Abstract  The autologous blood injection ICH model has been used successfully in pigs. The well-developed white matter in the pig brain (in contrast to the rat and the mouse) is good for studies of white matter injury after ICH. Swine provides an excellent model for the study of edema formation and white matter brain damage. Of the nonprimate mammals, pigs have a cardiovascular system, which is most similar to humans. In this chapter, we present a step-by-step procedure to produce ICH by injecting autologous whole blood.

Keywords: Intracerebral hemorrhage, Brain edema, White matter injury, Swine

1 Model Selection

Experimental models of intracerebral hemorrhage (ICH) have been available since the 1960s and commonly involve the injection of autologous blood into the frontal lobe of dogs, cats, pigs, or monkeys. Intracerebral blood injection model is a useful model for studying ICH-induced brain injury in pigs (Fig. 1). Autologous blood obtained from the femoral artery is infused into the white matter in the frontal lobe to simulate hemorrhage (Figs. 2 and 3). Mentioned below are the advantages of this model:

1. Well-developed white matter to determine white matter brain damage induced by ICH
2. A nice ICH model well suited to clot aspiration studies
3. Large brain size suitable to magnetic resonance imaging studies
4. The ability to study a variety of physiologic parameters that are altered by the hematoma, including intracranial pressure, cerebral blood flow, and cerebral perfusion pressure
5. Ease of reproducibility and rarity of complications
6. Modification of the procedure to test the neurotoxic effects of thrombin and red blood cells
2 Materials

Immature pigs weighing ~10 kg are used in this model of intracerebral hemorrhage. The materials recommended for the surgical procedure include the following:
1. Anesthesia machine
2. Respirator
3. Biophysical recorders with pressure transducers
4. Blood gas analyzer