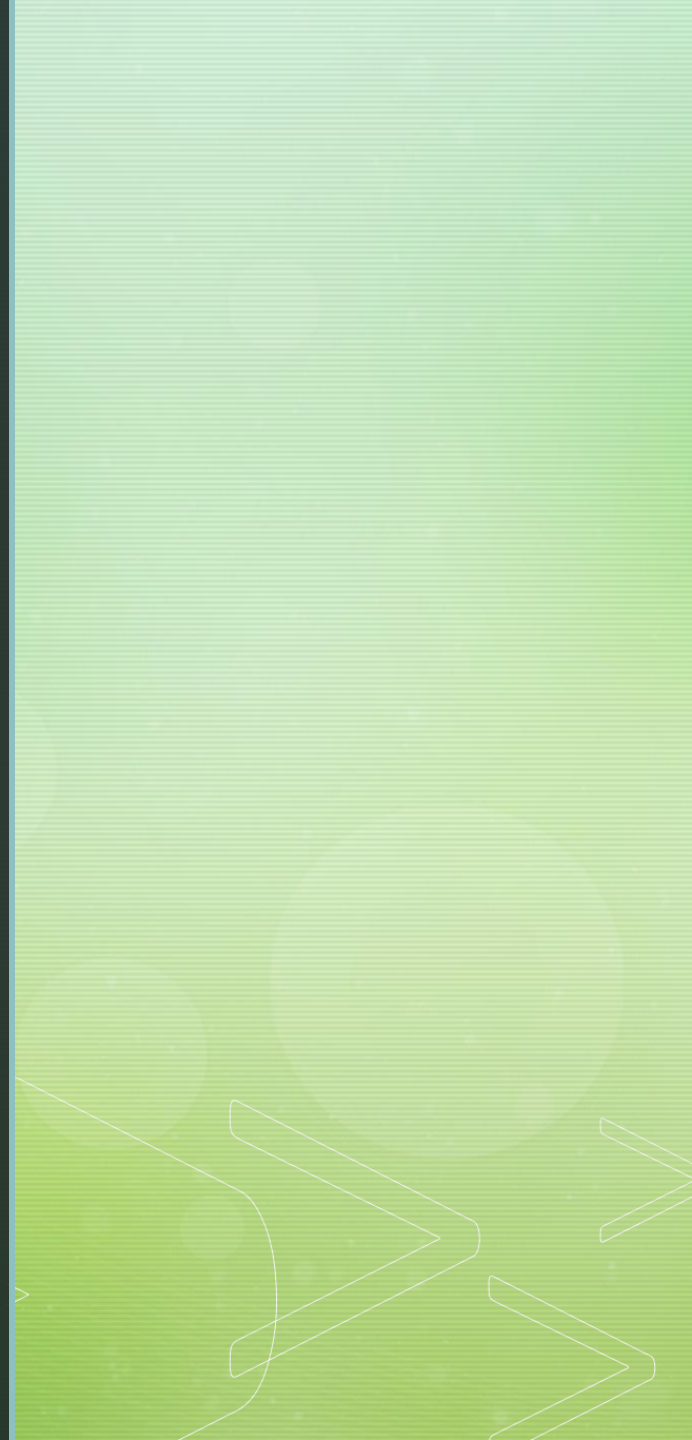


Claudia King & Louis van Rensburg

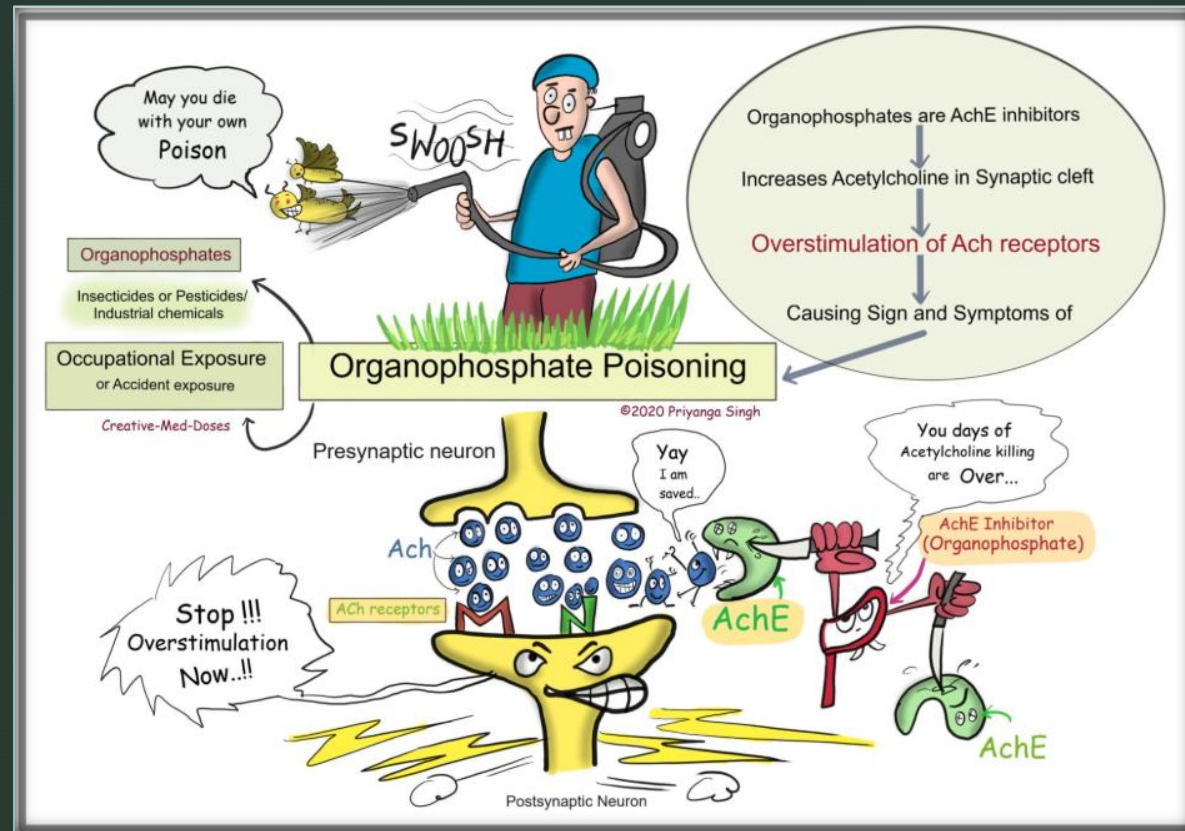


# Approach to Organophosphate Poisoning



# Introduction to Organophosphate Poisoning

- **What are Organophosphates (OPs)?**
  - Organophosphates are a group of chemicals commonly used in pesticides, herbicides, and industrial chemicals.
  - OP compounds also include certain nerve agents (e.g., VX, Sarin).
- **How do OPs cause poisoning?**
  - OPs inhibit acetylcholinesterase (AChE), an enzyme that breaks down acetylcholine at nerve synapses, leading to overstimulation of muscles, glands, and the central nervous system.



# Epidemiology of OP Poisoning

- **Incidence**

- Common in agricultural regions due to widespread pesticide use.
- Also occurs in suicides, occupational exposures, and accidental poisonings.
- A growing concern in chemical warfare and terrorism (e.g., nerve agent attacks).
- Intentional Poisoning of foods in South Africa causing death in children in the rural communities

