GUIDELINES FOR DIVING MEDICAL OFFICERS

MEDICATIONS AND DIVERS

(*October 2012 revision*)

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MEDICATIONS AND DIVING

GENERAL INFORMATION

1. These guidelines have been developed to assist Diving Medical Officers (DMOs) and Diving Medicine Technicians (DMTs) in determining the safe use of medications for CF divers. As new drugs become available or as new information is acquired in relation to extant drugs, this document will be updated by the CF's Consultants in Diving Medicine (C/DM).

BASIC PRINCIPLES AND GUIDELINES

2. There is little objective, scientifically determined evidence available to provide guidance on the use of medications in diving and hyperbaric environments. Well controlled clinical trials are rare. Recommendations are therefore generally based upon two principles. The first of these is the historically demonstrated safety profile of a drug utilized in active divers, in other words, experiential knowledge. The second is a consideration of the known pharmacokinetic and pharmacodynamic properties of any specific medication. An estimate is made as to the probable alteration of these properties in a diving environment and the likely physiological consequences arising there from. As clinical experience deepens and as new information on the underlying pharmacological attributes of any particular drug becomes available, the recommendations presented in this document may change.

3. In addition to understanding the general pharmacological properties of a medication, it is also necessary to appreciate the particular burdens of the diving environment. These factors include: increased hydrostatic pressure, increased or decreased PPO2, increased PPCO2, mixed respiratory gases (e.g. helium), nitrogen narcosis, physical exertion, cold, reduced visibility, diminished sound localization, buoyancy control and equipment constraints.

4. When prescribing medications to divers, several potential drug effects are of primary importance:

a) The diver's performance may be impaired such that he is unable to successfully complete his mission.
b) The diver may become incapacitated to the extent that he presents a threat to his own safety.
c) The diver may become incapacitated to the extent that he presents a threat to the safety of his team.
d) The medication's efficacy and safety profile may be altered as a result of hyperbaric exposure. Such changes may have consequences for the diver's general health separately from its specific effects in the diving environment.

5. Aside from a medication's effect on a diver's performance and safety, the underlying disorder for which the medication is prescribed must always be given due consideration. Some medications may be benign in and of themselves, but the condition for which they are prescribed may represent a contra-indication to diving. An example is the use of amoxicillin for the treatment of acute sinusitis. In this instance, the medication is not considered problematic, but the underlying condition is not compatible with diving.

6. A further concern is the possibility of side effects occurring when initiating a medication. Some medications may be compatible with diving over the long term, but have the potential for short term adverse effects upon initiation. ACE inhibitor induced hypotension is an example of this. Accordingly, it is recommended that divers be withdrawn from active diving duties when starting a new medication. The period of withdrawal is dependent on the specific drug, as will be discussed in the sections to follow. Once it is established that the diver is stable on the new medication, and once the condition for which he/she is being treated is also considered stable and compatible with diving, he/she may be returned to diving duties.

7. Once a diver has been deemed 'unfit diving' (whether for reasons of the underlying illness or the medication prescribed for it) they may be returned to diving duties by a Basic Diving Medical Technician (BDMT) in circumstances where the condition is minor, temporary (duration of less than 2 weeks), fully resolved, and where any medications prescribed for the condition are discontinued. In all other circumstances, clearance for return to diving duties must be approved by an Advanced Diving Medical Technician (ADMT), Basic Diving Medical Officer (BDMO), or Advanced Diving Medical Officer (ADMO).

8. The recommendations in this document should be taken as general guidance only. Exceptions may be warranted in particular cases. In any instance where the prescribing clinician considers that such an exception is warranted, he/she should discuss the matter with a Consultant in Diving Medicine (C/DM).

9. For any urgent matters concerning divers, please contact the C/DM 'on-call' at 416-246-3155.

DRUGS AND DRUG GROUPS – CONSIDERATIONS AND RECOMMENDATIONS

The following section provides general guidelines for specific drugs and drug classes.

a) **ANTIBIOTICS**

Antibiotics are generally considered to be safe in the diving environment. Owing to the potential for hypersensitivity reactions and other adverse effects, a 4 day initiation period of no diving is recommended.

