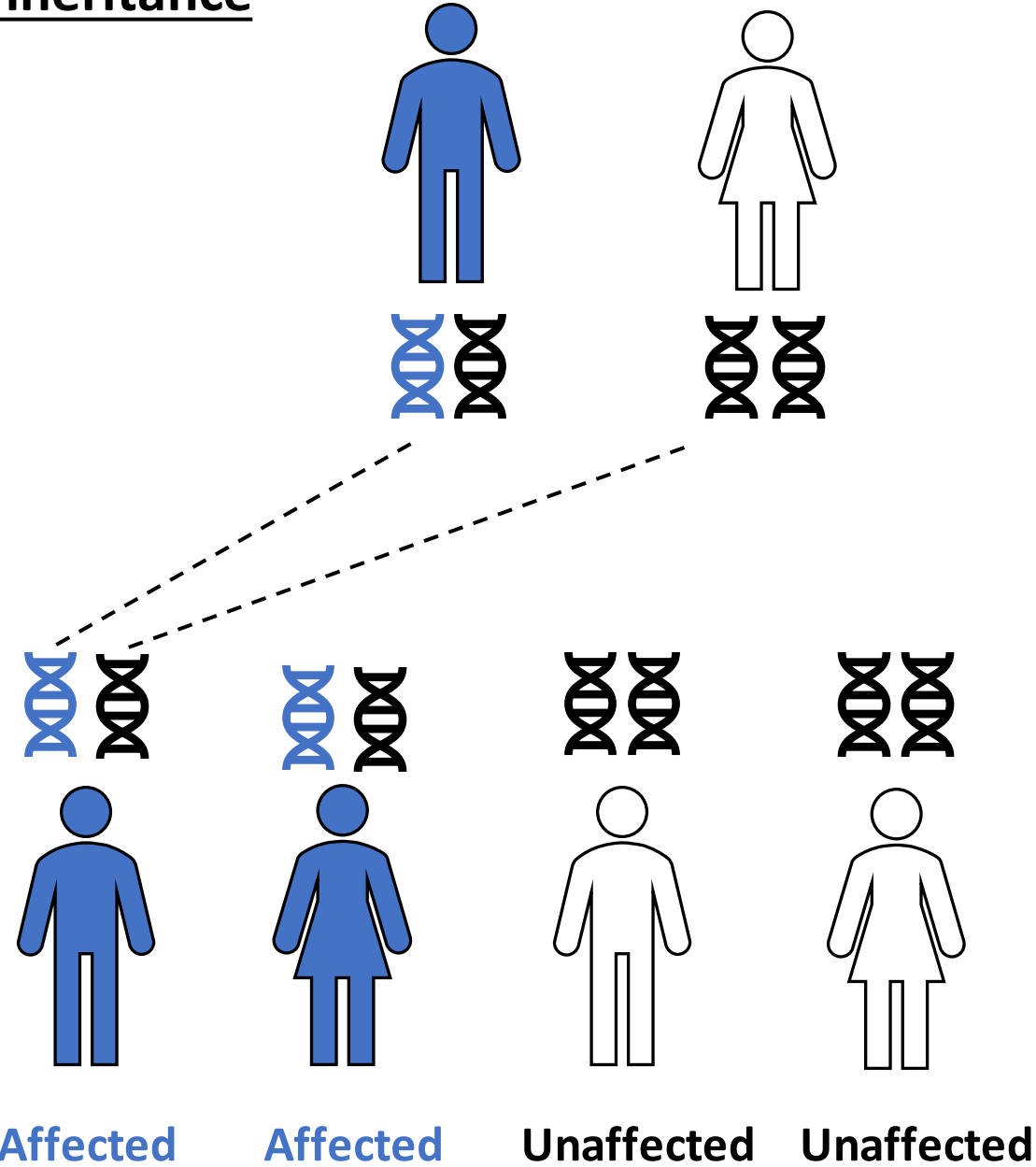
Father with PD





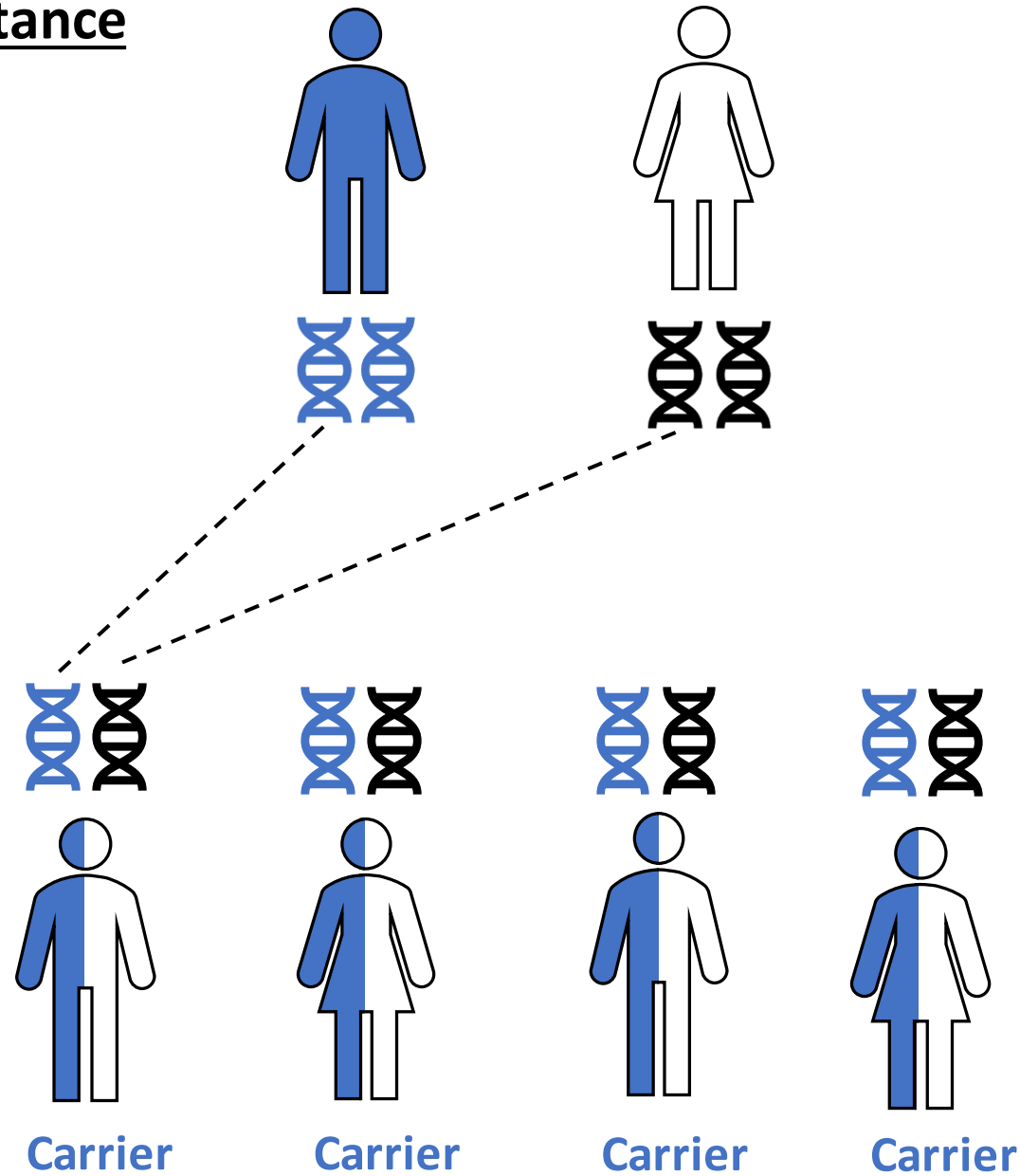
# Autosomal Dominant Inheritance

Father with PD



# Autosomal Recessive Inheritance

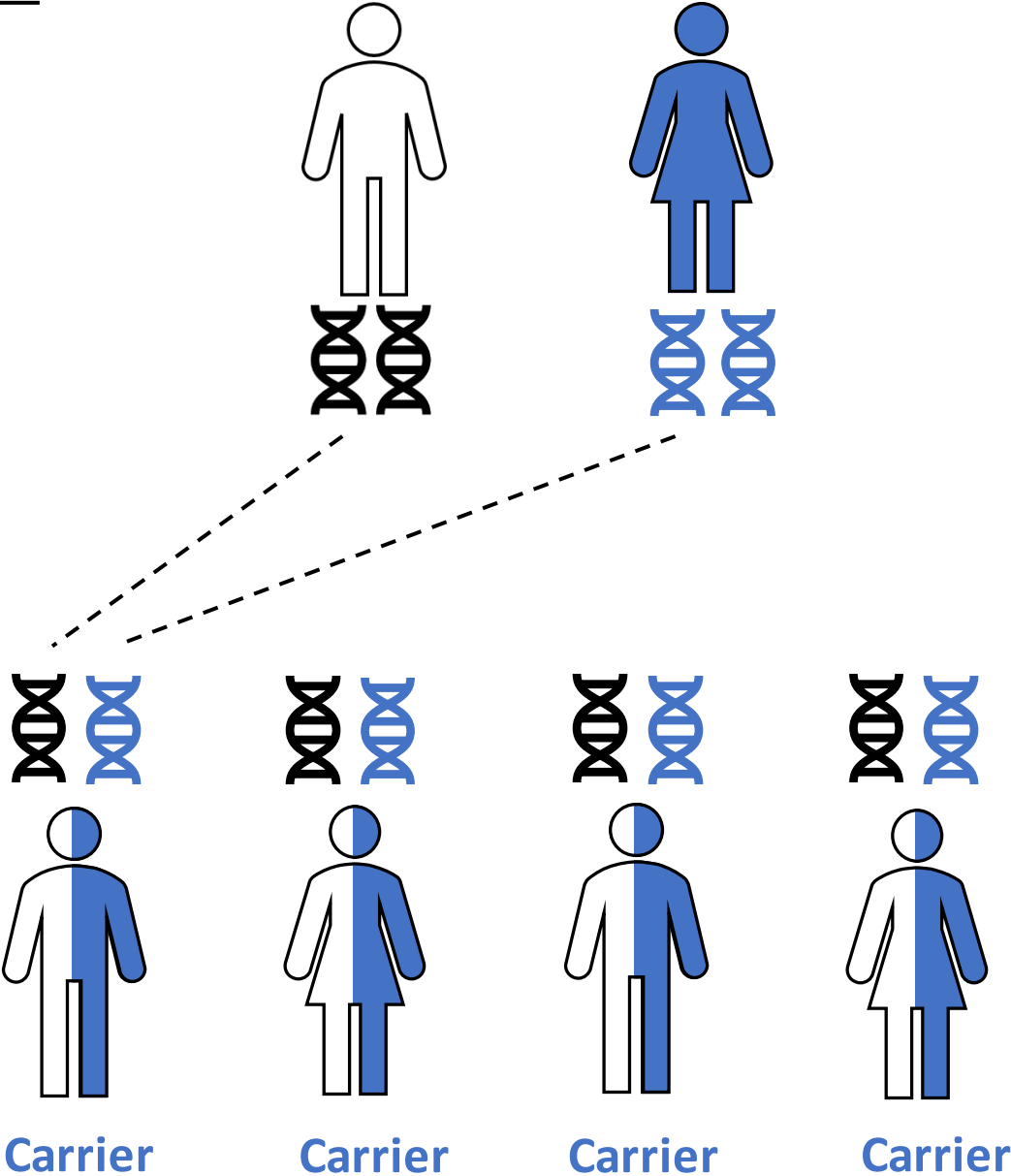
Father with PD





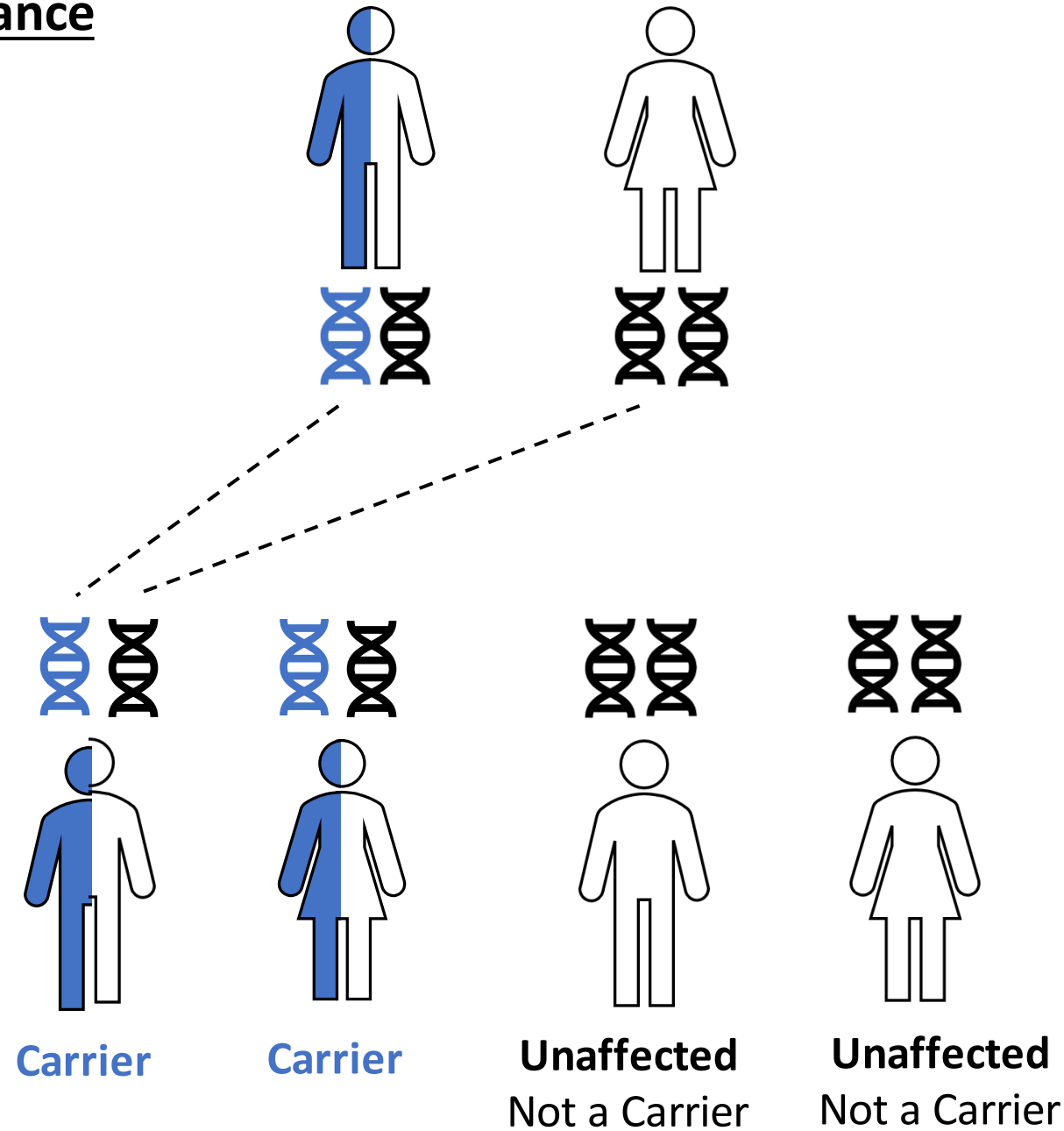
# Autosomal Recessive Inheritance

Mother with PD