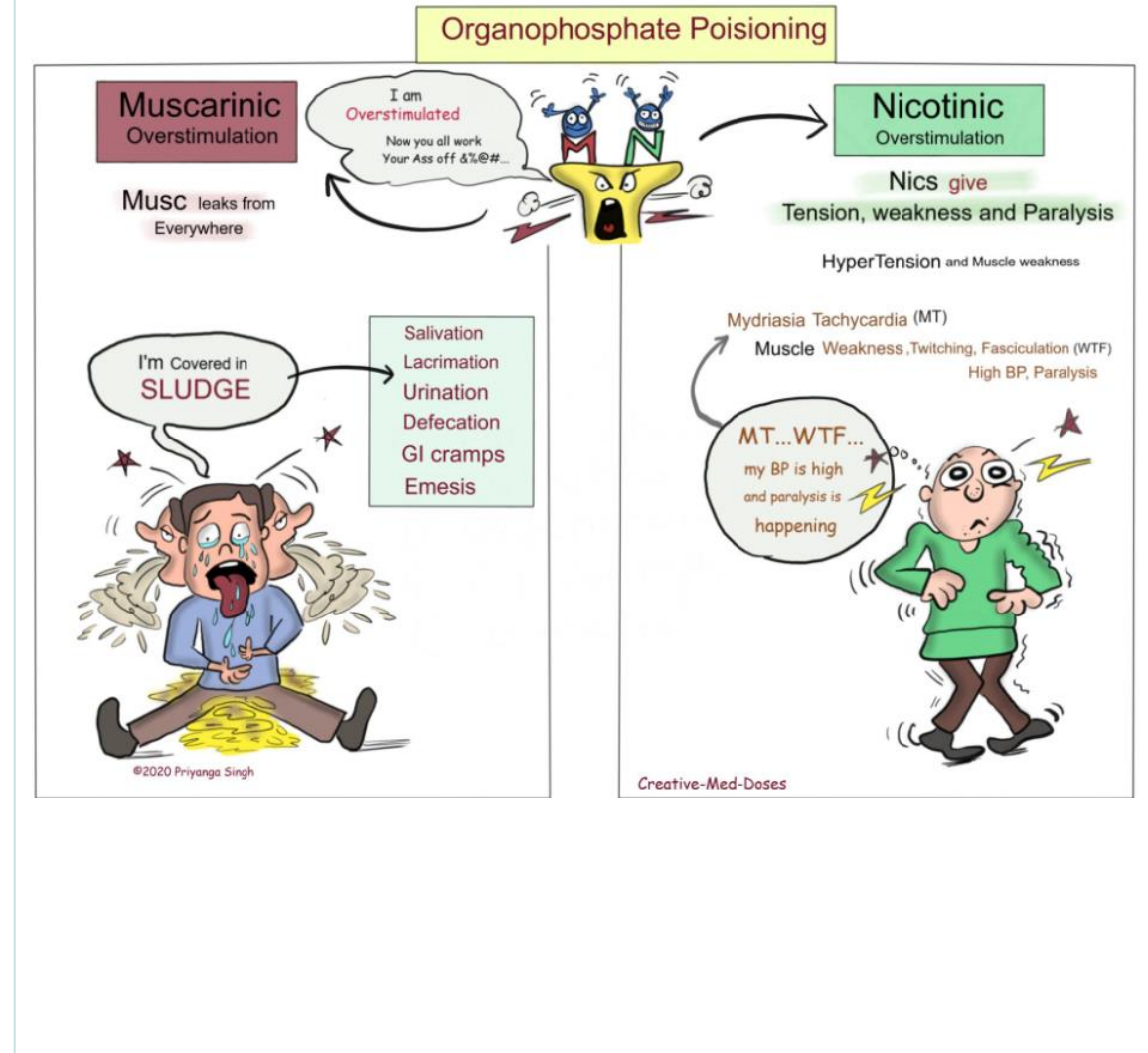
- **Toxicity Levels**

- Vary based on the type of OP, route of exposure (inhalation, ingestion, skin contact), and dose.

# Pathophysiology

- **Cholinergic Crisis**

- The central mechanism of OP poisoning is acetylcholine accumulation.
- Overstimulation of muscarinic and nicotinic receptors leads to symptoms in multiple organ systems:
  - **Muscarinic (parasympathetic):** Salivation, lacrimation, urination, defecation, gastrointestinal distress, emesis (SLUDGE), bradycardia, hypotension.
  - **Nicotinic:** Muscle weakness, fasciculations, respiratory failure due to paralysis of the diaphragm and intercostals.
  - **Central Nervous System:** Confusion, seizures, coma, respiratory depression.





# Prehospital Recognition of OP Poisoning

- **Key Symptoms to Identify (SLUDGE + Killer Bs):**
  - **SLUDGE:** Salivation, Lacrimation, Urination, Defecation, Gastrointestinal distress, Emesis.
  - **All Taps Open**
  - **Killer Bs:** Bronchorrhea, Bronchospasm, Bradycardia.
- **Signs & Symptoms**
  - **Mild Exposure:** Sweating, nausea, dizziness, blurred vision.
  - **Moderate Exposure:** Vomiting, diarrhea, bradycardia, respiratory distress, confusion.
  - **Severe Exposure:** Seizures, paralysis, coma, and death.
- **Differential Diagnosis**
  - Consider other causes of cholinergic symptoms (e.g., other toxins, infections, medication side effects).
  - **History of exposure** to pesticides, herbicides, or chemical agents is crucial.



