Introduction
Alcohol is a particularly dangerous addiction because its consumption is legal even in excess, despite its harmful effects. Because alcohol has a multitude of targets in the central nervous system that are modified during chronic exposure, medications with overlapping targets such as anesthetics and analgesics must be modified when given to alcoholics. Unfortunately, as relatively little is known about the mechanism of addiction, it is difficult to predict how medications will be affected by central adaptation to chronic alcohol exposure. This review summarizes the consequences of alcohol exposure with particular attention to the GABA<sub>A</sub> receptor, and discusses the reasons behind necessary adjustments to the doses of volatile anesthetics and analgesics for alcoholics.

Acute Effects of Alcohol:
The addictive nature of alcohol has been accredited to dopamine release in the mesolimbic dopaminergic system. Alcohol stimulates GABA<sub>A</sub> receptors and inhibits NMDA receptors on interneurons in the VTA to upregulate dopamine release.

Chronic Effects of Alcohol:
1. Increase the number of GABA<sub>A</sub> receptors
2. Alter the types of subunits expressed

Altering the number and subtypes of GABA<sub>A</sub> receptors builds tolerance and withdrawal.

Tolerance is the need to consume more alcohol to experience the same effects.
Withdrawal is the set of symptoms a person experiences when alcohol clears from the body.

The Consequences of Alcohol Exposure on Anesthetics and Analgesics
Alcohol and Volatile Anesthesia:
Chronic alcoholics develop cross tolerance to volatile anesthesia, as both bind to GABA<sub>A</sub> receptors. The dose of an anesthetic must be adjusted according to its potency to overcome cross-tolerance. According to the Meyer-Overton rule (Figure 3), the potency of an anesthetic is proportional to its solubility in olive oil.

Since the 1970s, the role of the endocannabinoid system in alcohol addiction has received more recognition. Opioids target the endocannabinoid system to trigger pain relief. Opioids and alcohol both bind to CB<sub>1</sub> receptors to increase GABA and decrease glutamate, the ligand of the NMDA receptor.

Opioids and alcohol also display cross tolerance due to their overlapping action in the endocannabinoid and dopaminergic systems. Alcoholics may require increased pain management to overcome cross-tolerance.

Conclusion
Chronic alcohol exposure results in increased tolerance by increasing GABA<sub>A</sub> receptors and altering subtypes of receptors. Alcohol, anesthetics, and analgesics have overlapping targets within the mesolimbic dopaminergic system and endocannabinoid system. Doses of volatile anesthetics and analgesics must be increased to accommodate cross-tolerance.