

Diphenhydramine Overdose

A review of prevalence, presenting symptoms, and the pressing need to develop and implement a prompt toxicology screen

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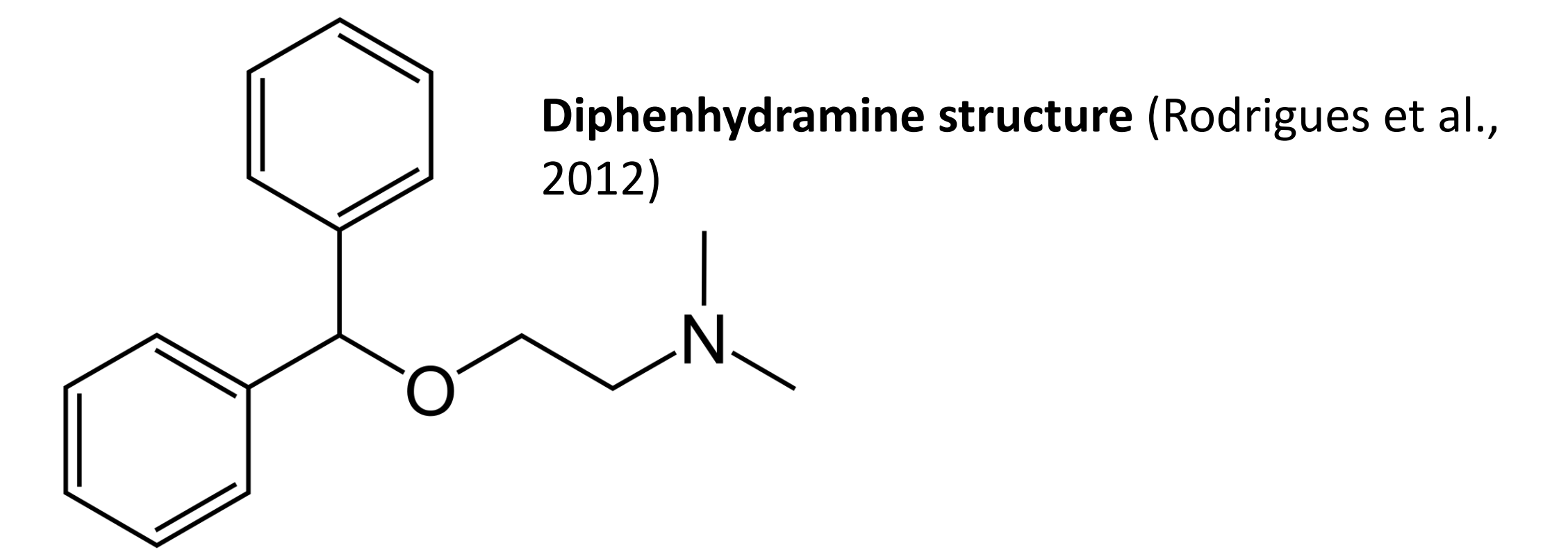
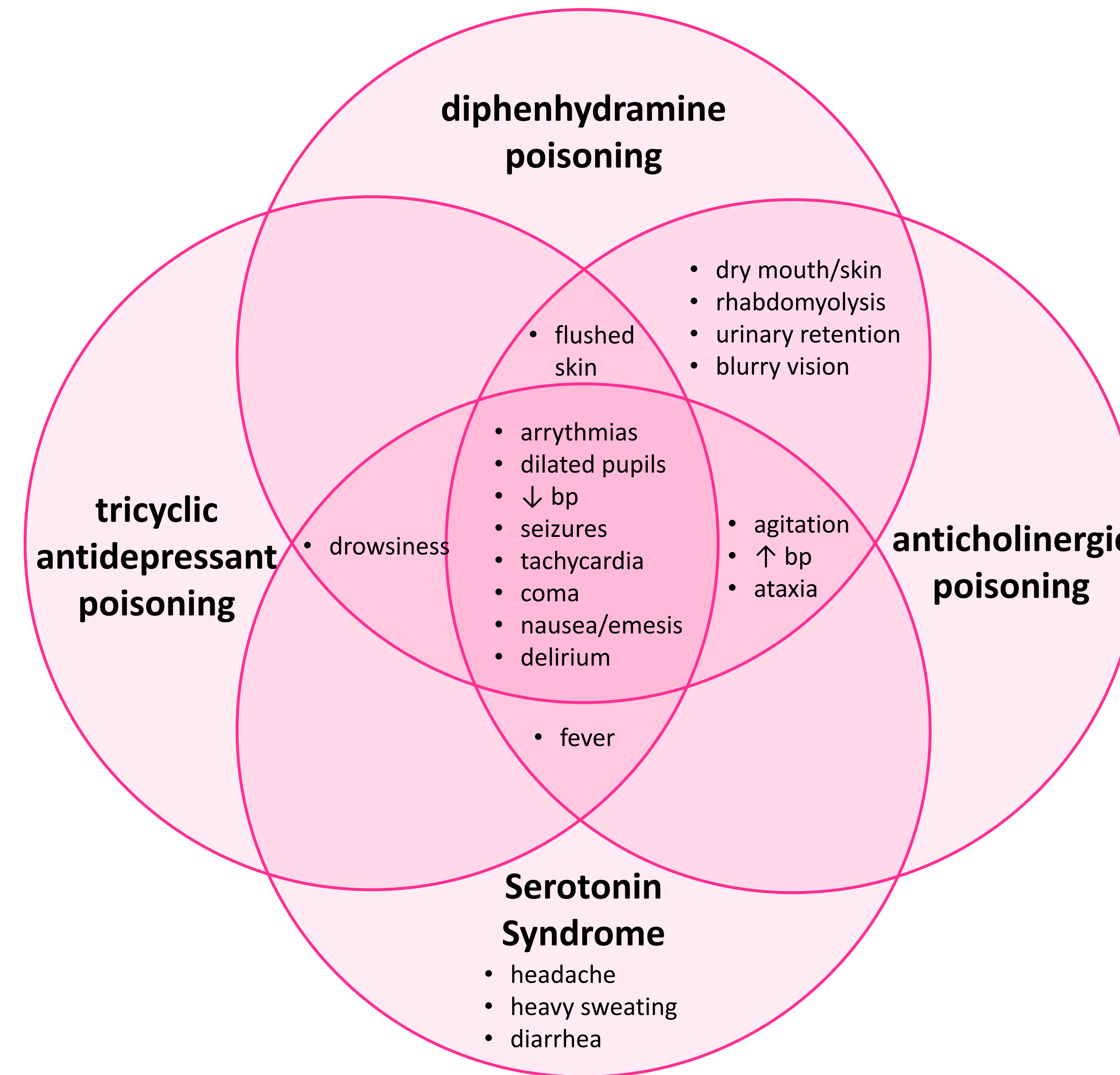
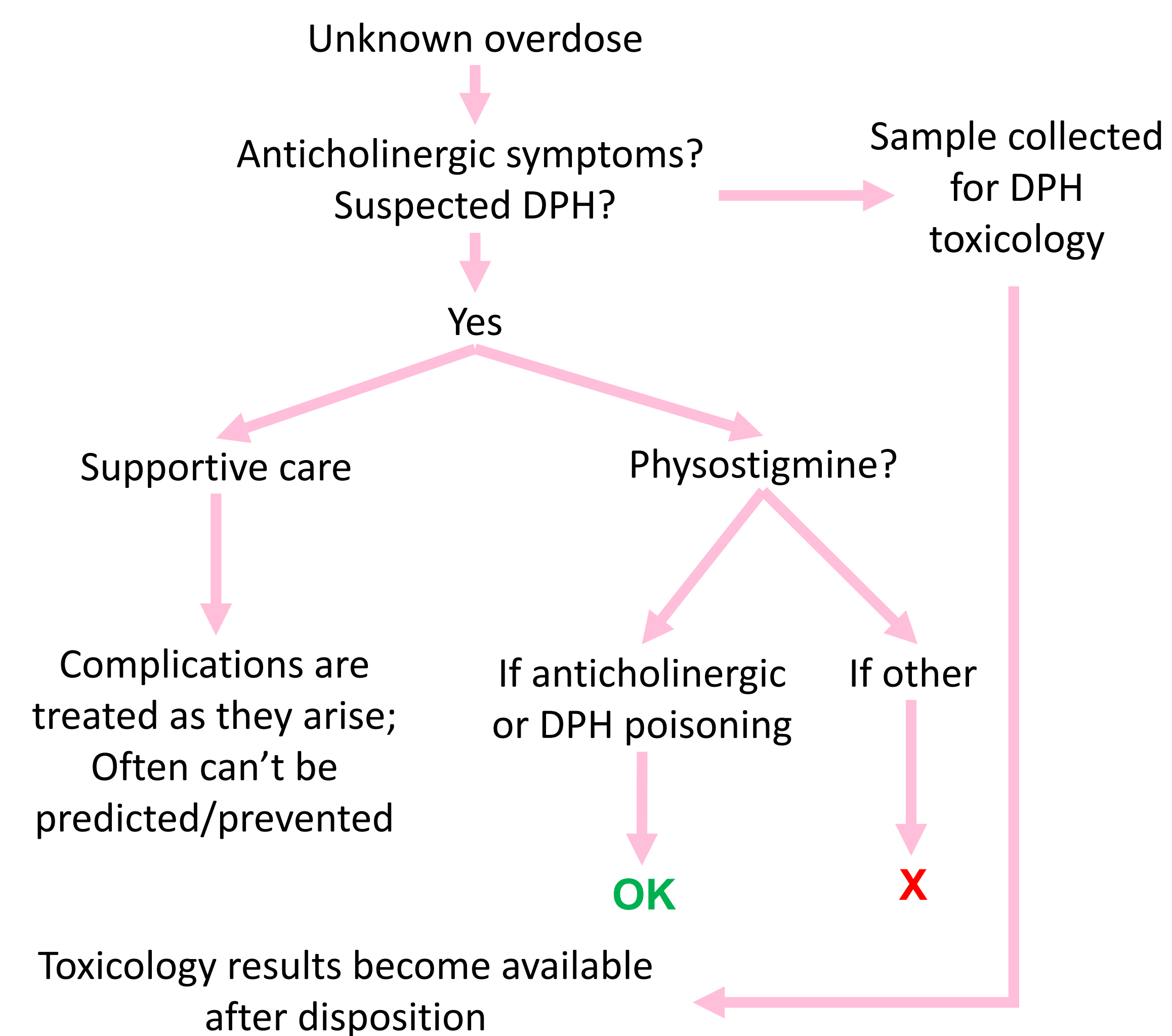
Introduction and Prevalence

