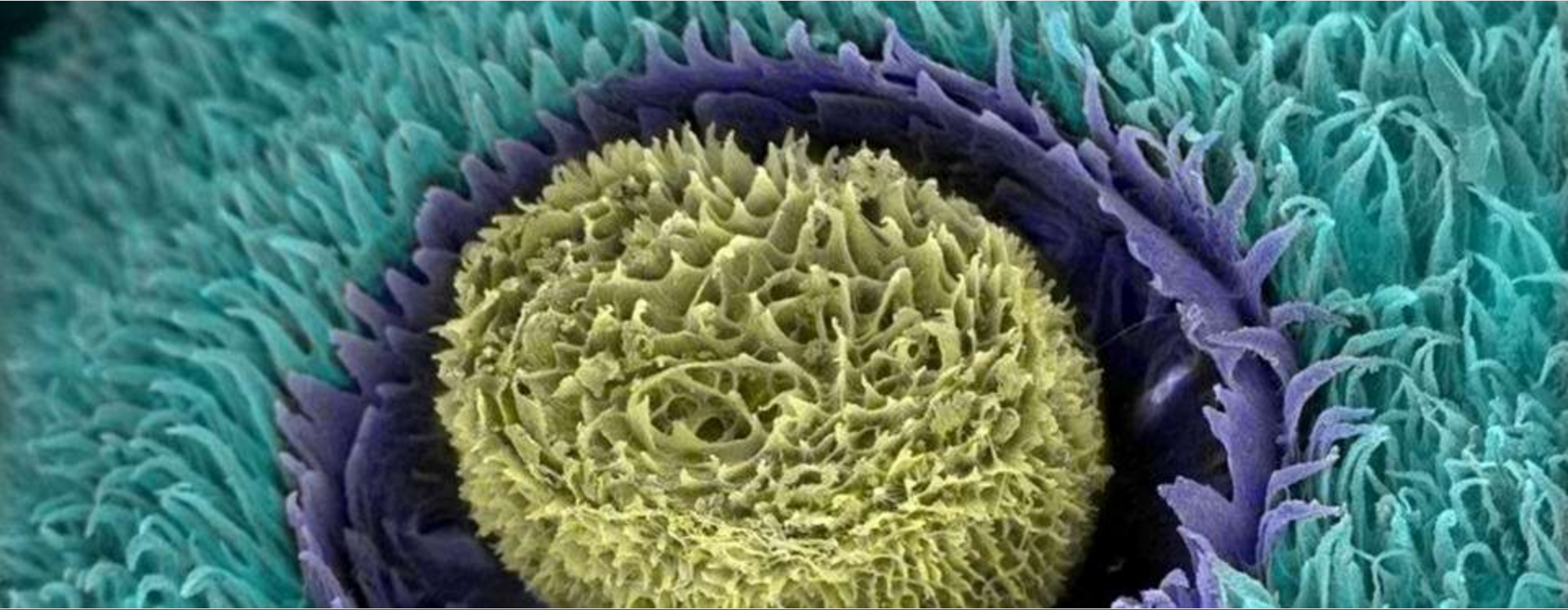


# Exploring Precision Medicine

- Chapter 1: What's the Right Medicine?
- Chapter 2: Is My Sense of Taste Controlled by My Genes?
- Chapter 3: Exploring Our DNA
- Chapter 4: How Is DNA Sequenced, and What Can We Learn?
- Chapter 5: Restriction Enzyme Digestion of TAS2R38 PCR Products
- Chapter 6: Gel Electrophoresis and Genotyping
- Chapter 7: SNPs and Drug Metabolism