Minocycline has a relatively high incidence of vestibulotoxicity and should be avoided in divers. Sulfamethoxazole-trimethoprim preparations are reported to have a somewhat elevated risk for vestibular side effects and should be used with caution.

When considering the underlying disorder, divers given antibiotics for LRTIs (Lower Respiratory Tract Infections) should be withheld from diving duties until the condition has fully resolved. The reason for doing so is to avoid potential pulmonary barotrauma arising from bronchoconstriction associated with airway inflammation. In some cases of LRTI, clinicians may wish to perform a chest X-ray and spirometry prior to returning a diver to full activities.

b) **ANTIFUNGAL AGENTS**

Topical antifungals may be used without concern, aside from the obvious issues related to absorption in a wet environment. Long duration dosing of systemic antifungals is occasionally used for resistant infections. The agents used are of the imidazole or triazole families. While generally well tolerated, their potential side effect profiles include dizziness, visual disturbance, arthralgia, nausea and headache; none of which are compatible with diving. Pulsed therapy is preferred to continuous therapy. A 4 day no-diving period following the first dose and a 2 day no-diving period after subsequent pulsed doses is recommended.

c) **ANTIVIRAL AGENTS**

Divers requiring HSV suppression therapy should be prescribed oral acyclovir, famciclovir, or valacyclovir. An initial 4 day period of no-diving is recommended to observe for adverse effects.

During acute HSV flare-ups divers should be made unfit diving until the lesions are dry and pain-free.

Oseltamivir is used for the treatment and prevention of influenza. When used for the treatment of acute influenza, the underlying condition will preclude diving

activities. When used for prophylactic therapy in contact populations, the period of administration is a minimum of 10 days. The most common side effects of this medication are gastrointestinal in nature. A no-diving period of 4 days is recommended upon initiation. Zanamivir has a higher incidence of reported nasal congestion and cough than oseltamivir and should be considered a second choice.

d) **ANTIMALARIALS**

(i) ***CF divers***

Doxycycline is currently the antimalarial agent of first choice for CF divers. A 4 day no-diving initiation period is recommended to observe for hypersensitivity reactions and adverse effects. Persons taking doxycycline should be warned of potential gastric irritation and photosensitivity.

Malarone is widely used by recreational and commercial divers in regions of endemic malaria and is considered to be safe. A 4 day no-diving initiation period is recommended.

Chloroquine's effectiveness for malaria prophylaxis is diminishing, but the drug is considered compatible with diving.

There is very little information available on the use of primaquine in active divers. However, as the drug is only used for a 7 day period of terminal prophylaxis, it is currently recommended that diving duties be suspended during that short interval.

Mefloquine has a number of significant adverse reactions (neuropsychiatric, vestibular, gastrointestinal, and dermatological) and is contra-indicated for use in CF divers.

(ii) ***CF members on HLTA (Home Leave Travel Assistance)***

CF members who are ***not*** **CF divers** and who are required to use mefloquine in their theatre of operation are advised not to engage in diving during their HTLA. The mean terminal half-life of mefloquine is 21 days. This interval does not allow adequate time for elimination during the standard HTLA period. If a member plans on diving during the HTLA period, it is recommended that they take either doxycycline or Malarone as prophylaxis during their operational engagement, provided that such medications are effective in the operational zone. It is strongly recommended that members planning on diving during HTLA discuss those plans with an ADMO.

(iii) ***Recreational divers in the CF***

Members who have taken mefloquine during operational deployment should avoid diving for approximately 40 days following discontinuation of the drug. This period allows for the passage of 2 terminal half-lives. As with all medications, divers should be free of any symptoms related to a drug before resuming diving.