- Diphenhydramine (DPH) overdose is common due to easy access.
- It can lead to serious permanent injury or death.
- Recently, the “Benadryl Challenge” caused many teens to overdose on DPH for hallucinogenic effects.
- In 2016 and 2017, diphenhydramine was one of the most frequently used drugs in suicide attempts.
- The cause of this overdose is often unknown due to the patient being unconscious/incoherent and unable to self-report DPH intake.
- The approach to diagnosing DPH poisoning can be streamlined.

Objective

I reviewed relevant case studies to create a comprehensive list of DPH poisoning symptoms, including less commonly recognized signs. I also explored the benefits of incorporating DPH testing into routine toxicologic/diagnostic tests.

Current Treatment of Unknown Overdoses



Development of Rapid Testing

- Immunoassay “ELISA”
 - Blood plasma/urine
 - Reliability has yet to improve
- Gas chromatography/mass spectrometry
 - Most common
 - Blood plasma
 - Can detect other types of antihistamines
 - Research is focused on improving extraction methods

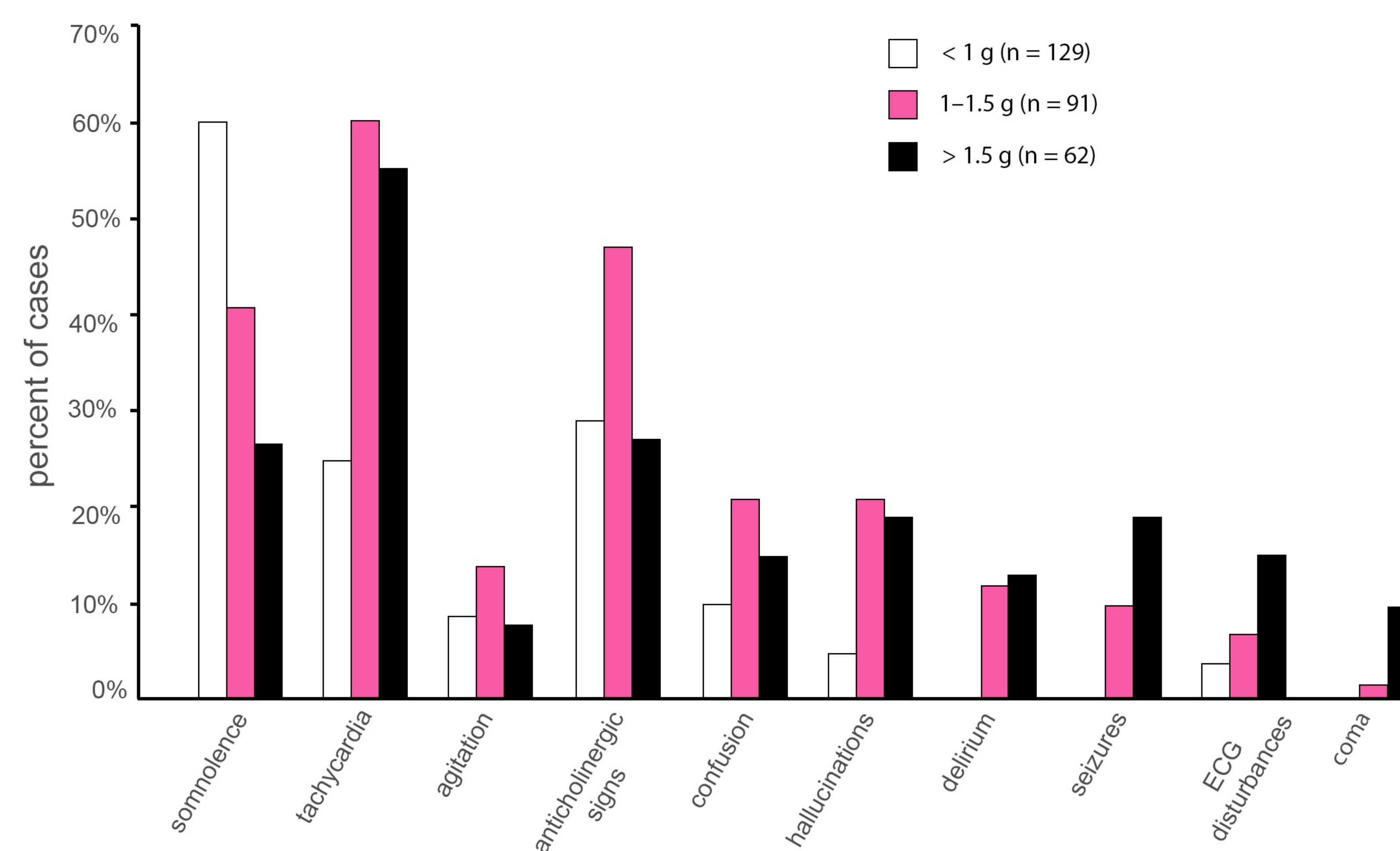
Conclusions and Future Direction

1. DPH poisoning is highly prevalent and can be lethal.
2. New literature shows that symptoms vary more widely than was previously thought and can be confused with other common poisonings.
3. Rapid tests for DPH in blood or urine can:
 - help rule out very similar overdoses and syndromes,
 - produce timely enough results to inform treatment,
 - help predict and prevent known complications of DPH poisoning.