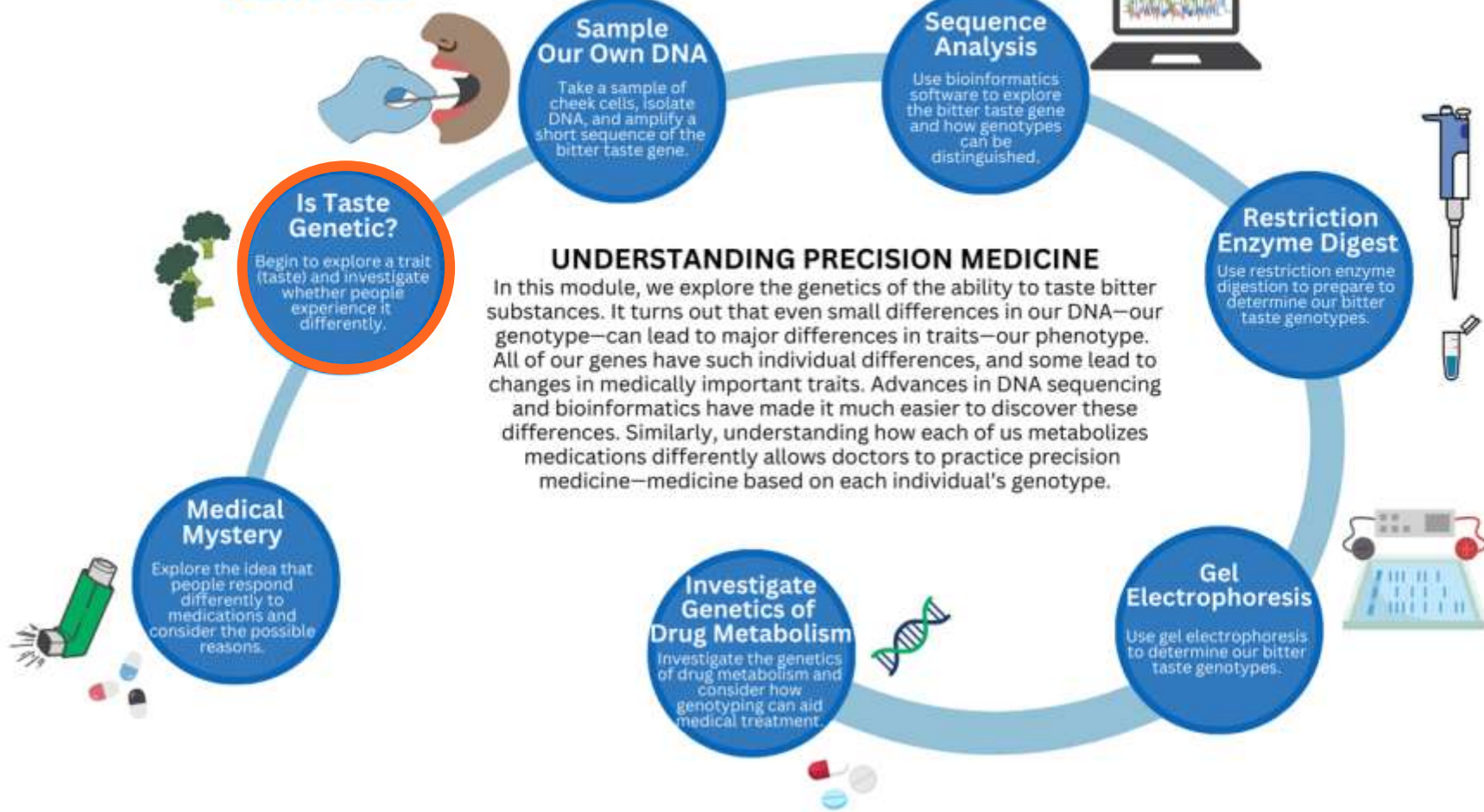
## Chapter 2: Is my sense of taste controlled by my genes?



# Exploring Precision Medicine: Activities

AMGEN Biotech Experience

Scientific Discovery for the Classroom



# Video and discussion: How Do We Taste?



## Video: *Umami*: The 5th Taste, Explained



# Activity: Rate the bitterness of these foods



## Survey directions for RM 2.1:

1. As your teacher shows each slide depicting a food, use the table on **My Bitterness Ratings (RM 2.1)** to rate the bitterness of that food on a scale of 1 to 3, with 1 being “Very bitter” and 3 being “Not at all bitter.” When rating each food, imagine you are consuming it **raw and without any condiments**. After you’ve rated the bitterness of each food, decide which taste word you would use to describe it: **salty, sweet, sour, bitter, or umami (savory)**.
2. If you’ve **never tasted the food**, mark the box “N/A.”
3. Note which foods you described the same way.