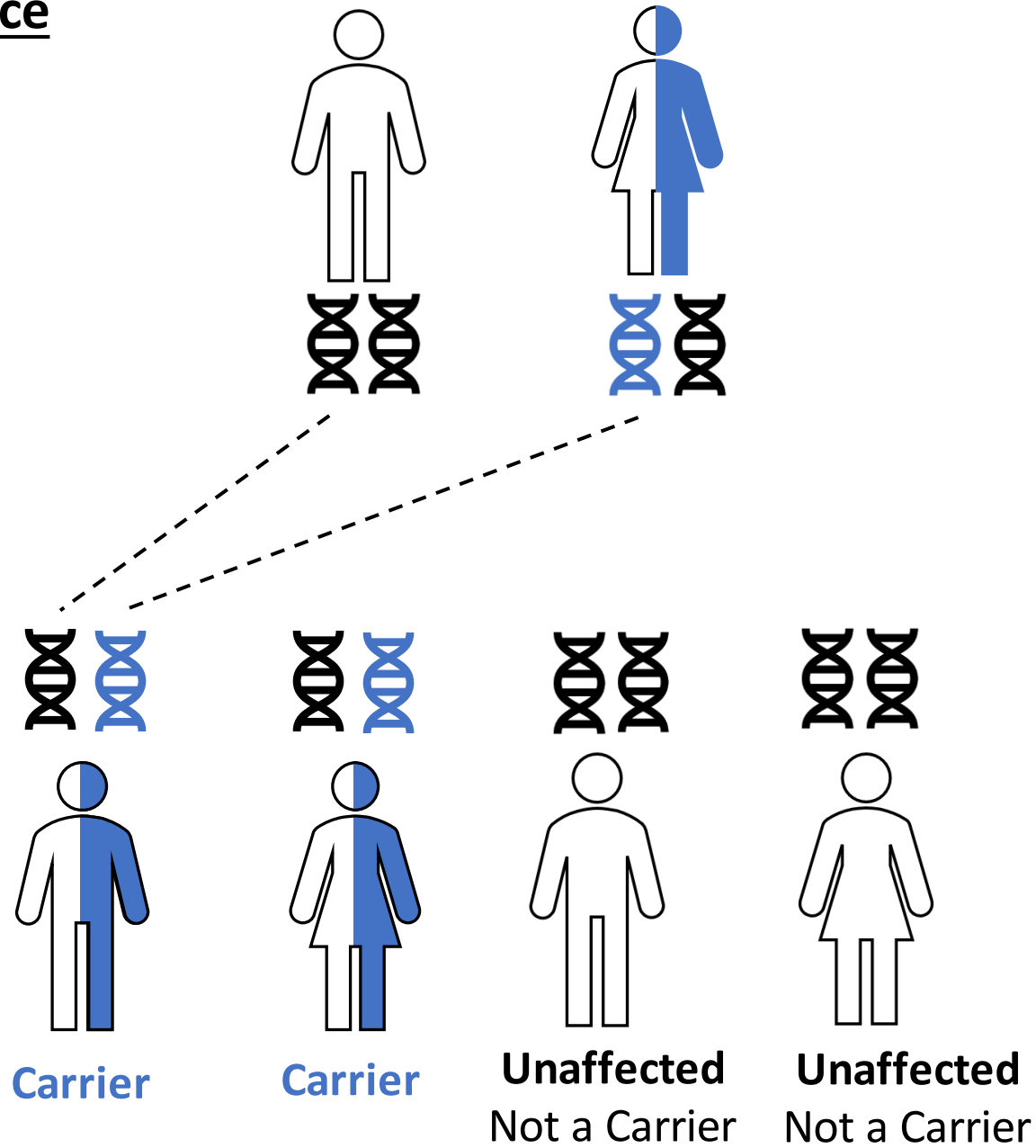
# Autosomal Recessive Inheritance

Carrier Father



# Autosomal Recessive Inheritance

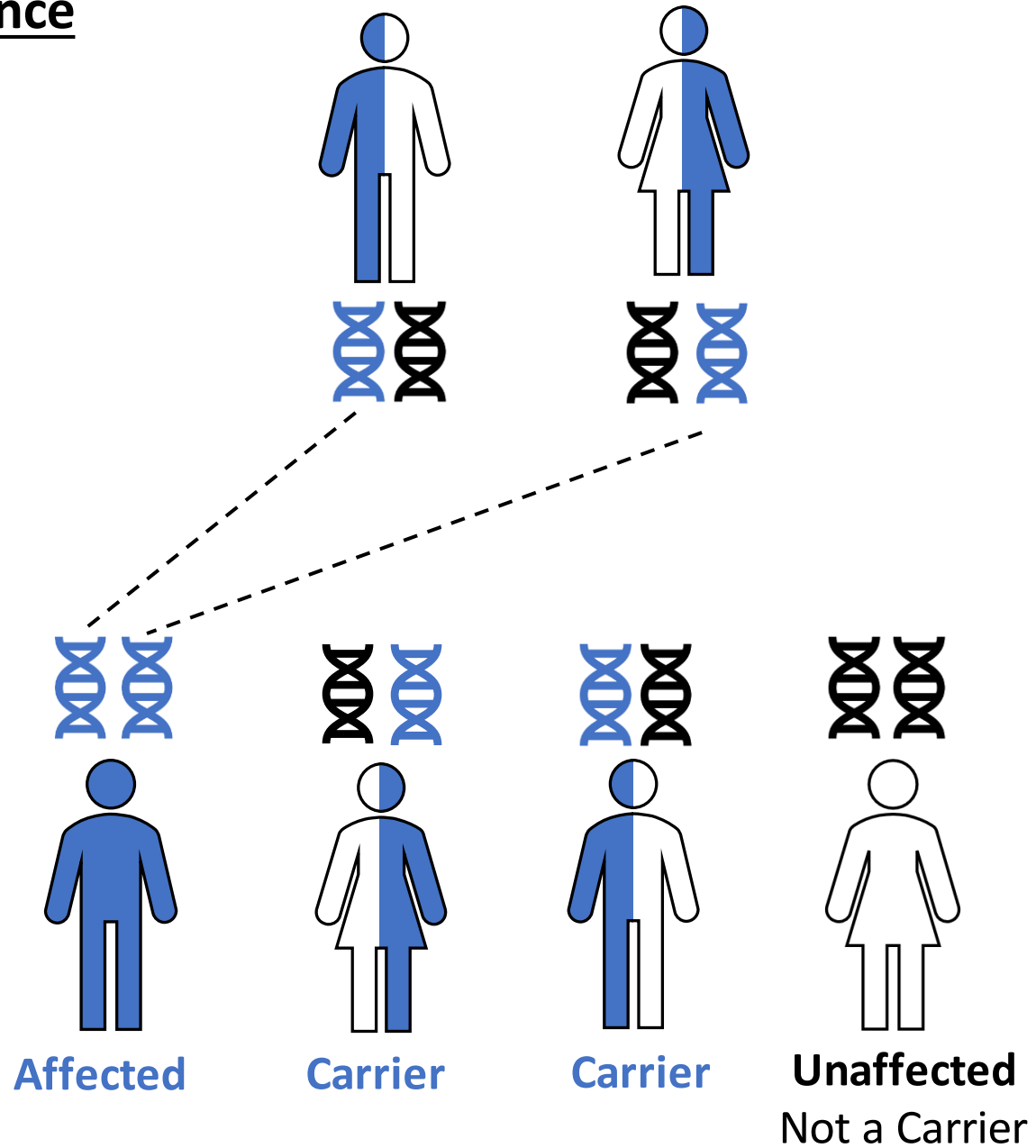
Carrier Mother



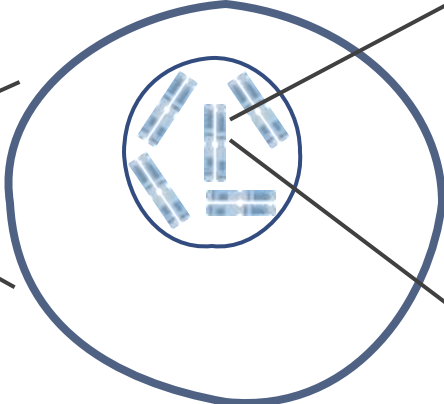
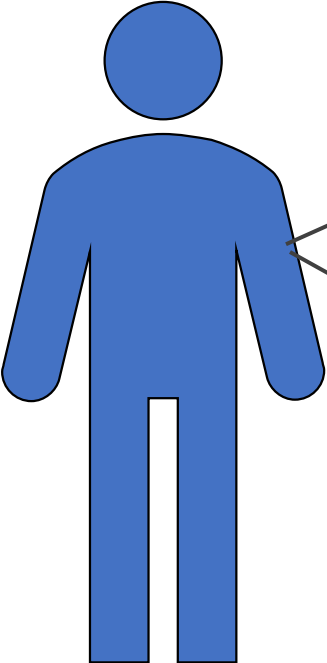


# Autosomal Recessive Inheritance

Both parents are carriers



