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Elaine has experience gained in a working Hunter competition yard, prior to becoming an RVN. In 2007, a year after training in Sudbury, Suffolk, she became an RVN and took a position at Rossdales Equine Hospital as a Neonatal Intensive Care Nurse during stud season.

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Use of Iridium-192 wires in treating peri-ocular sarcoids in horses

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ABSTRACT: Iridium-192 (^{192}Ir) implants can be used to treat peri-ocular sarcoids when more conventional therapies are not possible or previously have been unsuccessful. Although an effective treatment, it does have health and safety implications for veterinary personnel, owing to potential radiation exposure.

A sarcoid is a form of skin tumour that affects horses, donkeys, mules and other equids, all around the world. Evidence suggests a virus is the causative agent. Sarcoids are often frustrating and awkward to treat as they are locally invasive and, once removed, have a high potential for returning. This is a consequence of their highly infiltrative nature. When associated with the area around the eye, conventional treatment creams used to treat sarcoids may inadvertently enter the conjunctiva.

Treatment options include 'banding' with rubber rings on protruding lesions, chemotherapy creams or injections, BCG vaccine injections, cryotherapy using liquid nitrogen, light lasers, CO₂ lasers or surgical excision. These options are

often successful, but when it comes to treating peri-ocular sarcoids, these treatments are rarely safe or possible.

The eye is extremely delicate in nature – the use of creams and cryotherapy could easily cause localised irritation. Using lasers or surgical excision can interfere with the eye's blinking mechanism, which can lead to irreparable damage owing to trauma or corneal ulcers, sometimes requiring enucleation.

Iridium is a silvery white metal, named after the Latin word for 'iris' or rainbow, because the salts emit a highly coloured hue. It is difficult to mold into shape because of its dense and brittle nature.

Radioactive iridium-192 is normally produced in nuclear reactors by neutron activation of the iridium metal. It has uses outside the medical field, mainly in civil engineering for non-destructive testing and as a radio-tracer in the oil industry.

Using iridium-192 wires in medicine is a form of interstitial brachytherapy – a method of radiation treatment where sealed internal sources of radiation are inserted into a localised area that requires treatment. The wires consist of radioactive 'seeds' that emit a source of radiation intended to destroy abnormal tumour cells; it is regularly used in human medicine to treat neoplastic lesions found in cervical, cranial, breast and prostate cancers. It is also used elsewhere on the equine body and in small animal medicine to treat mast cell tumours.

Figure 1: Peri-ocular sarcoids being measured prior to treatment



Patient suitability and preparation

When deciding to treat a patient with iridium wires, many factors are taken into consideration, some of which include: the finances available, the horse's temperament and the proximity of a veterinary practice offering the treatment.

The cost of the treatment is high – in excess of £4,000 – as the production of iridium-192 is expensive and there are legislative requirements for shipping the wires. Also, specialist veterinary knowledge and facilities are required to perform the procedure, along with essential health and safety equipment.

Iridium-192 has a half-life of approximately 73 days thus enabling several patients to be treated with the same batch. This is why it is feasible to wait until there is a list of horses that require treatment so multiple cases can be treated at one time, making it more cost effective for both client and veterinary practice.

The horse's temperament must be taken into account. The patient must be of a relaxed nature since it will require stabling 24/7 away from other patients, with only minimal handling and interaction. Patients with certain behavioural traits, therefore, or that become unhappy when stabled, may not be good candidates for the procedure.

Only a handful of equine practices in the UK offer iridium-wire treatment, so the horse may be required to travel a considerable distance when an appointment becomes available.

Before the horse is admitted for treatment, digital photos of the sarcoid lesions are studied to ensure the correct amount of iridium is ordered. On arrival at the hospital, the horse will have the sarcoid further examined and measured (Figure 1). The horse is left overnight to settle into its new surroundings.

Treatment is carried out in a specially designed room, located in a quiet area away from other personnel and patients, closely following all health and safety protocols.

The horse is heavily sedated and given one dose of a prophylactic non-steroidal anti-inflammatory drug of either phenylbutazone or flunixin meglumine.

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Figure 2: This donkey is being prepared for iridium wire insertion. Note the lead-lined shield positioned in front of the donkey's head. The clinician works behind it to limit radiation exposure



The patient is then walked into stocks and positioned with its head resting on a table (Figure 2).