e) **ANTIHISTAMINES AND DECONGESTANTS**

First generation antihistamines (diphenhydramine, brompheniramine, chlorpheniramine, hydroxizine, clemastine fumarate) cause drowsiness in approximately 25% of users and are considered incompatible with the diving environment. While second generation antihistamines are commonly marketed as non-sedating, some individuals will nevertheless experience drowsiness. Several studies demonstrate that some preparations (loratidine, desloratidine, fexofenadine) are better than others (cetirizine, acrivastine) in this regard. Therefore, should an antihistamine be indicated for use in a diver, the first choice would be loratidine, desloratidine or fexofenadine. Second generation antihistamines bear the same potential for antimuscarinic side effects (dry mouth, blurred vision, urinary retention) as their predecessors. Divers should be withdrawn from active dive duties for 4 days on initiation of therapy. As always, the condition for which the medication is prescribed must be considered. If significant symptoms of nasal or sinus congestion are present, active diving should be avoided whether or not the diver is taking medication. While there is no direct interaction between loratidine and alcohol, their effects may additive. Avoidance of alcohol consumption for the 24 hours preceding a dive is warranted for those using any antihistamine.

Systemic decongestants (pseudephedrine, phenylephrine) are CNS and cardiac stimulants and may give rise to side effects such as anxiety, hallucinations, dizziness, tachycardia, hypertension, and palpitations. They may also cause tremor and mydriasis. Despite these potential problems, many divers use systemic decongestants on a semi-regular basis. Caution is nevertheless warranted and an initial trial of the drug in a non-diving situation is recommended. A further, though theoretical, concern is that systemic decongestants may potentiate the effects of CNS O2 toxicity. For this reason, use should be limited to shallow dives (< 18 msw) using air (i.e. not with gas mixes containing > 21% O2).

Topical nasal decongestants (pseudephedrine, oxymetazoline, xylometazoline) have negligible systemic effects. They are, however, subject to rebound phenomena and their use should be limited to a maximum of 3 days.

A concern with all decongestants, whether systemic or topical, is that they may allow a diver to achieve depth, but lose their effectiveness prior to or during the ascent phase, thus resulting in a reverse squeeze. This loss of effect may occur owing to the rebound phenomenon, prolonged dives, or multiple bounce dives. It may also occur when a diver's eustachian or sinus meatal function is marginal

but compensated for by a decongestant. Microbarotrauma may occur during descent, worsening the eustachian or meatal obstruction to the point that the decongestant can no longer compensate. For these reasons a general rule is that a diver should not dive with decongestants if he could not perform the dive without them.

f) **ANALGESICS**

Acetaminophen is considered compatible with diving when used on an occasional basis. Chronic use necessitates evaluation of the condition for which the drug is taken and that condition's compatibility with diving.

Narcotic analgesics of any kind and by any route of administration are not compatible with diving. Likewise, cannabinoids (Sativex) are not to be used in active divers.

Non-narcotic, topical analgaesics (NSAIDs, capsaicin, xylocaine preparations) are not contra-indicated, but their effectiveness may be impaired when used under a diving suit.

g) **NSAIDS**

Several concerns arise in relation to the use of NSAIDs in divers. The first of these is the condition for which the drug is used. Acute migraine is a contra-indication to diving activities. Acute or chronic musculoskeletal ailments may be incompatible with diving. The opinion has been expressed, though not empirically confirmed, that inflammatory MSK conditions may predispose an affected joint to DCS. It is also possible that pre-existing joint pain could be confused with the symptoms of Type I DCS, thus confusing the diagnosis and resulting in inappropriate treatment.

A second concern in relation to NSAIDs is their theoretical potential to exacerbate DCS owing to platelet inhibition and micro-haemorrhaging. This point is controversial in the literature. Though NSAIDs are generally contra-indicated in the presence of DCS, they may be used in selected cases of Type I DCS upon the recommendation of a C/DM.

A third concern is the side effect profile of NSAIDs. These include GI toxicity, hypertension, drowsiness, dizziness, and blurred vision. In the presence of dehydration (frequently seen in divers owing to submersion diuresis), NSAIDs may lead to renal insufficiency. Idiosyncratic sensitivity reactions include bronchospasm, which may lead to pulmonary barotrauma and arterial gas embolism.

Despite these concerns, the short-term (<14 days) use of NSAIDs is permissible in divers in the absence of the aforementioned conditions. A 4 day no-diving period on first use is recommended. The diver must, however, be functionally capable of performing all his/her diving duties and, further, must be able to do so

without the medication in question. Consideration must also be given to the potential for delayed recovery should divers return to physical activities too early following MSK injury. Because they 'can' does not mean they 'should'.