Cell to Gene



Cell



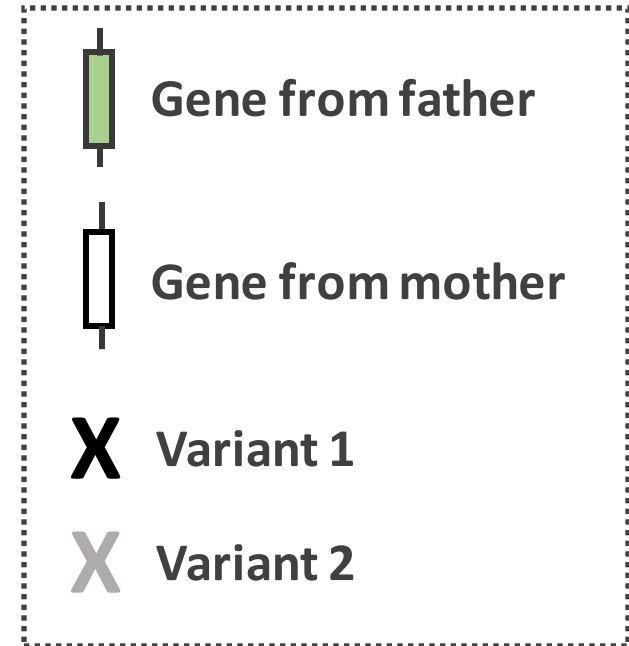
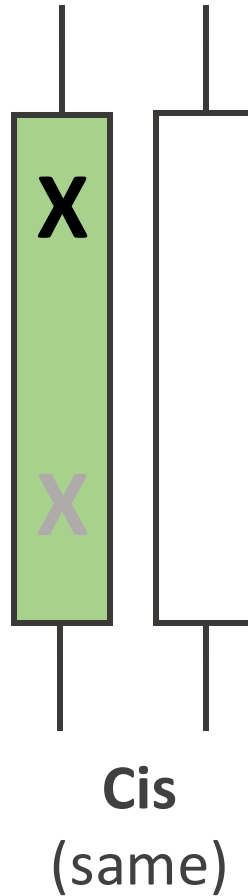
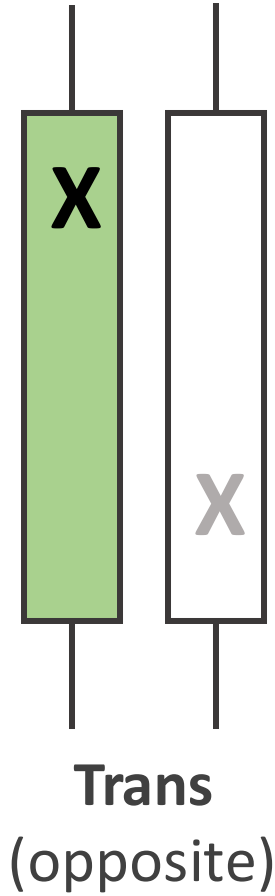
Chromosome



DNA

Gene

# Compound Heterozygous





*GBA1*

*LRRK2*

*PRKN*

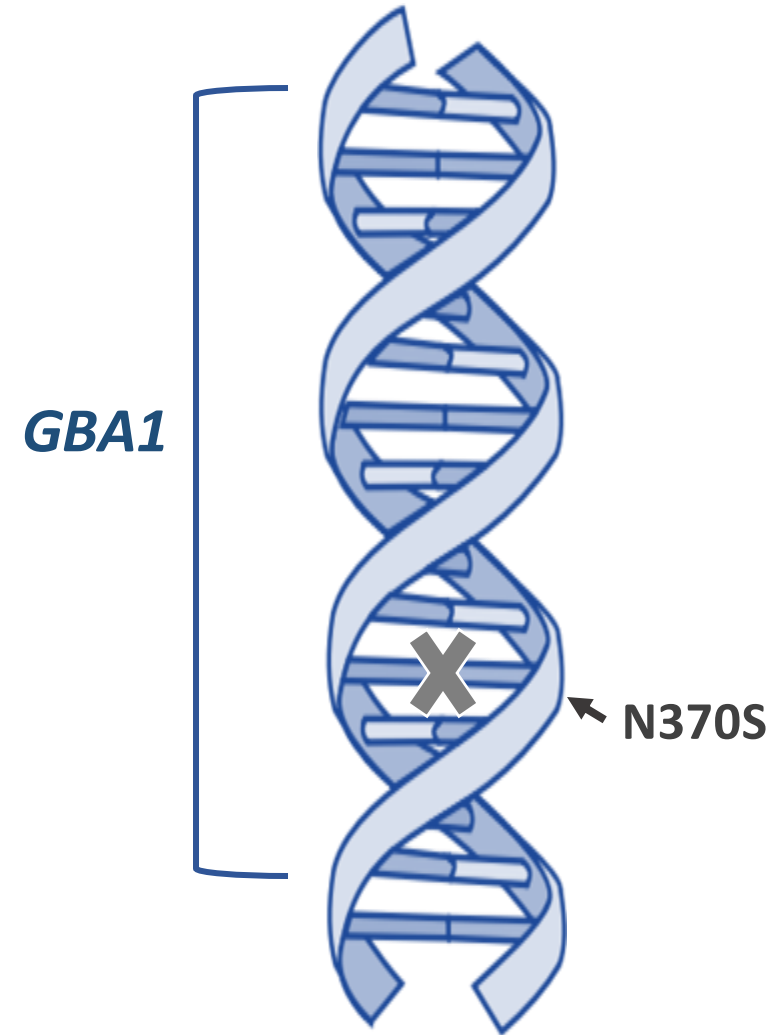
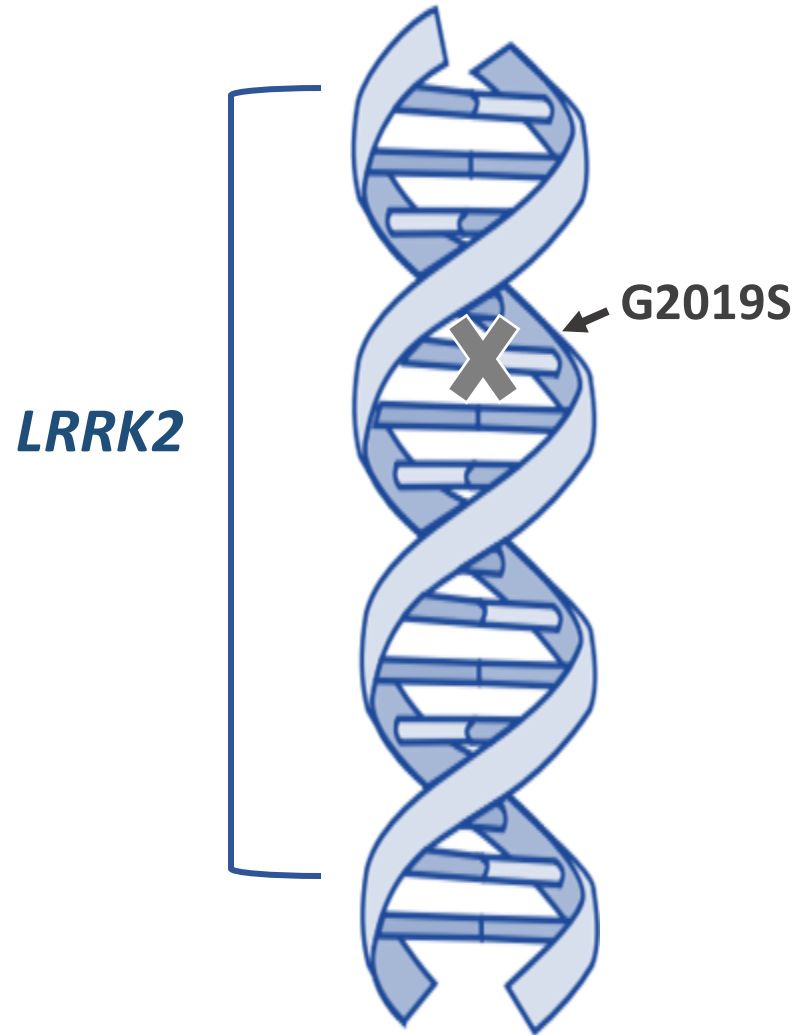
*VPS35*

