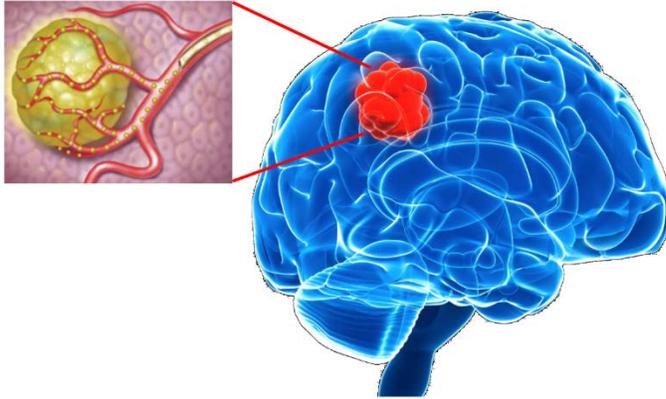


## What is Y-90 endovascular radiosurgery?



Your dog has a brain tumor. Y-90 endovascular radiosurgery is a procedure where we deliver a type of radiation directly to your dog's tumor using the blood vessels that supply the tumor with blood. This is done without making a large cut in the skin. First, a small puncture the size of a pencil-point is made in an artery in your dog's leg, then a small wire is fed into the vessel to guide a thin tube through the vessels up into the brain. Throughout the process, "dye" is injected to make

the vessels visible on X-ray. The thin tube also allows for the delivery of medications (i.e. to help control blood flow) and will help guide the administration of Yttrium-90 (Y-90). Y-90 is a type of radioactive material which is permanently attached to small glass beads, which will be released into the blood vessels that feed your dog's tumor. These beads land in the vessels of the tumor and stay there because the tumor has a lot of blood flow and many vessels within it. The radiation released by the Y-90 glass beads is special and only travels a few millimeters from each bead, which means that most of the radiation hits the tumor and not the brain surrounding your dog's tumor. This also means that the treatment is safe for people spending time with the pet after treatment. The goal of Y-90 endovascular radiosurgery is to stop the growth of your dog's brain tumor or even cause it to shrink.

## Why Y-90 endovascular radiosurgery?

Meningiomas are the most common brain tumors in dogs and occur more frequently in long-nosed breeds, such as the Golden Retriever. Gliomas are the second most common form of brain cancer in dogs with Boxers, English Bulldogs, and Boston Terriers having a higher incidence. Surgery, radiation given externally from the body, and chemotherapy seldom cure gliomas in dogs but may improve clinical signs. Typically, dogs will survive 2-4 months without treatment.

We hope that Y-90 endovascular radiosurgery can help improve survival in dogs with gliomas. The first phase of our study demonstrated that the procedure could be done in healthy dogs with only transient neurological symptoms, which resolved in 2 weeks. As we begin treating canine patients with brain tumors, we anticipate that Y-90 endovascular radiosurgery may help reduce tumor size and, thereby, prolong life.

## What is Y-90?

Y-90 stands for Yttrium-90 and is a radioactive substance which has a half-life of a little under three days. This means that by 3 weeks after the procedure, the radiation levels from the Y-90 will naturally have decreased to less than 1% of the original amount. Additionally, the radiation from Y-90 can travel only a maximum of 11 millimeters from each bead, so there are no radiation concerns for the pet owner following treatment.

**Who would be a good candidate for Y-90 endovascular radiosurgery in this study?**

We are offering Y-90 endovascular radiosurgery for dogs older than 1 year in age and greater than 10 kg in weight, who present with brain tumors. In order to enter the study, we must have an MRI scan that shows that the tumor is  $\geq 1$  cm in size, does not involve both sides of the brain, and has an extensive blood supply. Should the tumor meet these criteria, and your dog is stable enough to undergo the treatment, s/he would qualify for the study.

**How long does a treatment take?**

The endovascular radiosurgery procedure takes around 2-3 hours. However, the treatment day also may include a PET/CT scan performed immediately after the endovascular radiosurgery, which would take an additional hour.

**What are the benefits of Y-90 treatment and how long will it take to see them?**

The benefit of undergoing Y-90 endovascular radiosurgery is unknown, but we hope it will decrease the size of your dog's tumor and the neurologic symptoms from the brain tumor. We would expect to see this positive result starting one month after the procedure, with further decrease in size in the 6 months following the procedure. However, it is important to note that this is not a certain outcome and timeline, as this is an experimental procedure. Because the brain tumor is accessed through the blood vessels in your dog, there will only be a small cut made in your dog's groin.

**What are the risks of undergoing angiography and Y-90 endovascular radiosurgery?**

You may want to ask your veterinarian about the amount of radiation used during the procedure and the risks related to your pet's particular situation. It is a good idea to keep a record of your pet's past history of radiation exposure, such as previous CT scans and other types of X-rays, so that you can inform your veterinarian. Risks associated with radiation exposure may be related to the cumulative number of X-ray examinations and/or treatments over a long period of time.

Risks of undergoing angiography include: bleeding, injury to blood vessels and adjacent organs, change in heart rhythm, infection, formation of blood clots and air emboli, stroke or paralysis, cardiac arrest, impaired kidney function or allergic reaction resulting from contrast use. However, these complications are rare, and veterinarians will be closely monitoring your dog throughout the procedure, such that they can quickly respond to any situations that arise.

Additional risks specific to Y-90 endovascular radiosurgery include: brain swelling, brain inflammation, and transient neurological symptoms (i.e. circling, depression), which have resolved completely within two weeks in our previous study on healthy dogs. In order to prepare for and minimize these complications, steroids will be given to your dog during the procedure, and you will be instructed on the steroid dosing for your dog after you take him/her home.

Again, veterinarians will be available during the entire procedure to administer any necessary care, if side effects or complications do occur. If you have any concerns or questions regarding the procedure, please speak to your veterinarian.