# My bitterness ratings

For each food, rate its bitterness on a scale of 1 (very bitter) to 3 (not bitter)



**Apples**

# My bitterness ratings, continued



Strawberries

## My bitterness ratings, continued



Broccoli

## My bitterness ratings, continued



Celery

# My bitterness ratings, continued



Pears

# My bitterness ratings, continued



Carrots

## My bitterness ratings, continued



**Kohlrabi**

## My bitterness ratings, continued



**Brussels Sprouts**

## My bitterness ratings, continued



**Bok Choy/Pak Choy**

# My bitterness ratings, continued



Beans

# My bitterness ratings, continued



Cabbage

# My bitterness ratings, continued



Peas

# My bitterness ratings, continued



Collards

## Discussion: My bitterness ratings

- Are there any patterns in your personal results?
- Did you give similar types of foods similar ratings?
- Have foods always tasted the same way to you? Have you always liked or hated the foods that you like or hate today?



# Discussion: My bitterness ratings, continued

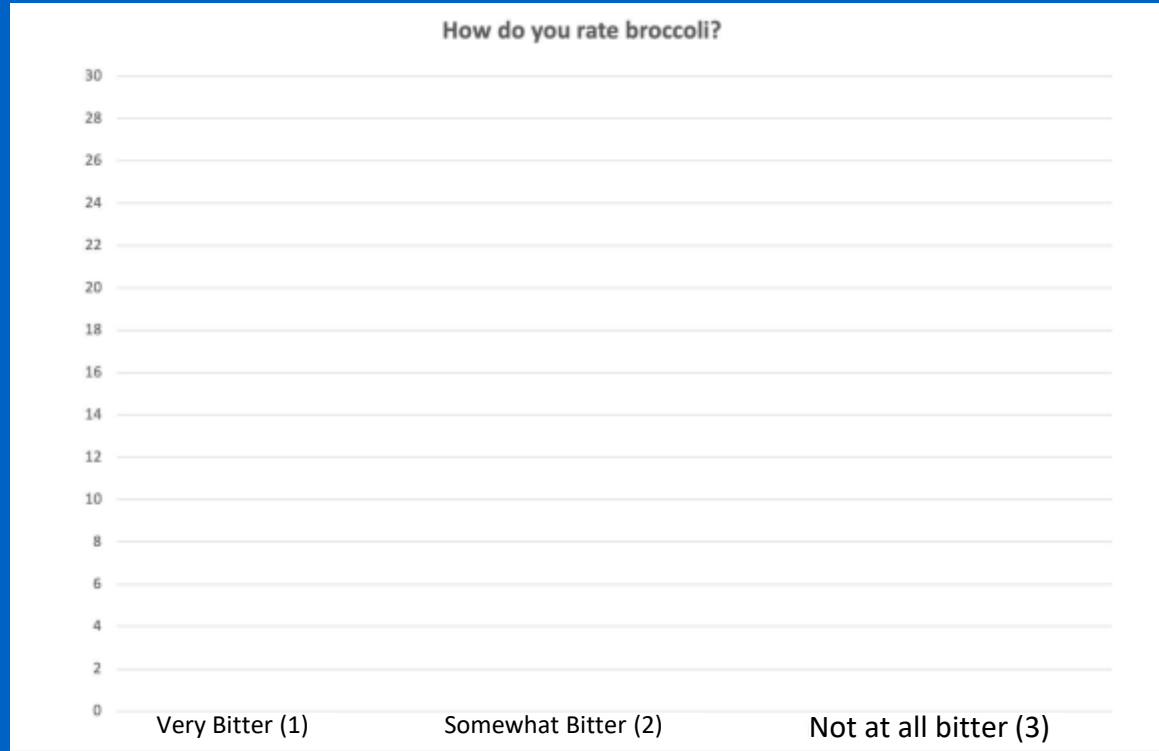
## ***Brassica* vegetables**

All of these vegetables belong to the *Brassica* genus.

What patterns do you notice in your rating of bitter taste for these vegetables?