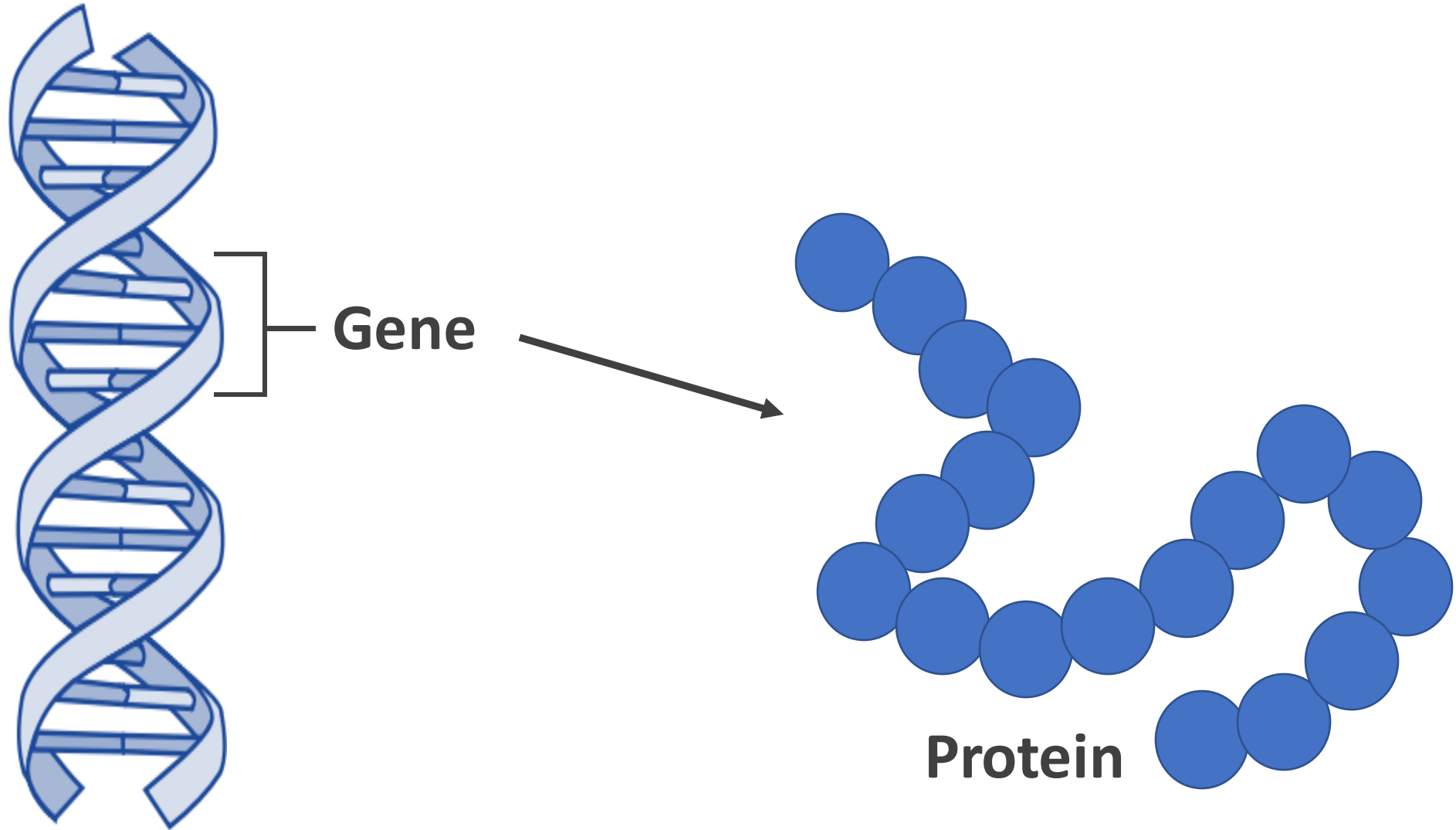
*SNCA*

*PINK1*

*PARK7*

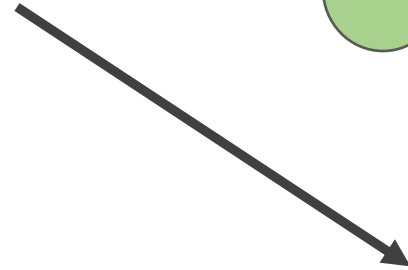
# Targeted Gene Testing



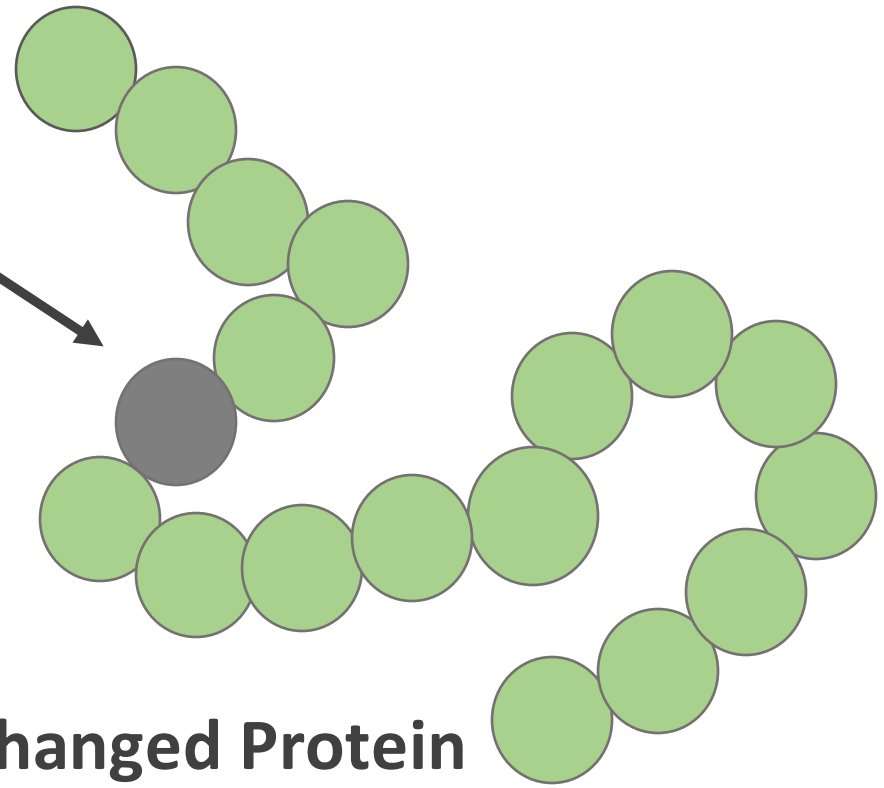




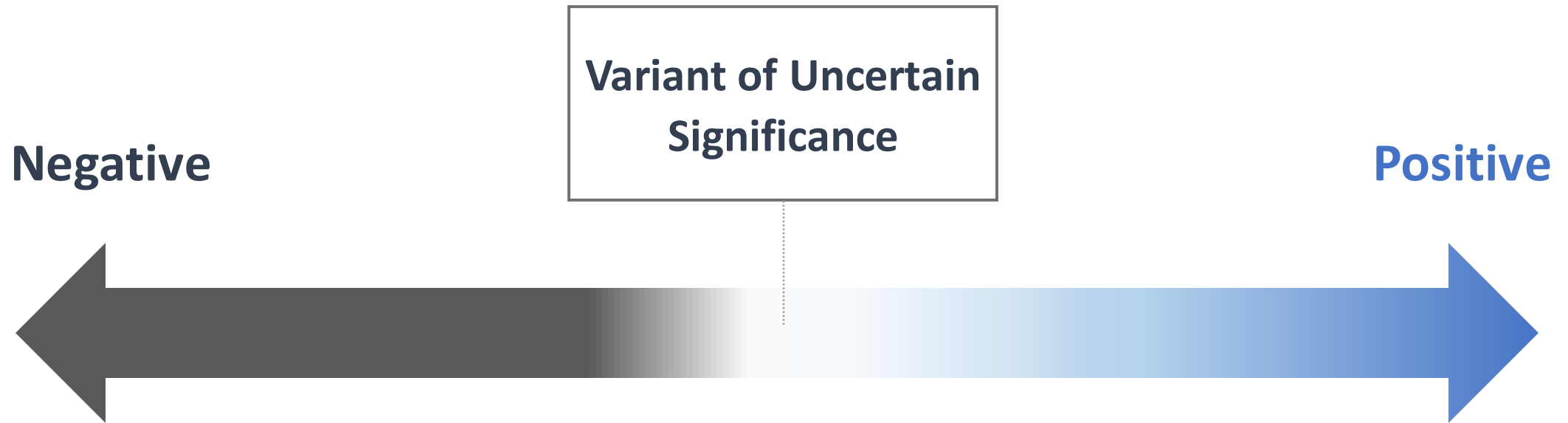
**Gene Change  
(Variant)**



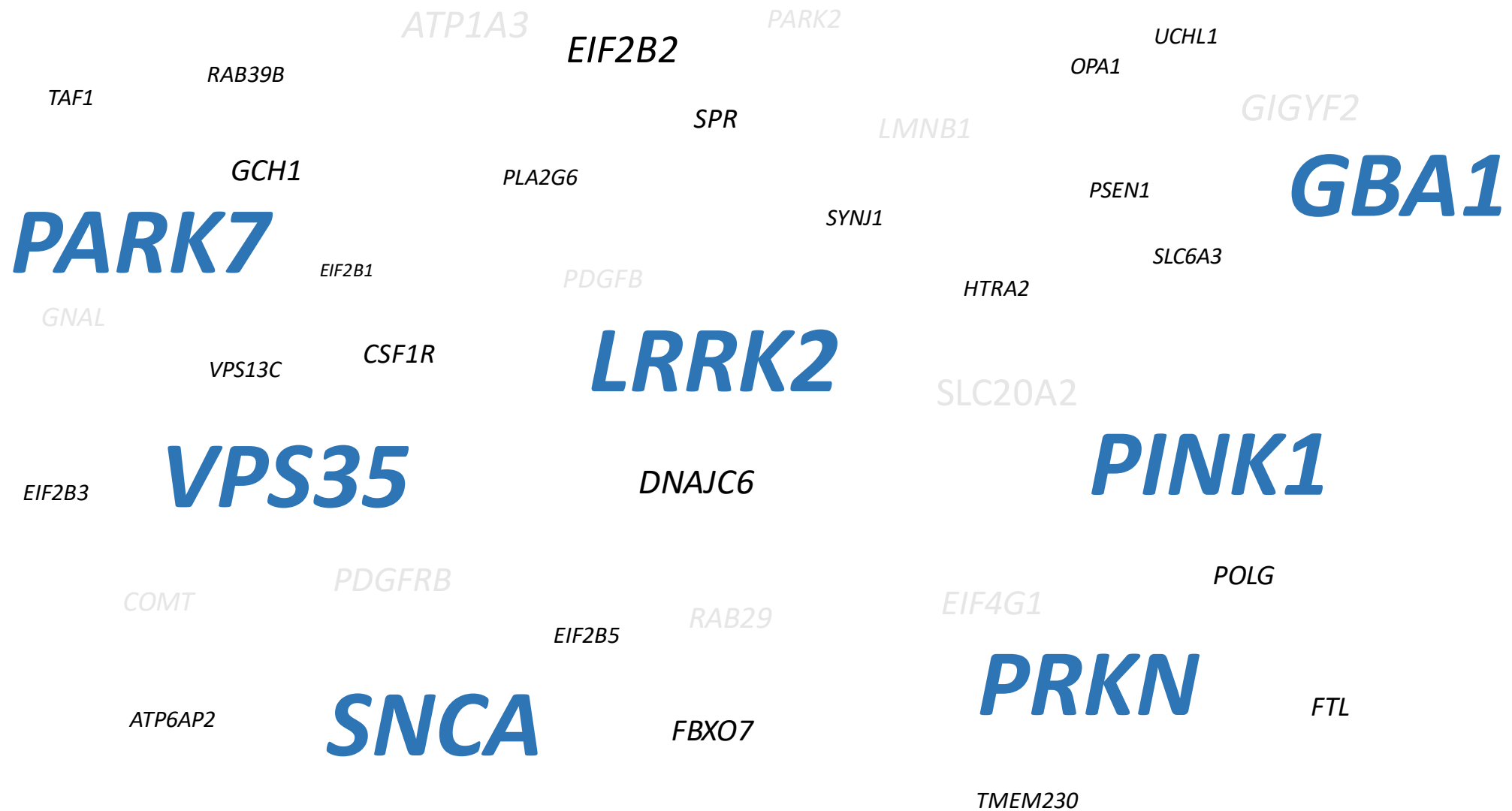
**Changed Protein**



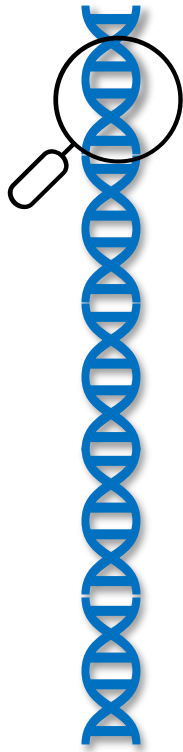
# Types of Genetic Results



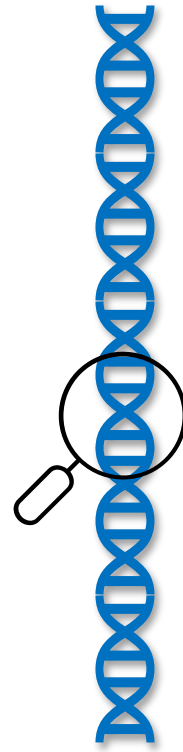




