I found no surfeit of volunteers who would involve testing this question directly. I measured the effect of polycythemia on ventilation delivering the same amount of oxygen? altitude natives permit them to breathe less while sus? Might a greater polycythemia in high.

Might this lesser ventilation reflect more adequate oxygen-transport pathway from inspired air to tissue? oxygen delivery in some other portion of the oxygen-carrying capacity of the blood could yield a lesser stimulus at the carotid body, particularly if blood flow to that organ is not excessively high. This possibility provoked the desire to determine the effects of polycythemia on neural discharge from the carotid body.

Following residency training in anesthesiology, I was able to re-enter the laboratory at Washington University of my original mentor, Albert Roos, to pursue this question. First, though, we had to know how to record from the carotid body’s nerve, measure blood gas tensions, and determine the normal stimulus-response relationships of chemoreceptor discharge to hypoxia, hydrogen ion, and carbon dioxide.

Roos is a respiratory physiologist with an insatiable curiosity and a bubbling joy at poking and prodding the unknown. He was not intimidated by embarking on a new area of scientific research, and I was not wise enough to be other than challenged by the opportunity. By trial and error and with support from others who knew more neurophysiology than we, we produced one of the first quantitative descriptions of how the carotid body responds to hypoxia, hypercapnic acidosis, and their interaction.

There are more sophisticated ways to make such measurements now, utilizing the output from single nerve fibers. Nevertheless, the quantification that we achieved adequately describes how the peripheral chemoreceptor responds. This research provides descriptive understanding, discovering an interaction between hypoxia and hypercapnic acidosis that was previously unsuspected, and ultimately, of posing a lot more questions than it answered.

The question of what polycythemia does to discharge from the carotid body remains.