Pulmonary vascular resistance was determined over a wide range in the dog. Pulmonary artery and left atrial pressures showed a marked effect on resistance by modifying vascular distension, this effect being most notable at low levels of pressure and flow. [The SCN® indicates that this paper has been cited in more than 215 publications.]

The First of 300
Hans G. Borst
Thoracic and Cardiovascular Surgery
Medizinische Hochschule Hannover
Postfach 61 01 80, D-3000 Hannover 61
Germany

The Hagen-Poiseuille equation describes the resistance encountered by fluid passing through tubes. Blood vessels, in contrast to rigid conduits, react to a rising perfusion pressure by an increase of diameter which lowers the resistance to flow. Although the relationship of pressure to flow in the pulmonary circulation was previously described, we were able to prove this paper, on these subjects. The paper on left atrial pressure was in fact my first publication in a series now approaching 300! As modest as my surgical abilities at the time were, I never expected to find myself an operating assistant to Sarnoff, a man in whom the physician's wisdom was combined with a keen surgical mind. At that time, he introduced apico-aortic bypass for the alleviation of aortic valve stenosis, which many years later became a clinical reality. Sarnoff had me design an in vivo right heart bypass pump circuit for controlled differential perfusion of both lungs which allowed for study of the effect of pharmacological agents and of hypoxia and hypercarbia on the pulmonary vasculature whereby one lung served as a control of the manipulated one. For this purpose, the normal passive response of the pulmonary vessels to changes in inflow and outflow pressures as well as in airway pressure had to be known. We subsequently published several papers, including this Classic paper, on these subjects.

I presume our work has been quoted so frequently because of its practical importance. Early on this was true, e.g., for the understanding of pulmonary hypertension and its modification by drug in congenital shunt anomalies. Recently, it has had implications for heart, heart-lung, and lung transplantation where knowledge of the mechanical factors entering pulmonary vascular resistance and its therapeutic maneuverability by pharmacological agents and inspiratory gas concentrations are of crucial importance both for surgical indications and ultimate results.
