



Owners are increasingly looking for additional therapies to aid the health and welfare of their pets. Picture, Hartpury College

## Hydrotherapy in practice

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**HYDROTHERAPY** involving therapeutic exercise in the form of swimming or walking in water (in contrast to balneotherapy, which involves simply bathing) is increasingly used in dogs as an effective adjunct to surgical and medical treatments for a range of conditions, such as postoperative rehabilitation for orthopaedic and neurological conditions, as well as behavioural and obesity-related problems. This article discusses the indications, theory and practice of canine hydrotherapy, but most of the principles considered also apply to horses.

### ROLE OF THE VET

The application of most physiotherapy modalities is ideally restricted to qualified professionals (see Sharp 2008). The RCVS Professional Conduct Department advises that the 'veterinary surgeon with care of the animal must . . . be satisfied with the experience and qualifications of the person carrying out the physiotherapy' (RCVS, personal communication). However, while

physiotherapy may involve hydrotherapy, most hydrotherapy can, in theory, be carried out by any lay person with absolutely no training (see box below).

The onus is therefore on the veterinary surgeon to recommend informed hydrotherapists to ensure that patients receive safe and effective hydrotherapy. With this type of approach and cooperation, the local hydrotherapist can become a real asset to vets and their patients and clients.

### Legislation relevant to hydrotherapy in the veterinary field

#### Veterinary Surgeons Act 1966

"'Veterinary surgery'" means the art and science of veterinary surgery and medicine and, without prejudice to the generality of the foregoing, shall be taken to include:

- The diagnosis of diseases in, and injuries to, animals including tests performed on animals for diagnostic purposes;
- The giving of advice based upon such diagnosis;
- The medical or surgical treatment of animals; and
- The performance of surgical operations on animals.'

Schedule 3 on 'Exemptions from Restrictions on Practice of Veterinary Surgery' (and its Amendment

Orders) relates to certain treatments and operations that can be performed by others, including the owner, students and listed veterinary nurses.

#### Veterinary Surgery (Exemptions) Order 1962 and the RCVS Guide to Professional Conduct (Part 2F)

The latter states:

■ 'The Veterinary Surgery (Exemptions) Order 1962 allows for the treatment of animals by physiotherapy, provided that the animal has first been seen by a veterinary surgeon who has diagnosed the condition and decided that it should be treated by physiotherapy under his/her direction.

■ "Physiotherapy" is interpreted as including all kinds of manipulative therapy. It therefore includes osteopathy and chiropractic but would not, for example, include acupuncture or aromatherapy.'

With regard to hydrotherapy in particular, the RCVS Professional Conduct Department advises (March 2008) that:

'If manipulation is not involved, the exercise of swimming would not normally be regarded as the practise of veterinary surgery and is therefore outside the scope of the Veterinary Surgeons Act. It may be prudent for a veterinary surgeon to be satisfied that it is an appropriate regime.'

## Aims of hydrotherapy

- Enhance preoperative fitness and conditioning (eg, before a hip replacement)
- Complete resolution of clinical signs (eg, after cruciate surgery)
- Postoperative restoration of some function (eg, in cases of discopathy)
- Merely palliative (including analgesia)
- Increase cardiovascular fitness
- As an adjunct to obesity management
- As a 'fun' form of exercise

## INDICATIONS, COMMUNICATION AND COLLABORATION

Any swimming for therapeutic reasons should be preceded by a proper diagnosis, which is the sole remit of the veterinary surgeon who can then recommend hydrotherapy if appropriate. When sending animals to a hydrotherapist, it is important to provide a good case history, including information about any conditions that may make hydrotherapy risky.

Veterinary opinion should be sought even before so-called 'fun swims' in order to eliminate pre-existing conditions that might contraindicate hydrotherapy (eg, cardiovascular compromise, epilepsy and diarrhoea) or conditions that would require adjustments in medication (eg, diabetes). Hydrotherapists are not qualified to assess such conditions or their impact on hydrotherapy. A veterinary consultation and good communication between vet and hydrotherapist are therefore essential and should be routinely requested by hydrotherapists before taking on new patients. Mild analgesic medication may be warranted during hydrotherapy, especially in cases such as