The area requiring treatment is infiltrated with a local anaesthetic agent, such as mepivacaine hydrochloride 2.0 per cent, and the eye is desensitised with proxymetacaine hydrochloride 0.5 per cent. Clipping and scrubbing of the treatment area is avoided to prevent irritation to the peri-orbital area, thus only a gentle cleaning with dilute iodine swabs is needed.

Method of insertion

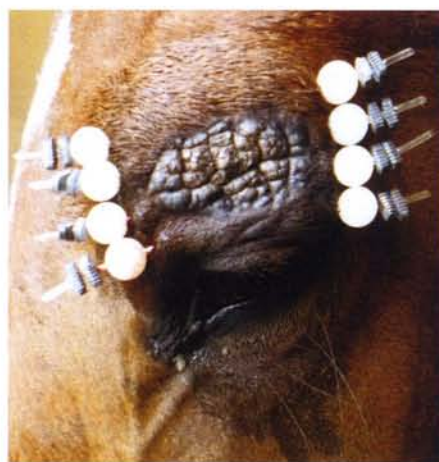
Guide wires are implanted at 1cm intervals with a 0.5cm margin of healthy tissue included to ensure the complete sarcoid receives treatment. A bead is then inserted on to the end of the guide tube, to ensure that a gap remains between the eye and the crimped lead clamps, which are used to keep the wire *in situ*.

One end of the guide tube is crimped and occluded, with the other end left open ready for the iridium seeds to be inserted. At this point, personal protective equipment (PPE) is donned in the form of lead aprons. Radiation dose meters are worn on the body (underneath the apron) of all personnel involved, and around the head and on the fingers of the clinician carrying out the procedure.

The iridium-192 is stored in a lead-lined canister and housed in a heavy-duty lead-lined safe. It is important to ensure all preparations have been completed before they are brought into the room. The clinician must then work quickly to insert the wires to reduce exposure to radiation.

The use of long-handled instruments is required to increase the distance between the wires and the clinicians – again to minimise exposure. Once the iridium wires have been inserted into the guide tubes they are then clamped closed in

Figures 3a and 3b: The iridium wires *in situ*



similar manner to the opposite ends (Figures 3a & 3b).

The treatment is administered over a period of four to seven days, depending on the radioactivity levels of the seeds and the size of the tumour, with the horse remaining in its radiation-controlled stable during this time. Horses will receive 60Gy of iridium as a therapeutic dose. The stable must have a two-metre control zone radiating from it in all directions, which is clearly marked out by the use of barrier chains and warning signs (Figure 4).

When entering the controlled zone, dose meters and lead aprons must be worn at all times. The patient is mucked out, fed and watered twice daily, and observed regularly throughout the day from outside the controlled area.

As when working with any radiation, there are strict protocols and guidelines

that must be adhered to. Dose meters are worn at all times, when handling the patient undergoing treatment, so that all accumulated radiation can be recorded (Figure 5). It is of paramount importance that every activity associated with, and around, the patient is clearly documented to maintain the safety of staff and other patients at all times.

Removal of wires

When the wires are removed, the procedure is similar to the insertion. The crimped ends of the guide tubes are cut (taking care not to cut the iridium seeds), removed and placed back into the lead-lined canister. All seeds must be removed and accounted for.

Background radiation checks are then carried out in the treatment room, on the patient and in and around the stable. There will be no residual radiation left in the horse, so it can be discharged from the

hospital. It is common for some swelling to appear around the treatment site, which will subside over the next few weeks.

The treatment should not be considered a 'quick fix' solution – it may take up to four months before an improvement is noticeable. Some patients can develop mild scarring or white hairs at the site of the tumour, but the cosmetic result is usually very good.

Iridium wire therapy is not restricted to peri-ocular sarcoids. It is also useful in treating lesions over joints or areas where other treatment protocols have failed. Larger tumours can be 'de-bulked' by lasers or surgical excision prior to insertion of iridium wires. This method can maximise efficacy and decrease the amount of radiation required.

Reviews from clinicians who perform this technique around the UK claim a 95 per cent success rate in treating peri-ocular sarcoids, with follow-up continuing for at least a year.

Summary

In summary, using iridium wires does pose health and safety risks to veterinary personnel and can be expensive for the client; but when treating peri-ocular sarcoids, it remains the 'gold standard' method of treatment. [vni](#)

Figure 5: A personal gamma radiation dosimeter



Figure 4: Barriers chains and signs in place to warn people of the danger of being in close proximity to the patient