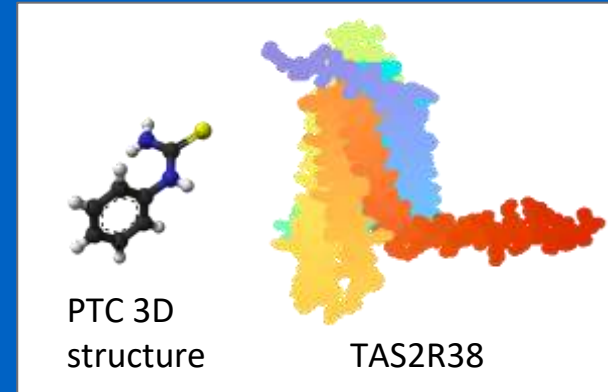


# What do you think of broccoli?



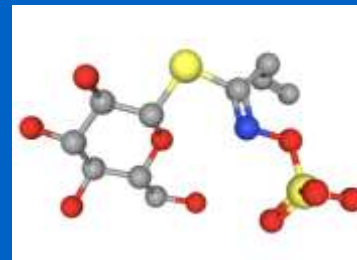
# Our bitter-tasting ability is genetic!

- Human gene: Taster Receptor 2 Member 38, or **TAS2R38**
- It's a bitter-taste receptor at the cell membrane of taste cells in the tongue.
- When it binds to PTC (phenylthiocarbamide), gustatory (taste) neurons send a signal to the brain.
- Not everyone can taste PTC.



## PTC is not found in nature, but . . .

- The ability to taste PTC is correlated with the ability to taste other bitter compounds.
- Brassicaceae are loaded with bitter compounds: glucosinolates.
- People who can taste PTC often dislike broccoli and other Brassicas!



Sinigrin, a bitter glucosinolate in Brussels sprouts and cauliflower

# How easily do you think you could taste PTC?

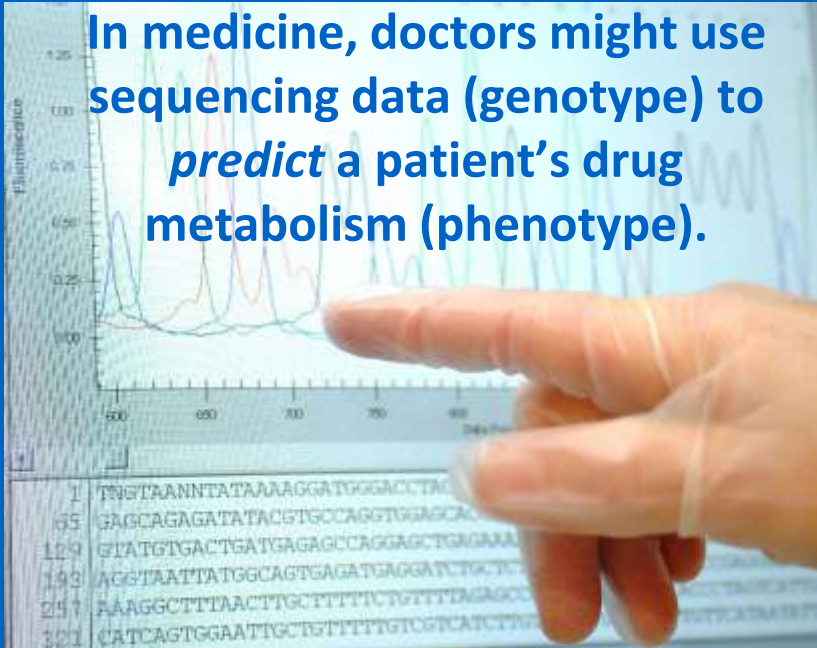
Would you be a strong taster, a weak taster, or a nontaster?

## Review: define genotype and phenotype

**Genotype:**  
**Your genetic makeup**

**Phenotype:**  
**How your genotype is  
expressed**

# Connecting genotype and phenotype



## You will...

- Determine your bitter-tasting phenotype by tasting PTC paper & control paper.
- Infer your genotype, which will be confirmed by PCR, restriction enzyme digestion, and gel electrophoresis.

