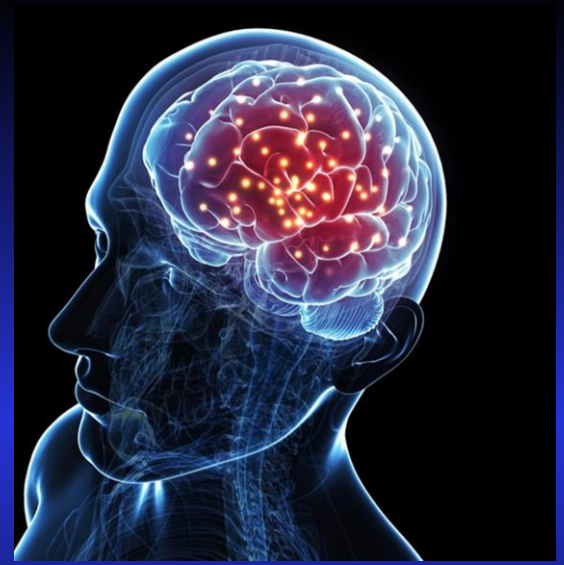


Effectiveness of Ketamine for Prehospital Termination of Benzodiazepine-Resistant Status Epilepticus Convulsions



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Seizure

and

Status
Epilepticus





Seizure Myths

- ▶ No one swallows their tongue
- ▶ Don't put anything in their mouth
- ▶ Restraining the patient is not needed

Clinical Pearl: Lateral Tongue Biting

- ▶ Occurs in 30% of Seizures
Highly Specific for Seizure if
LATERAL Tongue Bite

(Tip of tongue bite may occur
in seizure or syncope)



Treatment of Seizure

- ▶ **Most Seizures resolve on their own in under 5 minutes**
- ▶ ABC's
- ▶ O2 if needed
- ▶ Check Glucose and treat if needed
- ▶ Time the seizure duration
- ▶ **BENZODIAZEPINE!!!!**





BUT....

- ▶ Some Status cases are Refractory to Benzodiazepines
- ▶ Lifetime Risk of Status Epilepticus 15%
- ▶ Death rate 33% in adults
- ▶ EMS carries limited medication armamentarium

Status Epilepticus

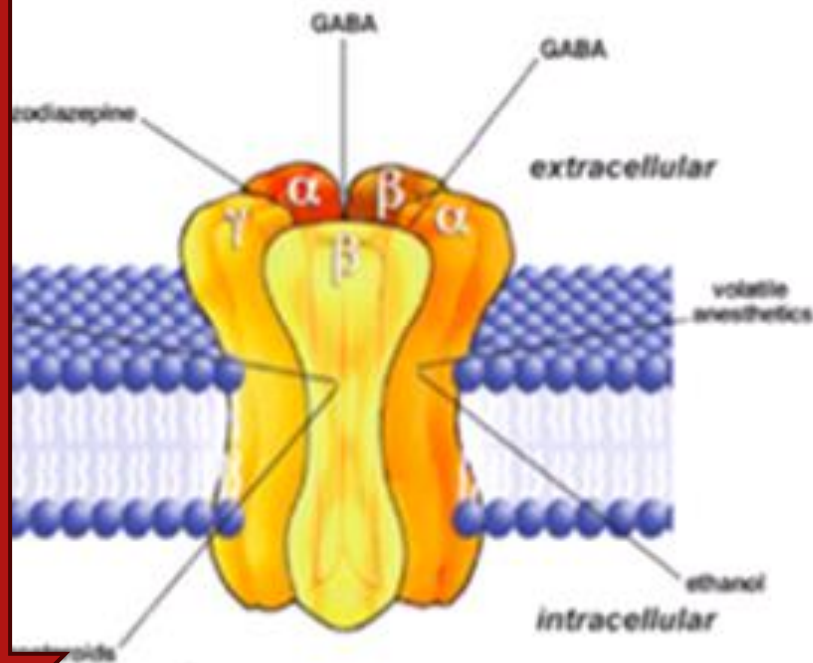
- ▶ How do Benzos and Most Seizure Medications Stop Seizures?
 - ▶ Midazolam GABA
 - ▶ Lorazepam: GABA
 - ▶ Diazepam: GABA
 - ▶ Phenobarbital: GABA
 - ▶ Valproic Acid: GABA
 - ▶ Thiopental: GABA
- ▶ What can we do if Benzo's Fail??