4. Making DPH testing more commonplace in local emergency departments by incorporating it into routine drug screens can accelerate results.

Citations

- Radovanovic, D., Meier, P. J., Guirguis, M., Lorent, J. P., & Kupferschmidt, H. (2000). Dose-dependent toxicity of diphenhydramine overdose. *Human & experimental toxicology*, 19(9), 489–495. <https://doi.org/10.1191/096032700671040438>
- Rodrigues, W. C., Castro, C., Catbagan, P., Moore, C., & Wang, G. (2012). Immunoassay screening of diphenhydramine (Benadryl) in urine and blood using a newly developed assay. *Journal of analytical toxicology*, 36(2), 123–129. <https://doi.org/10.1093/jat/bkr015>

Comparison between symptoms caused by diphenhydramine poisoning vs. three other common poisonings and their complications. The figure above shows a huge overlap in symptoms between these four conditions—and each is commonly seen in the emergency department. It’s a broader range of symptoms than was previously thought. Without concrete diagnostic testing, a diagnosis can be difficult or even impossible to determine. “bp” → blood pressure



Dose-dependent toxicity of DPH. In this study, 282 participants were given varying dosages of DPH. Their symptoms were categorized, ranging from mild to severe (from left to right). At lower dosages, severe symptoms were rare; at increased dosages, mild-moderate symptoms like anticholinergic effects withered and were replaced with severe symptoms. Anticholinergic effects peaked at moderate dosages. (Data were adopted from Radovanovic et al., 2000 and modified for clarity).