Long-term, low dose (80mg) ASA as part of a preventive strategy for cardiovascular disease is not contra-indicated in the diving environment.

Gastro-protection with a proton-pump inhibitor should be considered for any patients taking NSAIDs for durations longer than 2 weeks and for those identified as being at higher risk for NSAID related gastropathy.

h) **AGENTS FOR CHRONIC PAIN**

This class includes gabapentin and pregabalin. In the majority of cases the condition for which these medications are prescribed will preclude diving activities. In some instances, however, a functional and pain-free state may be achieved with the ongoing use of these drugs. A no-diving period of 14 days should be declared upon their initiation, and a 7 day period of no-diving should be required at the time of any dosage change (increase or decrease). The side effects of principal concern are those of somnolence, dizziness, nausea, and visual disturbance. Diving should not be allowed in the presence of any of these symptoms.

k) **MUSCLE RELAXANTS**

This class of drugs includes methocarbamol, cyclobenzaprine, baclofen, orphenadrine**,** and tizanadine. In most cases the condition for which these medications are prescribed will preclude diving activities. These medications are considered incompatible with diving owing to their side effects of drowsiness, dizziness, blurred vision, and confusion.

l) **ACID SUPPRESSION THERAPY**

A diver with active peptic ulcer disease or symptomatic GERD should be deemed unfit diving. Once successfully treated (symptoms resolved and underlying etiological factors addressed) a diver may be returned to active diving duties. For maintenance therapy of non-ulcer dyspeptic conditions (GERD, gastritis, duodenitis) proton-pump inhibitors (PPIs), H2 antagonists, cytoprotective agents (sulcraftate, misoprostil), and antacids are all acceptable in the diving environment if a 7 day initiation period produces no adverse effects.

m) **ANXIOLYTICS AND HYPNOTICS**

Anxiolytic agents are absolutely contraindicated in the diving environment owing to their negative effects on attention and cognition. Even in circumstances where a diver taking such medication does not exhibit overt cognitive impairment at the

surface, it is likely that the effects of nitrogen narcosis will be exacerbated at depth.

Hypnotics may be considered for use in active divers under certain circumstances. The condition for which the medication is prescribed must be compatible with diving, that is, not major affective disorder, anxiety disorder, or other significant psychiatric disturbance. Hypnotics (including melatonin) are not allowed for divers for anything other than occasional use, and return to diving will normally not take place until appropriate washout periods (at least 5 half-lives of the drug or longest-acting metabolite) are completed. Ongoing use other than this must be approved by a C/DM."

n) **ANTIHYPERTENSIVE AGENTS**

Divers diagnosed with hypertension should be declared unfit diving until:

- Blood pressure is demonstrably stable and controlled within acceptable limits.
- Secondary complications (CAD, nephropathy, opthalmopathy) have been assessed.
- Associated risk factors for CAD (DM, hyperlipidaemia, obesity, smoking, etc.) have been addressed.
- A minimum 14 days has passed upon initiation of a new antihypertensive medication.

Prior to a return to active diving, the member should be assessed by an ADMO.

(i) ***Thiazide Diuretics*** are compatible with diving and should be considered amongst the first choices for antihypertensive medication. The risks of dehydration and electrolyte disturbance increase as the dosage level rises beyond 25mg. As dehydration is thought to be a risk factor for DCS, thiazide doses in excess of 25 mg should be avoided.

(ii) ***ACE-inhibitors*** are also considered compatible with diving and are another first line choice of antihypertensive agent in this population. A bradykinin associated dry cough is present in approximately 10% of ACEI users. This cough may heighten the risk for pulmonary barotrauma during the ascent phase of a dive and, therefore, its presence requires that a diver be made unfit until the symptom is resolved. Hypotension during the initiation phase is relatively common, but is usually manifest within the first seven days.

