# Blood Pressure Measurement in Less Commonly Used Species (Part 2 -Rabbit, Guinea Pig, Hamster)

***Although the majority of blood pressure research is being performed on three species (rats, dogs, primates), the technical staff at DSI is often contacted by investigators who wish to use an animal species other than these three. The purpose of this technical note is to provide specific information regarding surgical protocols, transmitter model selection, and hardware and software configuration for some of the most frequently used miscellaneous species.***

When confronted with the need to measure blood pressure in an animal species other than the standard species for which our equipment was designed, an investigator must define certain conditions to assure proper data collection. The first is surgical implantation of the transmitter. The appropriate transmitter model should be selected based on the animal's body size, the vessel to be cannulated, and the required transmitting distance. The surgical protocol should be defined based on the surgeons experience and the idiosyncrasies of the species selected. The next step is to determine the appropriate cage size vs. transmitter model so that the necessary receivers can be installed to provide adequate signal reception. The final step is to set up the animal in the Configuration module of the Dataquest® software to allow accurate data calculation. Following are protocols which have proven successful for DSI customers monitoring blood pressure in various less commonly used species. Whenever possible we have taken information directly from the user to assure that the method has been used successfully in the field.

**SPECIES: Rabbit**

Although rabbits are a widely used research species, they are not used extensively in cardiovascular work. A few use rabbits because of their intermediate size and ease of handling. The surgical protocol for rabbits is identical to that of cats.

In fact, rabbits and cats are similar in body size and cardiovascular parameters. The same consideration of body size in relation to transmitter size for cats applies to rabbits. One feature that is an advantage for rabbit users is the abundant skin of the rabbit. This makes placement of the transmitter body less of a concern in terms of pressure necrosis. A disadvantage of using rabbits is their sensitivity to anesthetics. Injectable anesthetics are commonly used, however, the depth and duration can vary greatly from one animal to another.

One commonly used protocol is induction with ketamine (35 mg/kg) combined with xylazine (5 mg/kg) IP, followed by gas anesthesia if the procedure will take longer than 30 minutes.

Receiver configuration will depend on the transmitter model chosen. If the investigator chooses to use the C40 transmitter, more than one receiver will be required to provide adequate reception. One receiver will provide good reception when the D70 transmitter is used.

The software configuration includes a species designation for rabbits. By selecting this species designation, the software will automatically set the appropriate default values for collecting accurate pressure and heart rate data.

**SPECIES: Guinea Pig**

Although the guinea pig is a traditional research model, its use in cardiovascular studies is uncommon. They have the advantage of small size and ease of handling. Michael De Pasquale at Pfizer in Groton, CT, has used guinea pigs extensively to study blood pressure. He has shared with us his surgical protocol and tips on anesthesia.

The anesthetic protocol used at Pfizer is ketamine (80 mg/kg) and xylazine (10 mg/kg). He recommends using either a subcutaneous injection in the subscapular region or intraperitoneal injection. They found that injecting into the hind limb muscle caused paralysis or the animal to self-mutilate.

De Pasquale's group isolates the aorta proximally just caudal to the renal vessels and distally just cranial to the bifurcation. 3-0 or 4-0 silk suture is used to occlude the aorta during cannulation. Just prior to occlusion they apply 2% Lidocaine to the surface of the vessel to prevent vasospasm during catheter placement. A 21-gauge needle bent 45 degrees at the beveled end is used as a catheter introducer. Once the catheter is in place, the cellulose patch is placed over the entry and tissue adhesive is applied using a 1 cc tuberculin syringe. They warn against occluding the artery for longer than one minute. The guinea pig appears to be more sensitive to tissue anoxia than the rat. Hind limb paralysis will occur if flow is restricted for greater than one minute.

One receiver may not be adequate if a larger stainless steel cage is used. Multiplexing together more than one receiver will accommodate large cages. The transmitting distance of the C40 is 42 cm x 42 cm x 25 cm.

The software configuration does not include a designation for guinea pigs. By using advanced editing features, a custom species can be created. However, values for pressures and heart rates are similar to that of rats, and by selecting the rat as the species, the default values will allow accurate extraction of parameters from the pressure waveform in guinea pigs.

**SPECIES: Hamster**

Most of the common hamster breeds (i.e. Golden hamster, Syrian hamster) are too small to be implanted with the C40 blood pressure transmitter. However, there is one breed of hamster that is large enough to be implanted with that type of transmitter. The European hamster has body weights in the range of 300 grams. Professor Klaus Pleschka at Max Planck Institut in Germany has used this breed of hamster to study blood pressure. He has shared with us his surgical and anesthetic protocols.

The European hamster is a very aggressive animal, so anesthesia is induced in an inhalation

chamber using Halothane to avoid handling the animal. Once anesthesia has been induced, the animal is maintained using ketamine and xylazine IM. They have found this anesthesia to be a short-acting one that requires frequent supplementation.

The surgical procedure used by Dr. Pleschka is identical to the standard protocol used in rats. They have found, however, that hamsters are more sensitive to tissue anoxia than rats. Catheterization of the descending aorta must be performed within two minutes or necrosis of the lower extremities will occur. The transmitter model recommended for use is the C40 model.

One receiver should be adequate to provide coverage for the normal cage size used with hamsters. They are often housed in plastic basin type cages similar to rats. With this type of housing, the platform type receiver (RPC-1) is recommended.

The software configuration does not include a designation for hamsters. By using the advanced editing features, a custom species can be created. However, values for pressures and heart rates are similar to that of the rats, and by selecting the rat as the species, the default values will allow accurate extraction of parameters from the pressure waveform in hamsters.