## Choosing a hydrotherapist

### Before choosing a hydrotherapist

- Check the hydrotherapist's experience and/or qualifications
- Ideally, observe him/her at work to form an opinion on the quality of his/her skills
- Review the equipment available (ie, pool, treadmill, drying facilities, ramps, hoists, buoyancy aids)
- Check whether the hydrotherapist is insured (liability and third-party insurance)
- Check whether records of water quality are available
- Check whether the therapist is in the pool with the dog or stays outside the pool (both methods have their merits) or is a treadmill employed
- Check whether detailed records of the swims are kept

### On selecting a hydrotherapist

- Provide the hydrotherapist with a letter outlining the aim of therapy
- Communicate effectively with the hydrotherapist
- Check the patient's progress
- Give feedback to the owner and the hydrotherapist

## Pet insurance and payment

Membership of the UK-based Canine Hydrotherapy Association (CHA) is voluntary, but can potentially ease the administrative burden on therapists and facilities in the long run as many pet insurance companies will routinely pay for sessions carried out by its members or in pools 'licensed' by the CHA. However, successful completion of a recognised accredited training course is sufficient for some insurers. This should be checked with the insurers to guarantee insurance payment for the treatment. Most insurers insist on hydrotherapy being subject to prior veterinary consultation and recommendation.

femoral head excision in which new muscle function is introduced, but it is vital that the therapist is informed about this as it may mask mild clinical signs. The treatment's success should be monitored by the veterinary surgeon, and its frequency and duration can be re-evaluated after initial feedback from the therapist.

## Training courses

Qualified veterinary physiotherapists usually hold a three-year degree in human physiotherapy and will have undertaken two years of human clinical work followed by a two-year MSc in veterinary physiotherapy, which also includes hydrotherapy as one of the

modalities studied. However, most hydrotherapists lack such thorough training and may want to fine-tune their skills with the help of veterinary surgeons. Listed veterinary nurses are ideal candidates to qualify as hydrotherapists (via an accredited course) as they have a wealth of relevant skills and expertise acquired as part of their national vocational qualification (NVQ) and work in practice.

Canine hydrotherapy training courses, which are available and should be essential for any budding hydrotherapist, take different formats and appeal to different clientele. However, not many of these courses are accredited and the entry requirements are extremely variable. Most have a modular structure or consist of short blocks of intensive tuition, with varying amounts of practical work experience in and around the pool or underwater treadmill. They often comprise units such as practical and theoretical hydrotherapy (including legal considerations such as the constraints imposed by the Veterinary Surgeons Act), canine first aid, anatomy and physiology, resource management, canine care (performing basic checks to monitor health and welfare parameters during the sessions), and the management aspects of professional practice. They should also focus on possible ethical and welfare conflicts, and emphasise the importance of effective communication with veterinary surgeons, as it is the vet's domain to 'diagnose and offer advice based on diagnosis' – a hydrotherapist should obtain advice or back-up from the vet if there is any doubt about a dog's progress or if additional problems occur. Hydrotherapists should be made aware of how much aggravation of clinical signs is permissible after a session and this should also be communicated to owners.

Depending on their focus and duration, courses will also advise on higher education study skills to enable an evidence-based approach and lay down the foundations for participants to contribute to research activities and place emphasis on continuing professional development (CPD). Business advice and pool design may be included in higher level and longer courses.

### EXAMPLES OF ACCREDITED QUALIFICATIONS

Location	Awarding body	Academic level
Anrich Vets, Wigan	Open College Network	Level 2 course
Hawksmoor	Awarding Body Consortium	Level 2 course
Plumpton College	Open College Network	Level 3 course
Moulton College	Edexcel	Level 4 course

## UNDERWATER TREADMILLS VERSUS HYDROTHERAPY POOLS

Pools and underwater treadmills both have advantages and disadvantages with regard to carrying out hydrotherapy, but personal preference and experience will often determine which is chosen. Companies specialising in the design, construction and maintenance of canine hydrotherapy pools and underwater treadmills can advise on issues specifically related to veterinary hydrotherapy equipment (eg, the filter system must be able to cope with larger quantities of hair and particles than normal swimming pools). Technical support and aftercare are also important and should be agreed before a pool is acquired.

Equine hydrotherapy pools and treadmills come in various guises and particular attention should be paid to the safety of horse and handler during entry, filling and the initial sessions.

