

PTC and PROP taste strips

The PTC and PROP are not 'taste' tests and can evaluate only one's ability to taste PTC or PROP. They test only for the genetic ability to taste PTC and PROP, if a person cannot taste the bitterness on the strips that does not imply the person cannot taste.

Herewith a protocol which may help by administering the PROP and PTC taste strips:

- Depending on size of audience, either have whole class participate, or ask for 20-30 volunteers
- You can do one of two things next:
 - 1. Pass out paper towels and Dixie cups. Arrange to fill cups with water.
 - 2. Pass out hard candies like peppermints or butterscotch.
- Pass out the control strips. Have the kids label the strip in pencil with the number 1. Or have them hold it in their left hand if they don't have a pencil.
- Pass out the PTC (or PROP) strips. Have the kids label the strip in pencil with the number 2. Or have them hold it in their right hand if they don't have a pencil.
- Have the kids put the control strip of paper on their tongue. Instruct them to write down what it tastes like to them (or just remember).
- Have the kids put the PTC (or PROP) strip of paper on their tongue. Instruct them to write down what it tastes like to them (or just remember).
- Ask the kids how many of them could taste the PTC paper. Write down the number (on a board everyone can see if possible).
- Then confirm the rest of the kids could NOT taste the PTC (or PROP) paper. Write down the number (again, on a board if possible). Hopefully, the two numbers will add up to your total number of participants!
- Tell the students the second strip was impregnated with a chemical known as PTC (or PROP). Some people can taste it, others can't. Ask them why.
 - Why is because there is a single gene which codes for a protein found in our tongues. PTC (or PROP) will bind with the protein if it present and a person will taste it. If the protein is not present, PTC (or PROP) will not bind and a person cannot taste it.
- Tell the students to look at the numbers and what do they think about the genetic ability to taste PTC (or PROP).
 - Being able to taste PTC (or PROP) is a dominant trait. About 2/3 to 3/4 of the class should be able to taste it, while 1/3 to 1/4 will not.
- Then ask the "PTC-tasters/ PROP-tasters" what it tasted like. They should all say "bitter" (or gross or something like that). Ask them if there were any who thought it was so bitter they simply could not stand it. Hopefully, about 1/3 of the "tasters" (or about ¼ of the total participants) will say that was the case.
 - "Super tasters" are homozygotes for the dominant allele. It appears as though they produce either more proteins or proteins with more binding sites available to the PTC/ PROP. Before telling the students this, you can ask them WHY a homozygote dominant thinks PTC/ PROP tastes more bitter and see if they make the connection with the proteins.
- Other interesting facts:
 - Only about half of Aboriginal peoples from Australia and New Guinea are tasters. Nearly 100% of indigenous Americans (i.e. Native Americans and Inuits) are tasters. This is a good opportunity to discuss population genetics, "founder effects," and the like.
 - People who can taste PTC/ PROP are more likely to be non-smokers and to not be in the habit of drinking coffee or tea. People who are super-tasters are more likely to

find green vegetables bitter. This is a good opportunity to discuss how PTC/ PROP is related to the genetics of taste. Women, Asians, and African-Americans are all more likely to be super- tasters. Another interesting point to discuss: what might be the genetic advantage or disadvantage of being a super-taster? (Advantages include avoiding alkaloid toxic plants, lower fat intake; disadvantages include lower vegetable intake, more narrow consumption of palatable foods)

- If in a larger group, maybe ask for a second round of volunteers to see if you get similar results with a different population.
- You can also offer the students extra control and PTC/ PROP strips to take home if they want to test their families, if there are enough supplies.

Scientific background

There are lists of scholarly articles which can be found on PubMed www.ncbi.nlm.nih.gov/pubmed/ .

Here are some links to some articles:

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1397913/>

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6889489/>

www.ncbi.nlm.nih.gov/pubmed/24025627