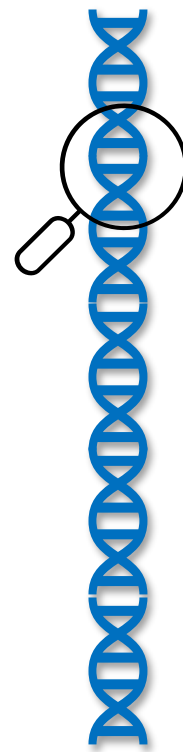
# Multi-gene Panel



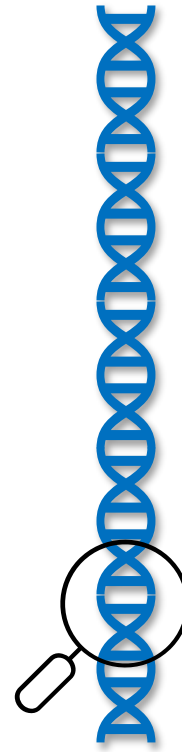
***LRRK2***



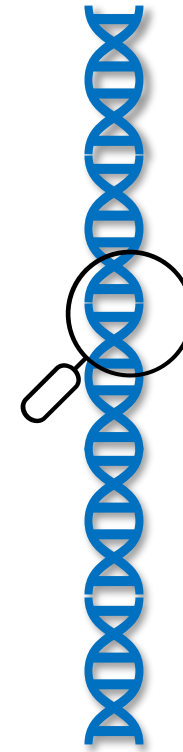
***GBA1***



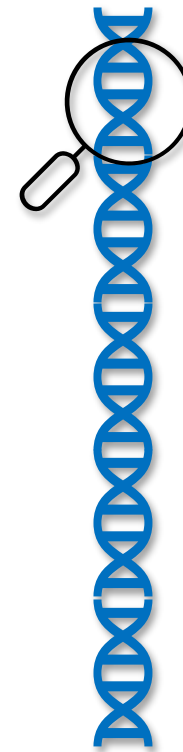
***PRKN***



***SNCA***



***PINK***







***PARK7***

# Symptoms of Gaucher Disease



## Gaucher Disease

-  Enlarged spleen
-  Anemia  
Easy bruising and bleeding
-  Severe bone pain  
Fractures
-  Fatigue