### Underwater treadmills

Underwater treadmills tend to be better for fitness than fun swims. They require a water tank and filter system, but occupy less overall space than reasonably sized pools. The room housing the treadmill may also require dehumidifying. The temperature of water in treadmills can be changed more quickly than that in pools, and the walking surface can be tilted on some machines to allow animals to exercise on an incline. In addition, the walking speed of an animal can be varied, but particular care must be taken to ensure that long fur does not get tangled in the moving parts of the equipment. The increased number of moving parts means that treadmills tend to have more mechanical problems than pools. Some designs also enable the hydrotherapist to stand on non-movable parts within the treadmill.

It is important to use the correct water level when employing underwater treadmills, particularly when walking or swimming small dogs. Some chondrodystrophic, short-necked dogs can undergo extra strain on the spine if they have to lift their head above the water as they stride forward. The water levels used for walking should therefore be adapted in the light of the animal's size, condition and the desired effect. Depending on the equipment, this can be achieved by either adjusting the height of the walking surface or pumping water in or out of the treadmill. Particular care should be taken when exercising dogs in low levels of water, as this places a lot of weight on the joints while increasing the work done due to water resistance. This can lead to undue strain



**Treadmills tend to be better for fitness than fun swims.**  
Picture, Hartpury College



**Underwater treadmill with a water filter and tank in the background.** Picture, Hartpury College

and should be used sparingly unless the dog is being exercised for fitness and/or is a recuperating animal that is monitored extremely closely. The speed of the treadmill must also be chosen very carefully.

Water may have to be pumped out of the underwater treadmill before the dog (and hydrotherapist) can leave (eg, via a ramp) unless the animal is very light or comfortable with a hoist.

A key advantage of underwater treadmills is that they allow limb movement to be observed and assessed from outside the unit.

### Hydrotherapy pools

Many hydrotherapists prefer pools over underwater treadmills as they are considered to be more versatile and the hydrotherapist is closer to the animal, thus ena-

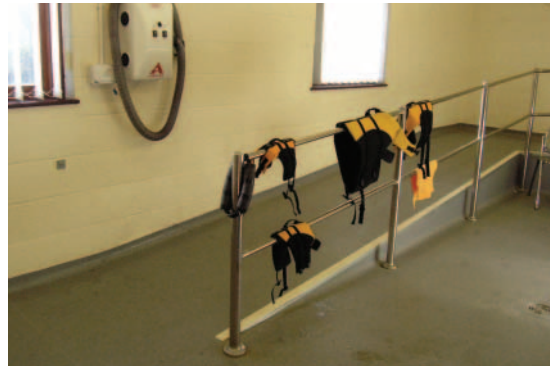


**Hoists can be used to place animals in or remove them from a hydrotherapy pool or treadmill, although some dogs panic when they are lifted off the ground.** Picture, Moulton College





**External ramps allow dogs to enter the hydrotherapy pool safely. Pools such as the one pictured also allow the hydrotherapist access from all sides.** Picture, Moulton College



**Ramp with a very gentle incline leading into a hydrotherapy pool.** Picture, Moulton College

bling a more hands-on approach with more immediate assessment of patient performance and targeted support. This is particularly important in animals with moderate to severe locomotive problems, where movement can be assessed manually from within the pool and the hydrotherapist can encourage proper limb movement (some dogs initially use only the front limbs to paddle). Proprioception deficits may mean that a dog cannot perceive surfaces underfoot and is not fit enough to walk on an underwater treadmill. Placing a hand under the caudal ribcage can help to lift drooping hindquarters to facilitate buoyancy and stress-free exercise. Hydrotherapists may also want to increase resistance or buoy up certain parts of an animal's body manually. Jets within the pool can further increase the workload undertaken by an animal and are often switched on to exercise fit dogs.

Pools probably match underwater treadmills with regard to their use for increasing fitness and muscle mass, but dogs generally tend to be calmer and more playful in pools. Toys can be used to encourage an extended range of joint movement and turning.

The type of ramp leading to a hydrotherapy pool and the incline at which it is placed depends on a number of factors, including the condition of the dog to be treated and whether the pool is sunk into the floor of a room or built above it. A ramp may be needed outside the pool to allow the dog to walk up to the level of the surrounding wall, but all pools should have a ramp leading down into



**Toys can be used to encourage dogs to perform a range of movements and turning**

the water and a submerged platform on which dogs can rest between bouts of swimming while still benefiting from increased buoyancy and the warmth of the water. Hoists can be useful for dogs unable to manage inclines, but many dogs panic when lifted off the ground and care must be taken with cases of spinal injury.

