

House Committee on Judiciary
February 15, 2024
House Bill 2782
Testimony of Philip E. Bickler, MD, PhD & Michael Lipnick, MD
In Opposition

To the Chair and Members of House Committee on Judiciary:

The use of nitrogen is considered too inhumane for euthanizing mice or dogs, yet some misinformed politicians, attorneys general, and inexperienced healthcare practitioners are supporting use of this cruel method for capital punishment in the United States.

Setting aside whether the death penalty is effective justice or ethical, our team of anesthesiologists, critical care physicians, dive medicine and high altitude physiologists at the Hypoxia Research Laboratory at UCSF urgently seeks to clarify important facts related to nitrogen hypoxia. Our opinions are based on scientific evidence and our laboratories unparalleled experience from studies on the effects of profound hypoxemia in more than 7000 human research subjects over the past 50 years. Dr. Bickler is a Professor of Anesthesia and Director of Neuroanesthesia at the University of California at San Francisco (UCSF), with more than 30 years' experience studying the effects of hypoxia on humans. Dr. Lipnick is an Associate Professor of Anesthesia at UCSF, and is boarded in Internal Medicine and Critical Care Medicine and has 20 years of experience studying hypoxia.

On January 25, 2024, Alabama executed Kenneth Smith by nitrogen inhalation, becoming the first state to use this method, and Kansas now may follow suit. For Kenneth Smith, eyewitnesses in the execution room described a violent, prolonged, then agonal and lingering death process, with convulsions and twitching movements (New York Times January 26, 2024). The process required many minutes. We may not know how long he consciously experienced extreme distress, but available evidence strongly supports that he did. Smith's spiritual adviser described the execution as "the most horrible thing I've ever seen." He described Smith as popping up in the gurney repeatedly, gasping and convulsing when the gas was turned on. From a different vantage point of the same event, Alabama attorney general Marshall hailed the new method as a success and said, "as of last night, nitrogen hypoxia as a means of execution is no longer an untested method. It is a proven one." As physicians and scientists we hope it will be the last one.

The horrible death experienced by Kenneth Smith aligns with existing medical knowledge and our experience with the clinical and experimental effects of profound hypoxia. This knowledge base includes caring for critically ill humans dying of hypoxemia (e.g acute airway obstruction, lung disease, COVID pneumonia) and healthy humans briefly experiencing severe hypoxia during experimental studies. It is

shocking that the state of Alabama was not aware of, or ignored, this body of knowledge.

As our group and others have previously published in peer-reviewed scientific journals (Bickler et al., 2017, Bickler et al., 2021, Adams et al., 1986), the human response to hypoxia is variable in the 60-100% saturation range, with symptoms ranging from minimal or mild shortness of breath and visual changes, to full-blown feeling of suffocation. But below 50%, the cruel nature of administering nitrogen to humans becomes universally apparent. We base this observation on personally experiencing these low levels of oxygen, as well as observations and evidence prior to 1995 when research studies stopped using desaturations below 60% (due to concerns for study participant safety and comfort). It also draws on the extensive experience of aerospace medicine researchers who study human responses to sudden loss of oxygen from decompression at high altitude flight. Based on personal knowledge of these often unpublished/unpublicised and even classified experiments, the effects of sudden oxygen deprivation can be shocking. With sudden loss of an oxygen supply, humans feel significant and distressing shortness of breath. This is usually accompanied by anxiety, increased heart rate, sweating, sleepiness, visual loss, and a feeling of impending doom as they go in and out of consciousness. Muscle twitching and seizures can occur. We also know this from personally being study participants involving saturations of 50% for less than one minute. If these study participants had not been rescued with oxygen, then continuing to raise nitrogen levels to 100% and oxygen levels to 0% would eventually lead to cardiac arrest and death after a variable period of time.

In case you are wondering why any laboratory would study profound hypoxia in humans, the studies are conducted to understand human physiology, including how breathing is controlled and how our bodies adapt to the hypoxia of high altitude or lung disease. Such experiments are safely done by slowly increasing the nitrogen fraction of inhaled gasses while lowering the oxygen concentration (e.g. Kronenberg et al., 1972). The healthy volunteers for these studies are in a monitored, hospital setting with constant feedback and assurance of comfort from study participants. Contemporary studies using this protocol are used to validate performance of many common medical devices such as pulse oximeters.

There are three common mechanisms underlying the sensation of shortness of breath. These are low oxygen levels, high carbon dioxide levels, and diseased lungs (e.g. pulmonary edema). Inability to excrete carbon dioxide produces a very strong response. Most people will begin to feel short of breath after only a minute or less of holding their breath. During this time, carbon dioxide levels rise enough to trigger shortness of breath, but oxygen levels have not started to decrease. The body's response to carbon dioxide is extremely strong in most people. However, the body's response to low oxygen levels is more varied across different people. Our experience is consistent with published scientific literature that finds approximately 25% percent of

people are relatively asymptomatic with oxygen levels dropping to a stable level of 80% percent (Adams et al., 1986, Lipnick and Bickler personal observations). The human response to extremely low oxygen levels (below 70% saturation) becomes much more consistent. When oxygen saturations are 40-55%, the majority of people will not yet have lost consciousness and will report significant shortness of breath, and distress. These feelings of extreme stress are an important reason why it is unethical to even study the effects of very low oxygen levels on humans. Colleagues from Europe have told us that it is difficult to even study very low oxygen levels because of the history of the horrific experimentation on oxygen deprivation by the Nazis (Spitz, 2005). Our experience as clinicians caring for hospitalized patients experiencing the horror of sudden loss of their airway and/or decreasing oxygen level is one that has become indelibly etched in our memories and is refreshed each time such a tragedy occurs. This was not an infrequent event during the COVID pandemic. The look of abject terror in a patient's eyes under these conditions is unforgettable.

Increasing the nitrogen fraction of what humans breathe is something very few physiologists, physicians, or politicians have any experience with doing, so it is no surprise that most of the commentary on the topic of nitrogen capital punishment has come in the popular press with little reference to or awareness of scientific evidence. Furthermore, most compassionate and competent clinicians avoid getting involved in the politics of 'how to euthanize' people, outside of palliative care practice. There is ample science on how to manage pain, consciousness, and comfort in the transition to death, and no available evidence or practice supports the use of nitrogen.

According to the US Constitution and Supreme Court rulings (Supreme Court ruling in *Kemmler*, 1890), no execution can involve a cruel or lingering death. The American Veterinary Medical Association has banned the use of nitrogen as a method of euthanasia in dogs and most other animals because of the variable and distressing responses to nitrogen breathing (American Veterinary Medical Association, 2020). This same response to nitrogen has also been well described in humans and should provide ample evidence of the unconstitutionality of the practice, if you need a constitutional justification.

As of February 2024, Kansas is among several states working to approve nitrogen as a method for capital punishment. This must be stopped before others experience the same horrible death as Kenneth Smith. At a time when the world has been scrambling to save lives and prevent human suffering by increasing access to medical oxygen, to intentionally deprive anyone of oxygen is all the more tragic.

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