

## Management in Divers of Osteonecrosis at Ficat Stage I

Cautionary Note  
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A current recommendation is to reduce the radiological exposure of those divers who are screened for being at an occupational risk of developing osteonecrosis. In such persons this health surveillance should be before there are any clinical manifestations of pathology.

In using MRI for screening as the alternative to x-rays, it is possible to diagnose osteonecrosis very much earlier, i.e. at MRI Ficat Stage I *before there are any x-ray changes*.

The common condition in which the diagnosis of osteonecrosis is made at such an early stage is idiopathic Femoral Head Necrosis (FHN). This presents in healthy men as a pain in the region of a hip and usually within a few years progresses towards articular collapse. A significant proportion appears to respond to core decompression, grafting or other surgical intervention and in this particular population an early diagnosis appears to be appropriate and beneficial.

Dysbaric osteonecrosis (DON) is a condition that occurs in men of a similar age to those who suffer FHN, but DON is relatively rare. DON is preceded by one or more hyperbaric exposures which may be deep or prolonged and with or without symptoms of decompression illness. Its progress follows a quite different natural history to that of the other secondary osteonecroses. The initiating cause seems to be a decompression injury, usually sub-clinical, that is relatively transient. After the bubbles and their sequelæ have resolved, there will be a quiescent period without further exposure that enables repair and recovery. Imaging reveals that juxta-articular lesions of DON are not confined to the upper end of the femur, as in FHN, but are more commonly found in the humeral head. Local hip pain is not characteristic. There are also relatively benign lesions in the shafts of long bones. Our knowledge of the causation, natural history and epidemiology of DON is based on the MRC's classification of lesions. No MRI-based epidemiology is available. All the early DON lesions in divers are pain-free and, if there is no imaging as part of their health surveillance programme, these can remain undetected for many years. In a few such persons with juxta-articular lesions of DON, the onset of pain is years later and associated with sub-chondral collapse (Ficat Stage 3).

**The essential difference at Ficat stage I between FHN and DON is that of prognosis. After the elimination of other causes of secondary osteonecrosis, the differential diagnosis between FHN and DON is an essential preliminary for management and should be made by referral to an orthopaedic surgeon who is knowledgeable about both conditions.**

That clinical review would include consideration of the presence or absence of:

- ◆ a presenting symptom of hip pain;
- ◆ a history of hyperbaric exposure that is greater than recreational diving to 30 metres;
- ◆ sub-chondral lesion(s) in the head of the humerus;
- ◆ shaft lesion(s) in the neck and/or shaft of the humerus;
- ◆ shaft lesion(s) in the neck, mid-shaft and/or distal end of the femur;
- ◆ shaft lesion(s) in the proximal end and/or shaft of the tibia.

**The natural history and prognosis of DON is such that early surgical intervention to the femoral head and neck may not be appropriate at Ficat Stage I when there are no x-ray changes there.**