It is important that pools are well designed so that the dog can be removed quickly if there is an emergency.

## **MECHANISMS OF ACTION**

Water has a number of properties that aid recovery, particularly in the case of musculoskeletal conditions. The main difference between exercise on land and in water is the beneficial effects of buoyancy and water resistance. Often, different effects act in combination to achieve the desired results.

### **Resistance, viscosity and buoyancy**

Water is a denser and more viscous medium than air, and increases resistance to movement – that is, more effort is required for propulsion (imagine running a 100 m sprint in treacle). For dogs, a five minute swim is often quoted as being the equivalent of a five mile run, but this depends on the fitness of the patient. Marine mammals and fish reduce this resistance (or drag) by having streamlined bodies. The viscous resistance force can be increased by creating turbulence or greater water velocity (eg, using water jets). This viscosity also supports the patient, so sudden twists and heavy falls are less likely, which makes hydrotherapy safe even for weak animals (overexertion represents the major risk). Severely affected canine 'wobblers' (suffering from cervical myelopathies), however, can lose their balance if the water is agitated next to them as the vortices created destabilise them. This is similar to ataxia resulting from gently pulling equine 'wobblers' backwards or sideways when they are still able to coordinate walking forward.

Buoyancy is the upward thrust exerted on a body that is partly or totally submerged in a fluid, and counteracts gravity (see diagram on page 276). This 'lift' depends on the volume and density of the object and the density of the fluid. A dog appears 'lighter' or 'weightless to a degree' due to the buoyancy effect of the pool water, but would sink unless it swam or was supported by flotation or buoyancy aids. An obese dog would float better than a thinner one as fat is less dense than lean muscle or bone.

Due to increased buoyancy and greater resistance in water, dogs and horses can exercise their muscles and

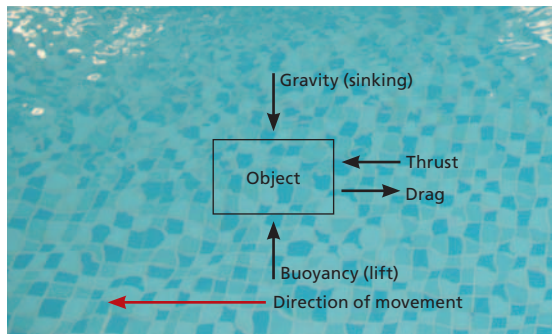


**Buoyancy aids (above) and manual support from within the pool (right) are particularly helpful in the early stages of a rehabilitation programme. A wet suit is essential to protect the hydrotherapist from accidental injury from contact with claws**



cardiovascular system without bearing weight when swimming (either in a pool or in a treadmill) or by bearing reduced weight when using an underwater treadmill. This increases muscle strength while placing less strain on joints and can be particularly beneficial in cases of (non-inflammatory) osteoarthritis. Patients with spinal problems can also profit from this supported exercise as

they experience less exhaustion and fewer dragging injuries than those sometimes encountered when undergoing supported exercise on land. The increased pressure on the dorsal aspects of the distal limbs trains animals' proprioceptive skills and assists in the re-education of the sensory awareness of paretic limbs.



**Forces exerted on a solid body that is at least partially immersed in fluid**

### Temperature

Due to the water's resistance, exercise can prove very strenuous, particularly for weak animals, and may result in overheating and exhaustion. This can be dangerous and frequent breaks are recommended. Most hydrotherapy pool sessions therefore involve 'interval training' – that is, several swims with pauses in between. Dogs usually rest partly submerged in the water on a platform or level part of the ramp, thus benefiting from the buoyancy exerted by the water and any flotation aids. As conduction and convection cause immersed bodies to lose heat very quickly during these breaks, the water temperature should be kept at about 30°C. This also increases perfusion at the body surface and warms up the muscles before exercise.