(iii) ***Angiotensin Receptor Blockers*** are generally very well tolerated and are considered compatible with the diving environment. As they do not produce an increase in bradykinins, as do ACEIs, they are significantly less likely to produce dry cough as a side effect. Hypotension on intiation is also less frequent with ARBs than ACEIs

(iv) ***Calcium Channel Blockers*** are another class of antihypertensive agent that is generally considered compatible with diving, though as a second choice to the agents discussed above. The dihydropyridines (nifedipine, amlodipine, felodipine, nicardipine) are potent vasodilators but have little in the way of inotropic or chronotropic effects. The non-dihydropyridines (verapimil, diltiazem) are less potent vasodilators, but have greater negative inotropic and chronotropic effects. The most frequently encountered side effect of significance for diving is that of postural hypotension. If such occurs and persists beyond the initiation period, the medication should be substituted by a different agent. Dihydropyridines are preferred to non-dihydropyridines in the diving population.

(v) ***Alpha Blockers*** are not generally considered first-line antihypertensive agents as their outcome data is inferior to that of other available medications. The major side effects of relevance to divers are those of orthostatic hypotension, dizziness, and syncope. They may also predispose a user to hypothermia, though this concern is conjectural rather than empirical.

(vi) ***Beta Blockers*** should only be prescribed for divers in limited circumstances and with the advice of a C/DM. Their negative inotropic and chronotropic effects can significantly impair exercise tolerance. Previous concerns about the potential bronchoconstrictive effects of beta blockers have largely been allayed by a data accumulated over the past decade. Meta-analyses indicate that there is no increased incidence of bronchoconstriction in individuals with no prior history of obstructive lung conditions (asthma, COPD). In those with a history of these conditions there is a negligible increase in B2 receptor sensitization, but no significant alteration of FEV1 or respiratory symptoms with the use of cardioselective beta blockers (acebutolol, atenolol, metoprolol). Individuals with obstructive lung conditions are currently excluded from CF diving duties.

o) **LIPID-LOWERING AGENTS**

The primary concern for divers requiring lipid-lowering medications is the underlying risk for cardiovascular disease. Thorough investigation and evaluation of this risk should be completed for all individuals diagnosed with hyperlipidaemia. A 7 day period of no diving is recommended on initiation of lipid-lowering agents.

(i) ***Statins*** are compatible with diving activities. The primary side effects of concern are myopathy and hepatic dysfunction. Monitoring CK levels during statin therapy is no longer recommended. Should a diver present with symptoms suggestive of myopathy while on a statin, he should be deemed unfit diving until such time as the diagnosis is confirmed and the symptoms are resolved. Monitoring hepatic function during the initiation period is controversial. While assessing hepatic function prior to commencing a statin is warranted, The National Lipid Association Statin Safety Assessment Task Force (US) states that routine monitoring of liver function tests is not supported by the available evidence. They further state that, “The preferred biochemical test to ascertain

significant liver injury is fractionated bilirubin, which, in the absence of biliary obstruction, is a more accurate prognosticator of liver injury than isolated aminotransferase levels." Divers with hepatic dysfunction of whatever origin should be made unfit diving until such time as a diagnosis is confirmed and the problem is resolved.

(ii) ***Fibrates*** are compatible with diving. Myopathy and hepatic dysfunction are reported less commonly than with statins.

(iii) ***Ezetimibe*** is generally well tolerated and is considered compatible with diving.

(iv) ***Niacin*** is compatible with diving. Dosage should be gradually titrated upward in order to avoid the common side effects of flushing, fatigue, gastro-intestinal distress and blurred vision.

p) **MOTION SICKNESS AGENTS**

This class of medication includes antihistamines (dimenhydrinate, diphenhydramine, meclizine, cinnarizine, and cyclizine), anticholinergics (scopolamine), and antidopaminergics (promethazine and metoclopramide). The antihistamine and anticholinergic medications commonly produce somnolence, visual disturbance, dizziness, and confusion; none of which are compatible with diving. Promethazine may produce these side effects as well as tinnitus and tremor. Despite these potential problems, operational divers may find themselves in circumstances where the use of these medications is required to meet mission objectives. In such cases, divers should be given a test dose (preferably prior to operational deployment) in order to determine their particular susceptibility to side effects. Utilization of these drugs should be based on test dose results and operational imperatives. In ordinary circumstances, the use of these medications would preclude diving activities.

