

**Article-Based Observation: Q**

**Directions:** Read the introduction of the *Science News* article "[Parkinson's pathways](#)" and answer the related Introduction to Parkinson's disease questions. Then in a group, read the article section assigned to you by your teacher and answer the related questions. The sections are: Gut feeling, Neural highway, Belly bacteria, Microbial forces and Head for cure. Once your group is finished, prepare and present a short summary of your article section to the class. Finally, individually answer the two questions in the last section titled, Summarize ideas and think critically.

**Introduction to "Parkinson's pathways"**

**1. What is Parkinson's disease and what causes it?**

**2. Why are Parkinson's researchers interested in the gut and nose?**

**3. Describe a recent study that provides evidence for a link between the gut and Parkinson's disease.**

## Gut feeling

4. Describe an early connection made between the gastrointestinal tract and Parkinson's disease?
  
  
  
  
  
  
  
  
  
  
5. What is alpha-synuclein and what is known about its role in Parkinson's disease?
  
  
  
  
  
  
  
  
  
  
6. What evidence did neuroanatomists Heiko Braak and Kelly Del Tredici and their collaborators find that suggested Parkinson's might not arise in the brain?
  
  
  
  
  
  
  
  
  
  
7. What is the standard treatment for Parkinson's disease?

## Neural highway

8. How might proteins associated with Parkinson's disease travel from the gastrointestinal tract to the brain? What have experiments in mice found?
  
  
  
  
  
  
  
  
  
  
9. What results were found in patients who had their vagus nerve severed right above the stomach?
  
  
  
  
  
  
  
  
  
  
10. What is *LRKK2* and how does it relate to Parkinson's disease and the gut?
  
  
  
  
  
  
  
  
  
  
11. What further links were found between inflammatory bowel disease and Parkinson's disease?

## **Belly bacteria and Microbial forces**

**12. What results were found in mice that were genetically engineered to overproduce the alpha-synuclein protein?**

**13. What happened in one study when rats' gut bacteria became stressed and produced their own amyloids? What does this suggest about a gut-brain connection?**

## **Head for a cure**

**14. What do observational studies of Parkinson's patients' microbiomes find? What does the finding mean for our understanding of Parkinson's disease?**

**15. How might microbiome research help Parkinson's patients?**

**16. Who is Martha Carlin and what is she doing to help promote further research of the microbiome and Parkinson's?**

**17. Who is John Carlin and what is he doing to help people who are diagnosed with Parkinson's?**

## **Summarize ideas and think critically**

**18. What is the central idea of the article?**

**19. If the gut turns out to have an important role, what approaches could you imagine that might eventually treat Parkinson's disease?**