## Cognitive Aids:

---

- SLUDGE
- DUMBELS
- Killer B's

**S**alivation

**L**acrimation

**U**rinary incontinence

**D**efecation

**G**astrointestinal pain

**E**mezis

**D**efecation

**U**rination

**M**uscle weakness  
**Y**osis

**B**radycardia  
**B**ronchorrhea  
**B**ronchospasm

**E**mezis

**L**acrimation

**S**alivation



**Killer B's**



Bradycardia

Bronchorrhea



Bronchospasm

# Prehospital Management Overview

- **First Principles**
  - **Early recognition** is key.
  - **Rapid intervention** improves survival and reduces morbidity.
  - The goal is to decontaminate the patient, treat symptoms, and prevent further exposure.
- **Prioritize Safety**
  - **Personal Protective Equipment (PPE)** for responders: gloves, masks, and goggles.
  - **Decontamination** should be performed early, before transport if possible.

# Decontamination

- **Remove the Patient from Exposure**
  - **Move the patient away** from the source of contamination (if possible).
- **Skin Decontamination**
  - **Remove contaminated clothing** immediately.
  - **Wash skin** thoroughly with soap and water (not alcohol, which can enhance absorption).
- **Eyes**
  - **Flush eyes** with water for at least 15 minutes if exposed.
- **Inhalation Exposure**
  - Remove the patient to fresh air.
  - If safe, use a powered air-purifying respirator (PAPR) or other respiratory support.
- **Ingestion**
  - Biggest concern in SA at the moment
  - No way to decontaminate



# Pharmacological Management



## Atropine

**Action:** Anticholinergic drug that blocks muscarinic receptors.

**Indication:** For severe muscarinic effects like bradycardia, bronchospasm, and salivation.

**Dose:**

- Initial: **2–5 mg IV/IM** (repeat every 3–5 minutes if symptoms persist, no max dose).
- 0,02mg/kg doubling the dose each time
- Higher doses may be needed for severe cases.
- Followed up with 10 or 20% of the total dose needed for atropinization every hour via IV infusion

## Diazepam

**Action:** Anticonvulsant.

**Indication:** For seizures.

**Dose:** **5–10 mg IV** (repeat as needed).



# Advanced Airway Management

- **Respiratory Support**

- Severe OP poisoning often results in respiratory failure due to paralysis of the diaphragm and other respiratory muscles.
- **Ventilatory support** may be required.
- **Intubation:** Necessary for patients with respiratory distress, altered mental status, or if they are unable to maintain their airway.

- **Monitoring**

- Continuous monitoring of vital signs: heart rate, blood pressure, oxygen saturation, and respiratory effort.
- **Pulse oximetry** and **capnography** to assess ventilation status.



# Transport Considerations

- **Early Hospital Notification:**
  - Notify receiving hospital early about the suspected OP poisoning so they can prepare for treatment.
  - Include the type of agent, exposure route, and clinical status.
- **Transport Route:**
  - Rapid transport to a hospital with **toxicology expertise** or **poison control**.
  - **Advanced care prehospital** can improve outcomes, but definitive care is needed as soon as possible.

**Poison Information Helpline**  
of the Western Cape, serving South Africa

**0861 555 777**

Developed by: Tygerberg Poison Information Centre  
[toxicology@sun.ac.za](mailto:toxicology@sun.ac.za) / [www.sun.ac.za/poisoncentre](http://www.sun.ac.za/poisoncentre)

# Challenges and Considerations

- **Timing:** The sooner atropine is administered, the better the outcomes.
- **Exposure Type:** Whether inhalation, ingestion, or dermal exposure affects management.
- **Toxicology Consultation**



# Conclusion

- **Prehospital Care is Crucial**
  - Early recognition and rapid intervention can significantly improve outcomes in OP poisoning.
  - Proper decontamination, pharmacological treatment, and support for respiratory failure are key steps in managing these cases.
- **Key Takeaways**
  - Recognize early signs of poisoning (SLUDGE + Killer Bs).
  - Administer atropine and anticonvulsants as needed.
  - Ensure rapid transport to an appropriate medical facility.



# Poison Information Helpline

of the Western Cape, serving South Africa

**0861 555 777**

[toxicology@sun.ac.za](mailto:toxicology@sun.ac.za) / [www.sun.ac.za/poisoncentre](http://www.sun.ac.za/poisoncentre)



# References

- Clinical Toxicology journals
  - Poison control resources
  - Guidelines from the CDC, WHO, and AAPCC (American Association of Poison Control Centers)
  - Advanced Trauma Life Support (ATLS) and PALS guidelines
- 