Basic Science Mechanism of Action in Status Epilepticus

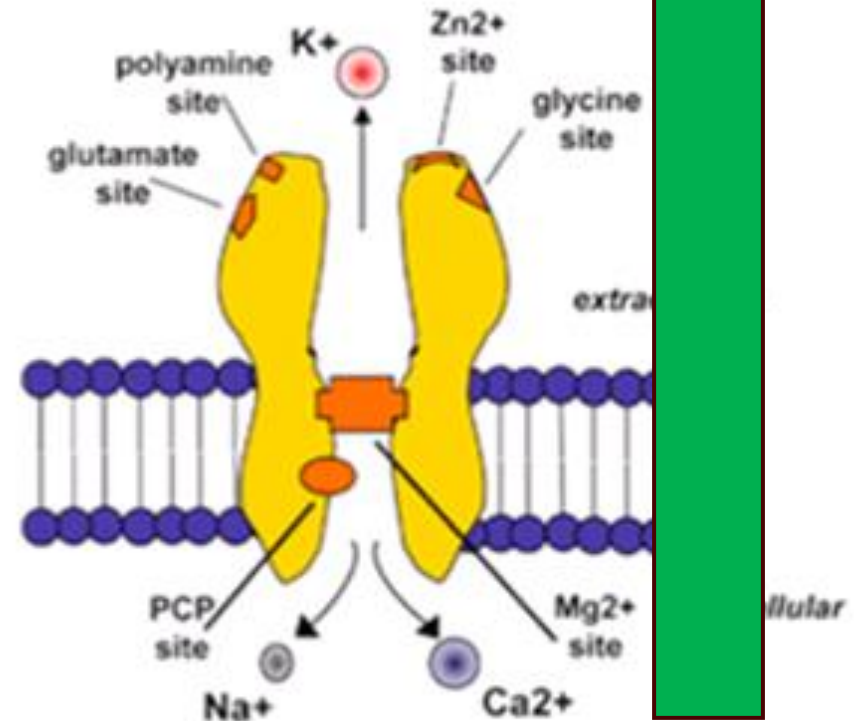
As Seizure Progresses

GABA_A Receptors (inhibiting brain cell firing)



NMDA Receptors (causing brain cell firing)

B



Scheppke's Personal Bias



Boys rescued from Thai cave were sedated with ketamine



By [Katie Hunt](#), CNN

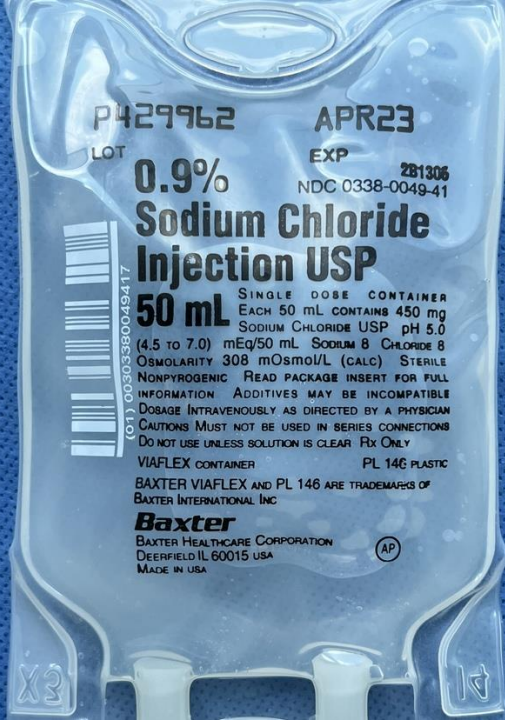
Updated 2:48 PM EDT, Thu April 4, 2019



EMS Already Carries Ketamine

- Sedative (Dissociative Anesthesia)
- Pain Relief
- Amnesia
- Bronchodilator
- **Anti Seizure**





Ketamine Status Epilepticus Protocol

- ▶ **Adults:** 100mg of KETAMINE in a 50mL bag of Normal Saline
- ▶ Administer IV/IO utilizing a 60 gtt set, run wide open
- ▶ **Children:** 2mg/kg IN/IM. Max single dose 100mg

So How Did We Do???

Adults:

Age range: 18 to 86

57 Uses per Protocol,
plus

8 Uses ketamine alone (without prior EMS
delivered Benzo)

Results:

100% Termination of Convulsions



So How Did We Do???

Children:

Age range: 1 to 17

16 Uses per Protocol

Results:

82% Termination of Convulsions

3 Failures: 2 IN Admin, 1 Anoxic
Posturing



Untoward Effects: Hypoxia

- There Were No Concerning Ketamine-Attributable Effects on Blood Pressure, O₂ saturations or ETCO₂ (for both adults and children)
- Pre-Ketamine De-Sat & ETCO₂ Resolved after Convulsions Ceased



Conclusion

- ▶ Status Epilepticus: time sensitive life-threatening condition
- ▶ Benzodiazepines are first line therapy
- ▶ Ketamine is highly effective (96% overall) at terminating Benzodiazepine Refractory Status Epilepticus in the prehospital arena
- ▶ Cases of Hypoxia and Hypercarbia are more likely to occur PRIOR to ketamine and actually improve after ketamine
- ▶ IM may be the preferred route vs IN when IV/IO access not available

Thank You!!

