



Consensus Conference on Hyperbaric Medicine
Lille 2016

List of indications for HBOT



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Type 1

CONDITION	ACCEPTED			NON ACCEPTED			COMMENT
	Level of Evidence			Level of Evidence			
	A	B	C	D			
Type I							
CO poisoning		X					
Open fractures with crush injury		X					
Prevention of osteoradionecrosis after dental extraction		X					
Osteoradionecrosis (mandible)		X					
Soft tissue radionecrosis (cystitis, proctitis)		X					Proctitis changed from T2 to T1
Decompression illness			X				
Gas embolism			X				
Anaerobic or mixed bacterial infections			X				
Sudden deafness		X					Upgraded from C to B and from T2 to T1



Open fractures and/or crush injury

1. We recommend early application of HBO following severe open fractures because it can reduce complications such as tissue necrosis and infection. Gustilo 3B and 3C injuries are considered indications for HBOT and less severe injuries should be considered for treatment when host or injury related risk factors are present. (Type 1, Level B)
2. We suggest that HBO may offer benefit in crush injuries with open wounds but without fracture, where tissue viability is at risk or where there is significant risk of infection. (Type 2, Level C)
3. It would be reasonable to provide HBO for closed crush injuries where tissue viability is clinically judged to be at risk. (Type 3, Level C)
4. It would be reasonable to provide HBO for closed crush injuries where there is a potential for compartment syndrome, but where compartment syndrome requiring fasciotomy is not established and where it is possible to monitor progress and response to treatment either clinically or via compartment pressure or oxygenation monitoring. (Type 3, Level C)
5. We recommend that HBO centres treating crush Injury should have equipment for monitoring TcPO₂ under pressure as this has predictive value in some situations. (Type 1, Level B)



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Decompression Illness (DCI)

(applies to Surface Oriented Diving, Compressed Gas Works, Aerospace Exposures, does not apply to Saturation exposure)

1. We recommend:
 - 100% normobaric oxygen first aid (ECHM Type 1);
 - intravenous fluid resuscitation with non-glucose containing crystalloid solutions (ECHM Type 1);
 - hyperbaric oxygen therapy / recompression therapy tables (USN TT6 or He-Ox Cx30 or equivalent*) for the initial treatment of DCI (ECHM Type 1);
 - appropriate HBO2 / treatment tables for residual manifestations of DCI (ECHM Type 1);
 - the use of low-molecular weight heparin for the prophylaxis of deep venous thrombosis for immobile or paralysed cases of DCI (ECHM Type 1);
2. We suggest
 - the use lignocaine / lidocaine and oxy-helium recompression tables for serious neurological DCI (ECHM Type 2);
 - oral tenoxicam for appropriately selected DCI cases (ECHM Type 2).

* Table US Navy T5 can be used as the first recompression schedule for selected mild cases



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Type 2

Type II	A	B	C	D	-	-	
Crush Injury without fracture			X				Added
Diabetic foot lesions		X					
Compromised skin grafts and musculocutaneous flaps			X				
Osteoradionecrosis (bones other than mandible)			X				
Radio-induced proctitis							Upgraded to Type 1
Radio-induced lesions of soft tissues (other than cystitis and proctitis)			X				
Surgery and implant in irradiated tissue (preventive treatment)			X				
Sudden deafness							Upgraded to Type 1
Ischemic ulcers			X				
Refractory chronic osteomyelitis			X				
Burns 2 nd degree more than 20% BSA			X				Upgraded from T3 to T2
Central retinal artery occlusion (CRAO)			X				Upgraded from T3 to T2
Pneumatosis cystoides intestinalis			X				Upgraded from T3 to T2
Stage IV neuroblastoma			X				
Femoral head necrosis		X					Upgraded from NA, from D to B



Femoral Head Necrosis

1. We suggest HBO to be used in the treatment of the initial stage of femoral head necrosis (Type 2 recommendation; Level B evidence)
2. We suggest daily treatment of ≥ 60 minutes at $\text{FiO}_2=1$ (5 to 6 days a week, and 4-5 weeks per cycle) at 2.4 ± 2.5 ATA, at the initial stage of FHN (Type 2 recommendation; Level B evidence]
3. We suggest to schedule MRI and orthopedic clinical evaluation at 3-4 weeks from the end of the HBO₂ cycle ([Type 2 recommendation; Level C evidence]
4. We recommend HBO not to be used as an isolated treatment but to be integrated in a multidisciplinary protocol including minimizing weight-bearing (crutch adequate as per height, and contralateral to the lesion), suggesting to ameliorate the patient BMI, physical therapies where applicable, quitting smoking so not to reduce the efficacy of the treatment.([Type 1 recommendation; Level C evidence).



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Type 3

Type III	A	B	C	D	-	-	
Brain injury (acute and chronic TBI, chronic stroke, post anoxic encephalopathy) in highly selected patients			X				TBI is new, stroke is upgraded, post-anoxic no change
Radio-induced lesions of larynx			X				
Radio-induced lesions of the CNS			X				
Post-vascular procedure reperfusion syndrome			X				
Limb replantation			X				
Burns							Upgraded to T2
Selected non healing wounds secondary to systemic processes			X				
Sickle cell disease				X			Upgraded from NA
Interstitial cystitis			X				Upgraded from NA, from E to C



Brain injury in highly selected patients

(acute and chronic TBI, chronic stroke, post anoxic encephalopathy)

Traumatic brain injury:

1. It would be reasonable to consider HBO in acute moderate-severe TBI patients and in a highly selected group of patients with chronic TBI who have clear evidence of metabolic dysfunctional brain region (Type 3 recommendation, level B evidence)
2. We recommend HBO use in TBI to be only done in the frame of an investigational study protocol approved by an Ethic committee and performed according to >Clinical research good Practice (Type 1 recommendation).

Stroke:

1. We do not recommend HBO use in the acute phase of stroke. (Type 1, level C)
2. It would be reasonable to consider HBO in the frame of an investigational clinical study in a highly selected group of patients with chronic stroke who have clear evidence of metabolically dysfunctioning brain regions that are mismatching with the necrotic brain regions (Type 3, level C).



No recommendation

<u>NO RECOMMENDATION</u>	<u>A</u>	<u>B</u>	<u>C</u>	<u>D</u>	<u>E</u>	<u>F</u>	-
<u>Post sternotomy mediastinitis</u>	-	-	-	<u>X</u>	-	-	-
Malignant otitis externa				X			
Acute myocardial infarction				X			
Femoral head necrosis				X			<u>Upgraded to T2</u>
Retinitis pigmentosa				<u>X</u>	X		
Interstitial cystitis				<u>X</u>	X		<u>Upgraded from C to B and to T3</u>
Facial (Bell's) palsy				<u>X</u>	X		



Negative recommendations (Type 1)

<u>NEGATIVE RECOMMENDATION (TYPE 1)</u>	<u>A</u>	<u>B</u>	<u>C</u>	<u>D</u>	-	-	-
<u>Autism spectrum disorders</u>	-	<u>X</u>	-		-	-	<u>Added</u>
<u>Placental insufficiency</u>	-	-	<u>X</u>		-	-	-
<u>Multiple sclerosis</u>	-	<u>X</u>	-		-	-	-
<u>Cerebral palsy</u>	-	<u>X</u>	-		-	-	-
<u>Tinnitus</u>	-	<u>X</u>	-		-	-	-
<u>Acute phase of stroke</u>	-	-	<u>X</u>	-	-	-	<u>Added</u>