Dr. Niklason is a Professor at Yale University in Biomedical Engineering and Anesthesia, where she has been on faculty since 2006. Dr. Niklason's research focuses primarily on regenerative strategies for cardiovascular and lung tissues, and the impact of biomechanical and biochemical signals of tissue differentiation and development. In 2005, Dr. Niklason founded a biotechnology company ("Humacyte, Inc."), which is working to bring engineered tissue replacements to patients. Engineered blood vessels have now been implanted into 80 recipients as part of 3, Phase I trials in renal and peripheral vascular disease. For her work in creating engineered arteries, Niklason was named one of only 19 "Innovators for the Next Century" by US News and World Report in 2001. Niklason's lab was also one of the first to describe the engineering of whole lung tissue that could exchange gas in vivo, and this work was cited in 2010 as one of the top 50 most important inventions of the year by Time Magazine. She was inducted into the National Academy of Inventors in 2014, and was elected to the National Academy of Medicine in 2015.

Niklason received her PhD in Biophysics from the University of Chicago, and her MD from the University of Michigan. She completed her residency training in anesthesia and intensive care unit medicine at the Massachusetts General Hospital in Boston, and completed post-doctoral scientific training at Massachusetts Institute of Technology. From there she went onto a faculty position at Duke University, where she remained from 1998-2005, before moving to Yale.