



Background

Encapsulation traps flavor molecules within lipids or polysaccharides for controlled release. In microgravity, fluid shifts reduce olfactory sensitivity, dulling taste. Encapsulated systems protect and time-release flavors to enhance astronauts' sensory experience.

Significance

Enhancing flavor perception is vital for astronaut nutrition and morale. Microencapsulation ensures flavor stability and controlled release, potentially creating 'smart foods' adaptable to long-duration missions.

Research Question:

How can encapsulation technology be used to enhance taste perception and aroma delivery for astronauts experiencing sensory dulling in microgravity?

Methods

Tube Type: MixStix (3 chambers, 2 clamps; total volume ~6.5 mL).
Chamber 1: Encapsulated flavor compound (Garlic oil or Umami IMP/GMP).
Chamber 2: Neutral buffer (pH 7.0).
Chamber 3: Collection chamber for post-mix sample.

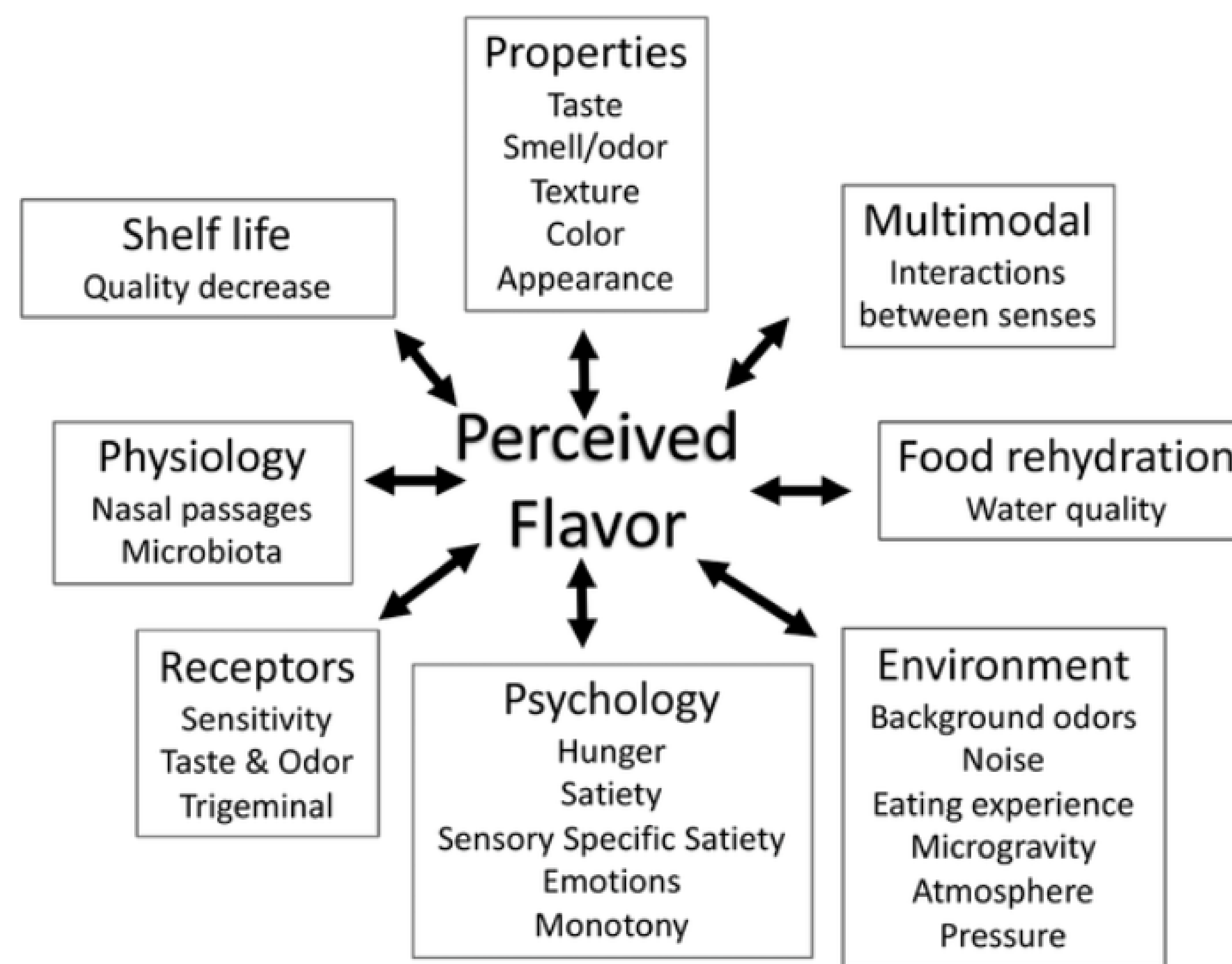
Crew Interaction:

A=0 Open Clamp 1 → mix compounds.

A+2 Open Clamp 2 → move mixture to Chamber 3.

U-14 through U-2: no further manipulation.

Rhodium Fluid Experiment Tube (RhFET-01) Mini-Laboratory Configuration



Factors that have the potential to affect the flavor perception of foods in space

Expected Outcome and Analysis

Post-flight GC–MS analysis of volatile compounds (e.g., diallyl disulfide) and umami markers.
Conductivity and pH will verify chemical stability.

Insight:

If release profiles remain stable post-flight, encapsulation can sustain flavor integrity for future space food systems.

Conclusion

Encapsulation can counter sensory dulling in microgravity, improving astronaut well-being and food satisfaction. Results could advance flavor delivery for both space and Earth applications, aiding populations with sensory impairments.

References

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