# What's your PTC taster phenotype?

- Time for a taste test!
- Directions:
  - Taste the control strip. (**Don't swallow it!!**)
  - Rinse your mouth with water.
  - Taste the PTC paper. (**Don't swallow it!!**)
  - Record your taste level on **RM 2.2**.
  - Record your teammates' responses on page 2.
- **Hint:** If you are a strong taster, the PTC paper will taste terribly bitter!

Supplemental Material 2.2  
**CAN YOU TASTE PTC?**

1. What does this control taste like? (Sweet, Sour, Bitter)

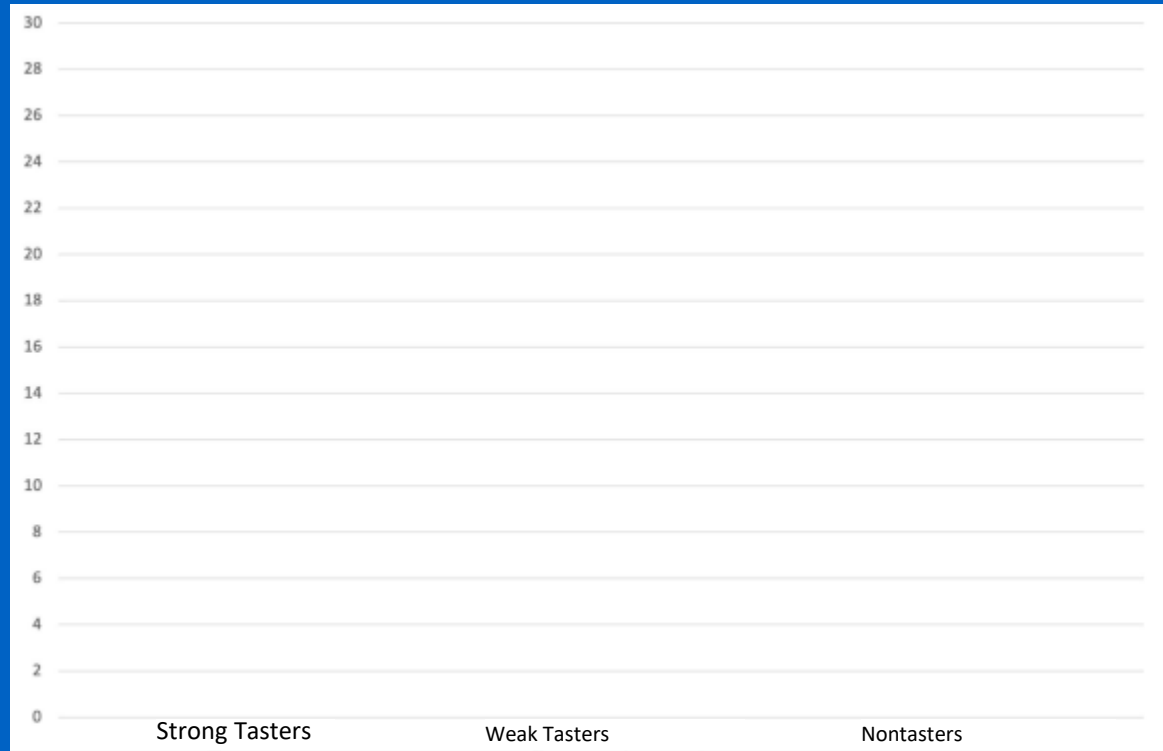
2. Record if you are a strong taster, weak taster, or non-taster in the table below. Record your teammates' responses in the table as well.

| Student | Strong taster | Weak taster | Non-taster |
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3. Record your response in the table below.

| Student | Strong taster | Weak taster | Non-taster |
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# How easily could you taste PTC?



## Before the next lab:

- Watch the video *What Is a Gene?*
- *If your teacher assigns it:* Read the article “Mamas, Don’t Let Your Babies Grow Up to Be Broccoli-Haters.”
- Complete **RM 2.3**.
- Read in your Student Guide about how PCR works.
- Complete **RM 2.4**.

# Discussion: “Genetic Taste Markers and Food Preferences”

## Before the next lab:

- Read in your Student Guide about how PCR works
- Complete **RM 2.4**