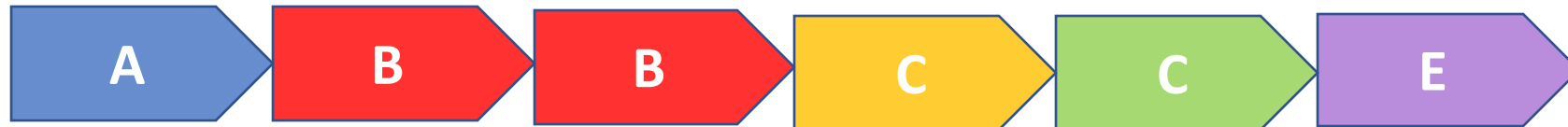
# Duplication



**Normal**



**Duplication**



# Triplification

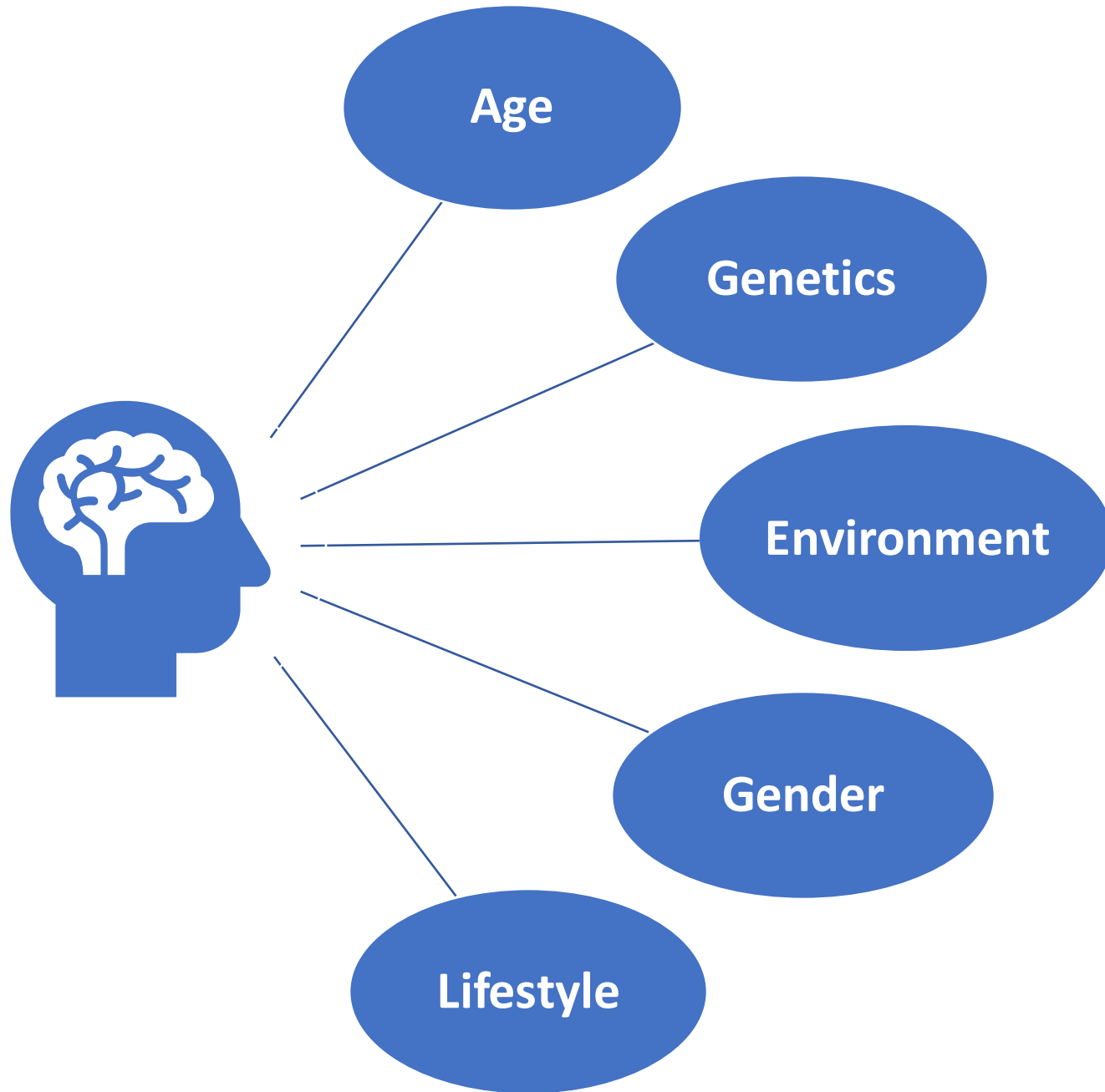


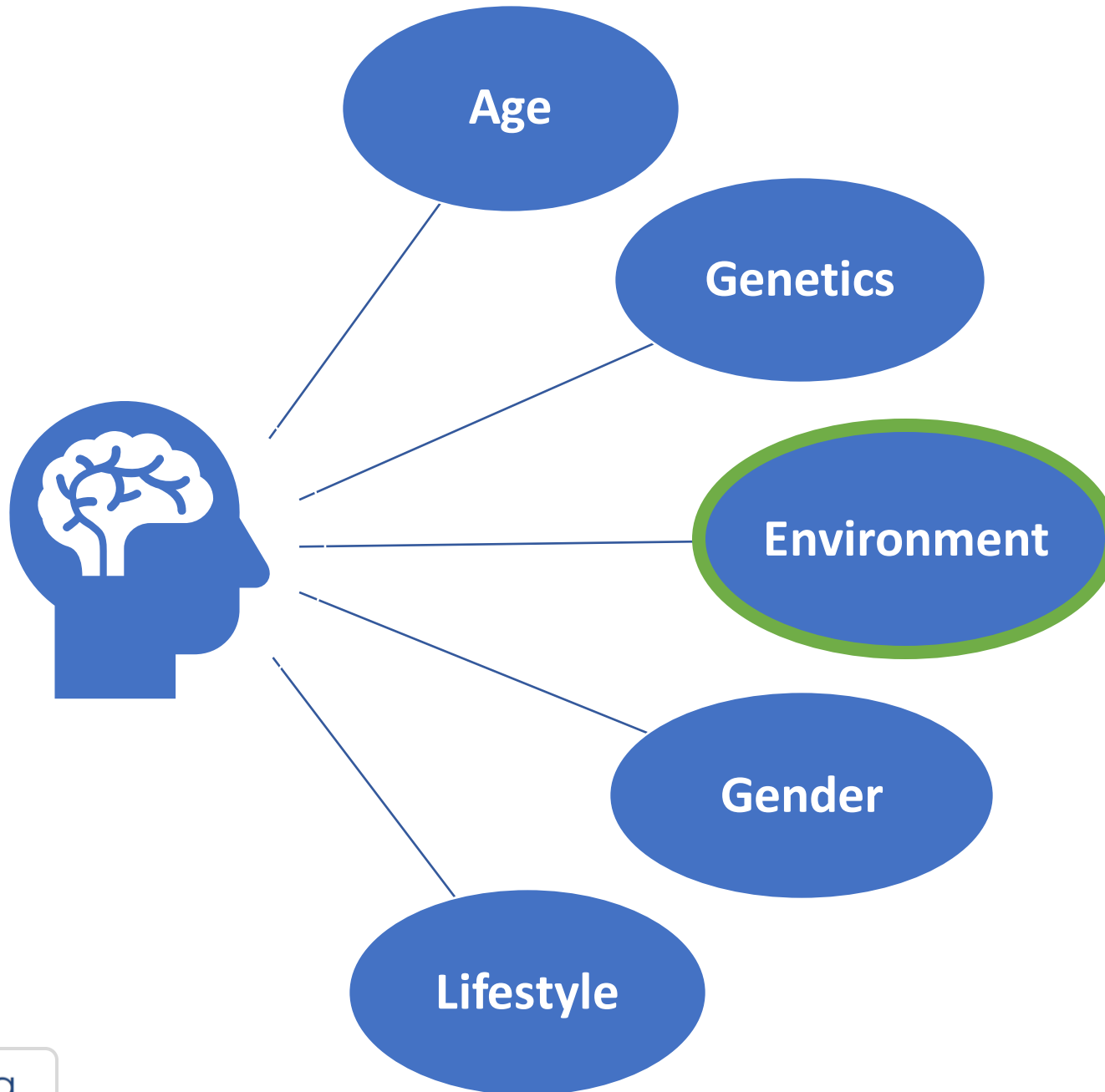
**Normal**



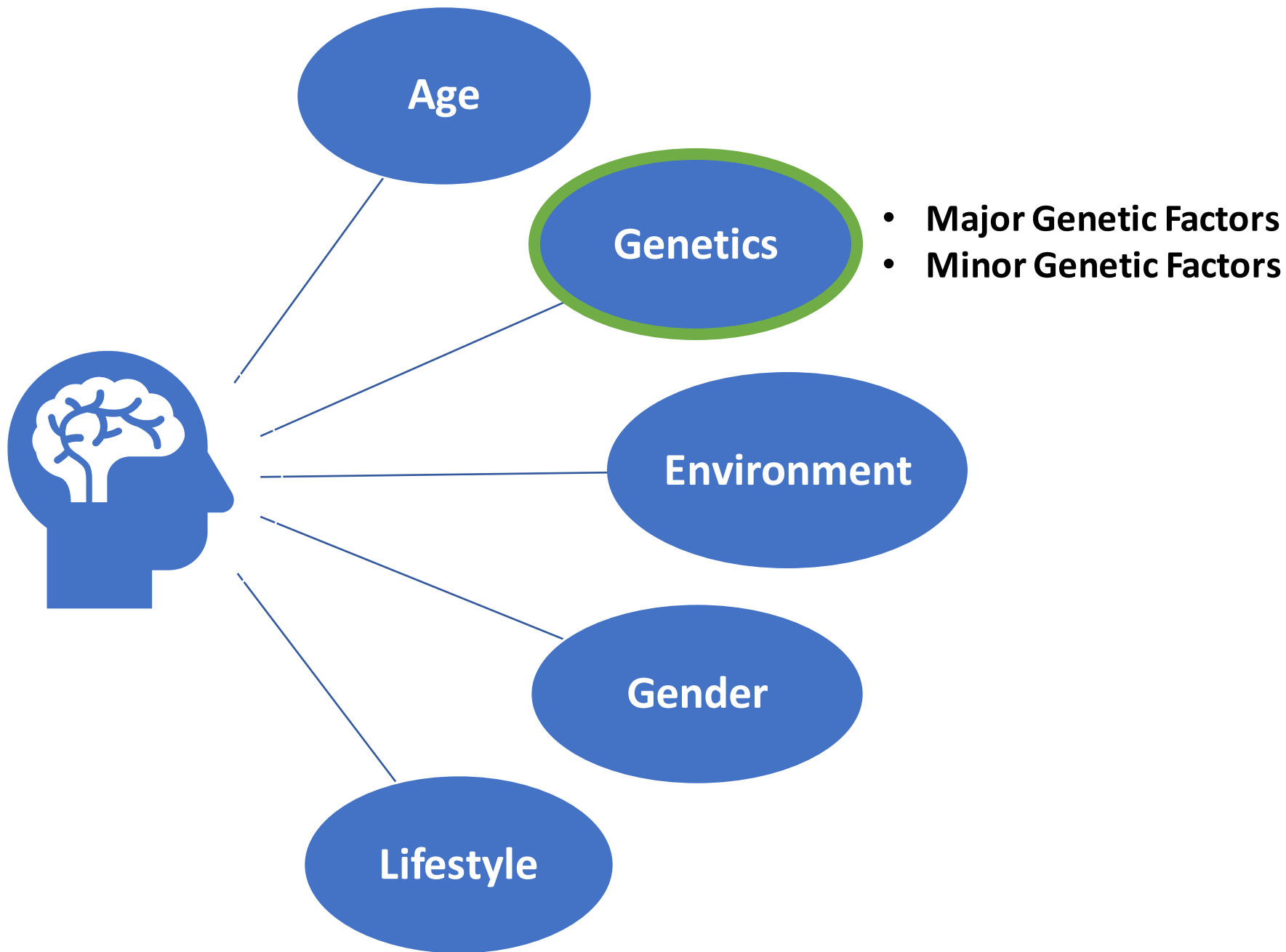
**Triplification**



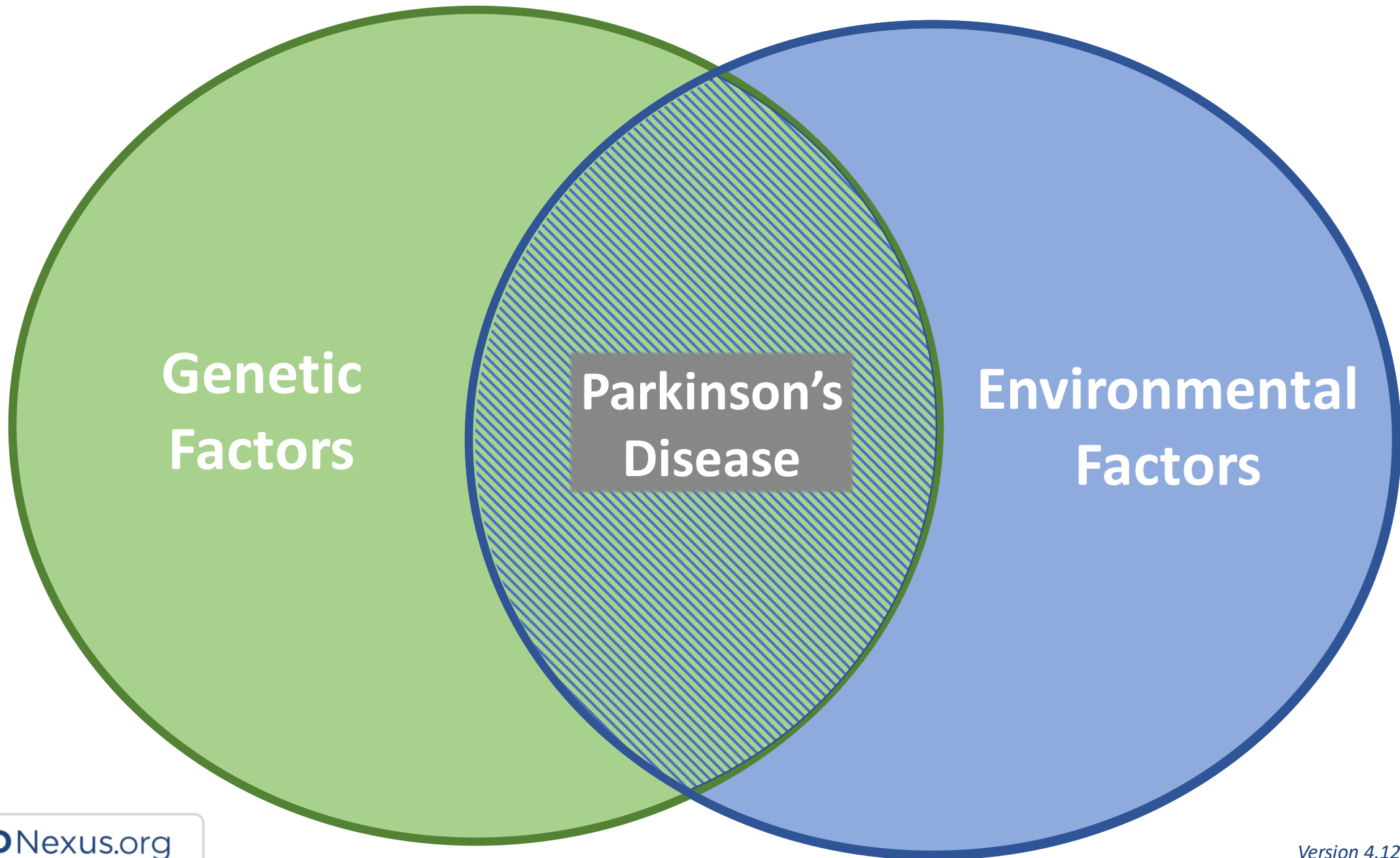




- Pesticides, Herbicides
- Rural Living
- Prior Head Injury
- Infection
- Other



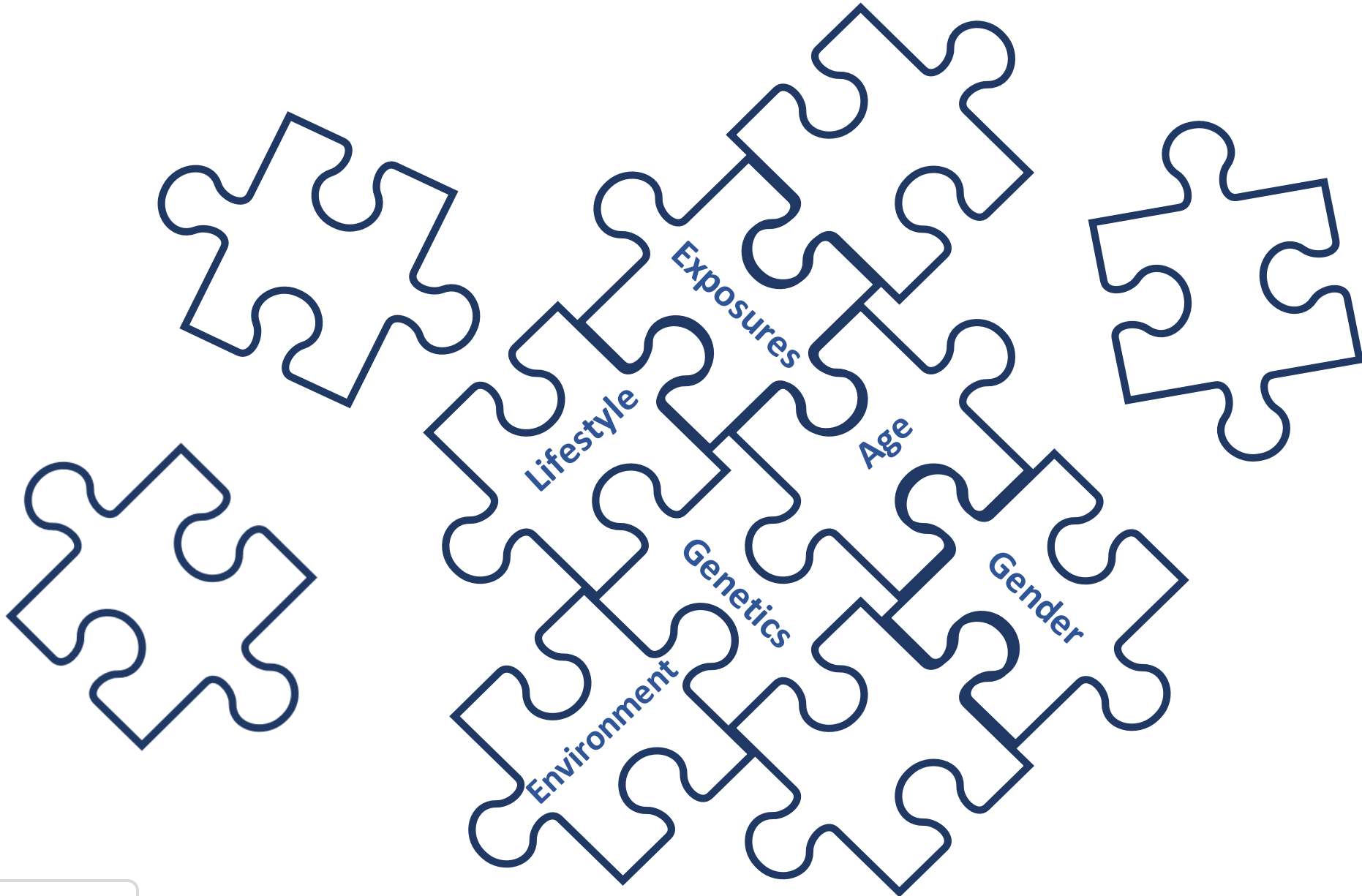




**Genetic  
Factors**

**Parkinson's  
Disease**

**Environmental  
Factors**





# GINA

## Genetic Information Non-Discrimination Act

A Federal Law in the United States

---



### Protects against

- Employment discrimination
- Health insurance discrimination



### Does not protect against

- Life insurance discrimination
- Long-term insurance discrimination
- Disability insurance discrimination



# GINA

## Genetic Information Non-Discrimination Act

A Federal Law in the United States

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GINA **protects** most people from **genetic discrimination by employers and health insurance companies.**



However, **it does *not* protect** a person from **discrimination by life, long-term, or disability insurance companies.**