**Different levels of water permit different levels of weightbearing exercise. It is important to remember that even large dogs working on underwater treadmills may panic; in such cases, changing the setup – for example, getting the dog to swim towards the handler – can help.** Pictures, Hartpury College





## Surface tension

Surface tension (caused by water molecules adhering to each other) has no major effect and can thus be largely discounted, unless an animal breaks the surface constantly by lifting its feet out of extremely low water levels, which results in increased resistance at the most distal parts of the animal's legs while only minimally reducing the load on the joints. Therefore, very low water levels should only be used in fit, light and healthy animals or with careful monitoring.

The effects of exercising dogs on treadmills are particularly influenced by the water level – if the water reaches only the level of the lateral malleolus of the tibia, the dog will bear about 91 per cent of its body-weight (Levine and others 2002) and has to work hard against the resistance of the water, which is not ideal for a patient with arthritis. In general, water should reach the level of the greater trochanter in such cases.

## Hydrostatic pressure

The water pressure at a given depth in a static fluid is due to the weight of the liquid above and the pressure acting on the surface on the fluid, and therefore increases deeper in the pool. For every 10 m of water depth, the pressure increases by one atmosphere ( $10^5$  Pascal [Pa], which is equivalent to about 1 kg force/cm<sup>2</sup>). In a hydrotherapy pool, even a large dog's digits do not go much deeper than 1 m so the pressure experienced would be  $1.1 \times 10^5$  Pa, which is equivalent to about 1.1 kg force/cm<sup>2</sup>, compared with  $1.0 \times 10^5$  Pa above. In theory, increased pressure acting on all sides of the lower limb causes a massaging effect upwards, thus aiding venous return and reducing oedema. In practice, the effect is not very pronounced as the body adapts to the pressure to some extent, but it is reported to be beneficial in horses as they are larger and hence sit deeper in the water.

The slight compression of the thorax (due to hydrostatic pressure and increased resistance) in combination with the greater oxygen demand (due to exercise) can cause dyspnoea and hypoxia in patients with impeded breathing (eg, brachycephalic breeds), and agitation of the water (eg, using a jet stream) can exacerbate orthopaedic conditions – dogs asked to perform tight turns in front of a jet can experience localised pressure that may place undue strain on convalescent joints or the spine.

## Efficacy

Hydrotherapy is an efficient therapy and is used to complement other veterinary treatments. Its effects can be measured objectively in terms of the increased range of limb movement, a reduction in lameness, an increase in muscle mass and increased cardiovascular fitness. However, other more subjective observations should also be taken into account, such as owners reporting renewed vigour in their pet and even stronger bonding with it. Most owners are encouraged to attend sessions to help with poolside management of the dog and to provide motivational encouragement for the animal. They often feel relieved that they can actively contribute to their dog's recovery, whereas surgery is often perceived to be out of their control.

Other modalities of physiotherapy, which may be 'manipulative' and therefore fall under the Veterinary Surgeons Act, can be used in a more focused way (eg, restricted to one joint or one muscle area) and are particularly useful in cases where hydrotherapy is contraindicated (eg, in animals with cardiovascular impairment, skin con-



Animals undergoing supported swimming can safely exceed the range of movement achievable on land. Picture, Hartpury College

ditions, incontinence). However, some do not have the cardiovascular effect of hydrotherapy, so physiotherapy and hydrotherapy are often used to good effect in combination.

Physiotherapy can be started soon after orthopaedic surgery in some animals (eg, cases of fibrocartilaginous embolism), with a series of hydrotherapy sessions in warm water after the suture canals have sealed. These sessions can obviously run in conjunction with the extended use of other modalities of physiotherapy.

## CURRENT RESEARCH

Research is currently being conducted to quantify the measurable effects of veterinary hydrotherapy further (eg, to evaluate the increases in the range of movement achievable, and the effect of water temperature on heart rate and other cardiovascular parameters). Kinetic evaluation, force plate and video analysis are also used to help assess any improvements in lameness.

Current research in the human field is investigating several hypotheses regarding the mechanisms contributing to analgesia, such as whether hydrostatic pressure provides phasic stimuli to sensory skin receptors and causes a decrease in nociceptor hypersensitivity which, in turn, reduces pain perception (Geigle and others 1997, Hall and others 2006), the influence of endomorphins and the effect of increased muscle mass on arthritic joint functionality. In time, this may also aid the understanding of pain in animals.

Collaboration between veterinary surgeons and suitably qualified hydrotherapists should advance the knowledge to the benefit of the health and welfare of patients.

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