# Risk of Parkinson's Disease



Baseline Population

3% = 3/100



# Risk of Parkinson's Disease



First Degree Relative

6% = 6/100

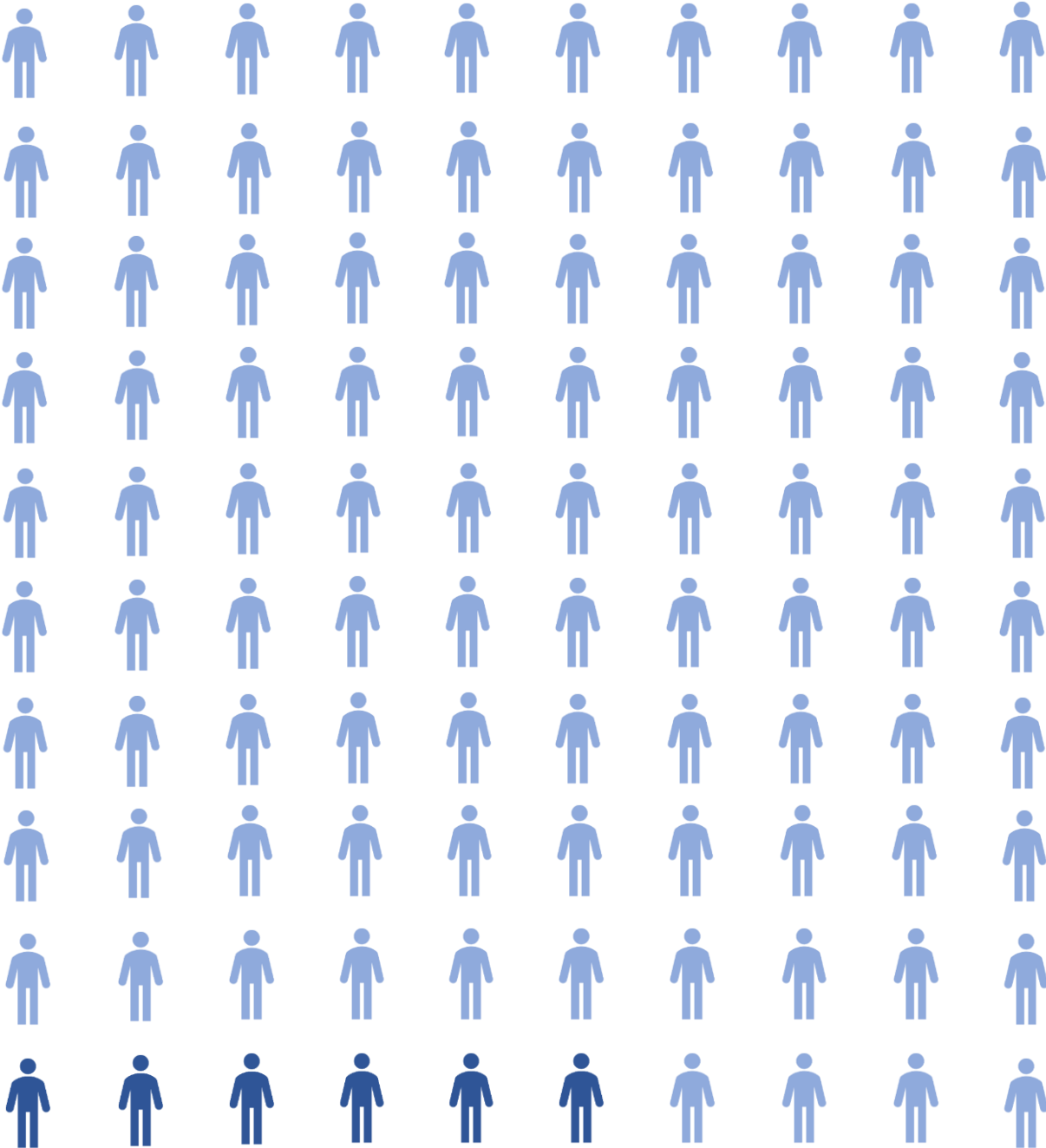


# Risk of Parkinson's Disease



*GBA1* N370S

6% = 6/100



# Risk of Parkinson's Disease



*LRRK2* G2019S

25% = 25/100









# Everyone has an “Parkinson’s jar”

Environmental risk factors



Genetic risk factors

Images by Ben Austin

Adapted from work by Jehannine Austin

# Parkinson's develops when the jar fills to the top



time →

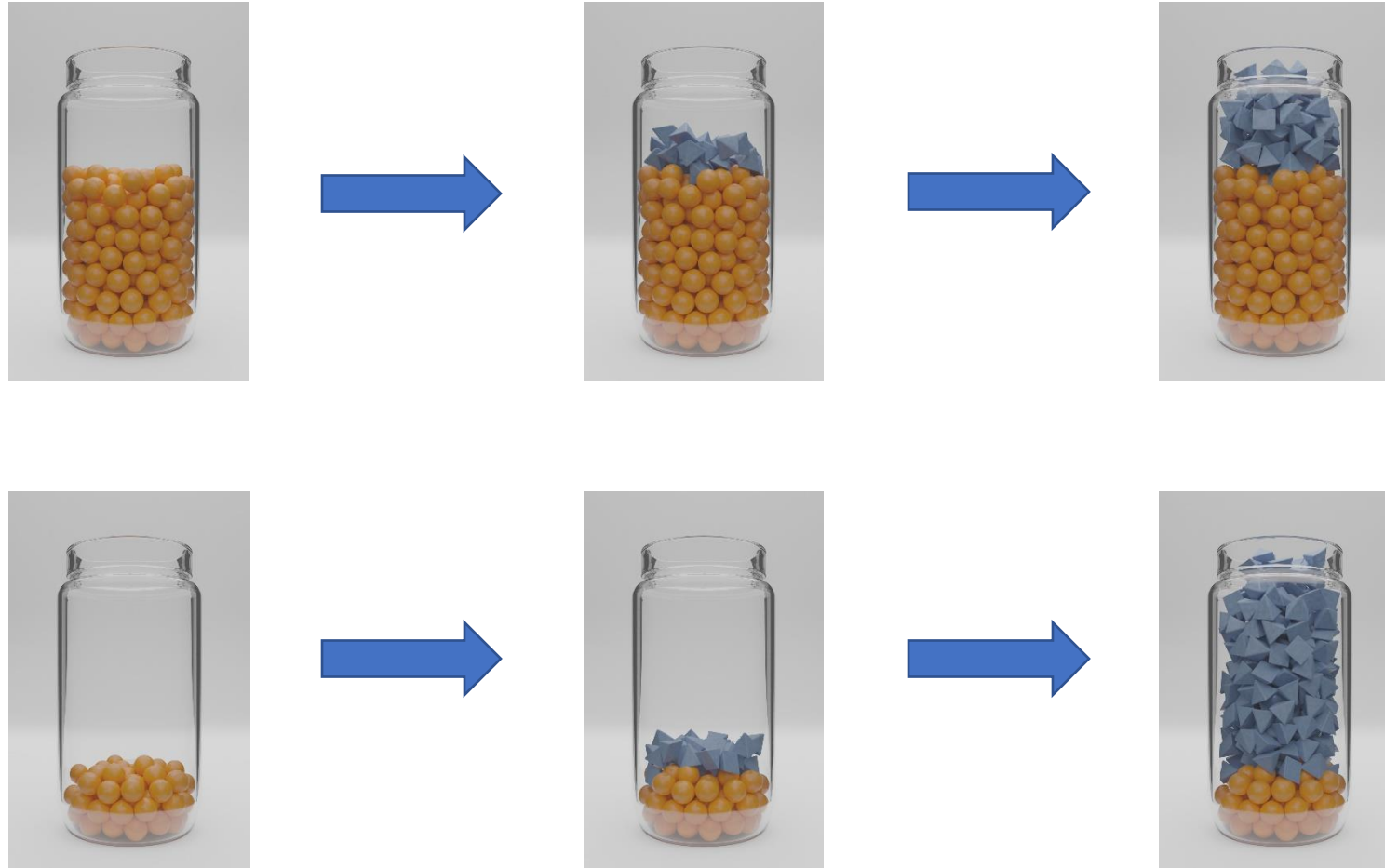


time →



Adapted from work by Jehannine Austin

# Different people have different combinations of genetic and environmental risk factors



Adapted from work by Jehannine Austin



# Protective factors can make the jar taller



Adapted from work by Jehannine Austin



# Everyone has an “Parkinson’s jar”



Adapted from work by Jehannine Austin

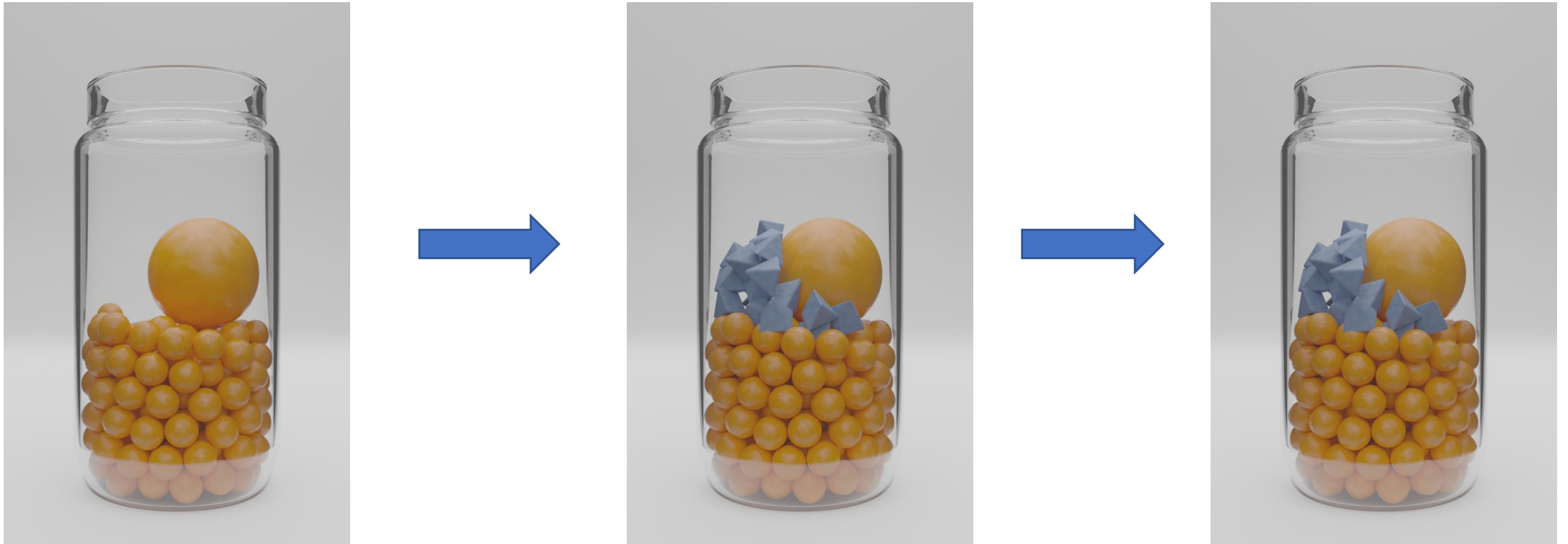
# Parkinson's develops when the jar fills to the top



Adapted from work by Jehannine Austin



## We can have genetic risk factors for Parkinson's but not develop symptoms



Adapted from work by Jehannine Austin





# Protective factors can make the jar taller



Adapted from work by Jehannine Austin