q) **ANTIDEPRESSANTS**

Major affective disorders and anxiety disorders are not compatible with diving. Patients who have been diagnosed with these or other conditions (including chronic pain syndrome, sleep disorder, etc.) and who require the ongoing use of antidepressant medication are generally considered unfit diving. Under certain circumstances, however, where the individual is asymptomatic and stable on an antidepressant, exceptions may be made by a CDSM. Medications in the SSRI, SNRI, SARI, NDRI, TCA, and TeCA groups have the potential to lower seizure threshold and may therefore heighten the risk for CNS O2 toxicity. In addition, medications in the TCA group can produce significant cardiac conduction abnormalities. Recent research indicates that a diving depth below 45 msw may be arythmogenic in and of itself, an effect which could theoretically be exacerbated by TCAs. MAOI type medications are often poorly tolerated and have significant potential for drug and food interactions which makes them

problematic for operational scenarios. Prior to clearing a diver for active dive duties following a diagnosis of major affective disorder or anxiety disorder consultation should be obtained from a C/DM.

r) **THYROID MEDICATIONS**

Hypo or hyperthyroid states are contraindications to diving activities. Once a clinical and biochemical euthyroid state is achieved, a diver may be considered for return to diving duties. Thyroid replacement hormone (Synthroid, etc.) is compatible with diving. Propylthiouracil and methimazole are generally well tolerated, but patients should be monitored for agranulocytosis, arthralgias, GI disturbance and skin rash. Should these adverse effects occur, diving activities should be halted until they have resolved.

s) **HAIR LOSS**

Both topical minoxidil and oral finasteride are compatible with diving after an initial 7 day period of no diving.

t) **CORTICOSTEROIDS**

Topical corticosteroids, as dermal preparations or nasal sprays, are compatible with diving. Systemic steroids have multiple potential adverse effects and mandate a period of no diving until the drug is withdrawn.

u) **CONTRACEPTIVES**

Theoretical concerns that oral contraceptives may increase the risk of DCS have been rebutted by empirical evidence. They are considered compatible with diving following a 7 day initiation period. This same advice applies to the vaginal estrogen-progesterone contraceptive ring (NuvaRing).

Contraceptive skin patches (Evra) present issues with delivery in circumstances where the skin is wet or there is friction from overlying garments (e.g. diving suits). They are not recommended for female divers.

While there are no diving specific contra-indications to the use of Depo-Provera, the drug has a very long duration of activity and a number of potential adverse effects. For these reasons it is not considered first line contraceptive therapy.

Emergency Contraceptive Pills (ECPs or the ‘morning after pill’) commonly result in nausea and vomiting. It is recommended that women taking this medication avoid diving for the first 48 hours.

Hormone replacement therapy for menopausal symptoms is compatible with diving following a 7 day initiation period.

v) **ACCUTANE**

Accutane is discouraged for use in divers owing to its associated potential to lower seizure thresholds. C/DM opinion should be sought for cases where Accutane therapy is thought warranted in an active diver.

w) **SMOKING CESSATION AIDS**

(1) ***Transdermal Nicotine***

Divers may use transdermal nicotine patches while on active diving duty, though with some limitations. A 4 day initiation period of no-diving is required to ensure that there are no significant side effects. Divers should remove the patch while exposed to the hyperbaric environment (in either 'dry' or 'wet' conditions).

(ii) ***Bupropion***

This medication has been demonstrated to lower seizure threshold and is contraindicated in the hyperbaric environment. A 10 day washout period upon cessation of the drug is recommended prior to re-commencing diving duties.

(III) ***Varenicline***

As with bupropion, this drug is known to lower seizure threshold and is contraindicated in the hyperbaric environment. A 10 day washout period on cessation of the drug is recommended prior to re-commencing diving duties.

x) **GLAUCOMA**

Topical adrenergic agents, topical beta-blockers, and prostaglandin F2ά analogues (Xalatan) may be used without restriction after a 7 day initiation period

y) **PDE5 INHIBITORS (Erectile Dysfunction)**

Animal studies have demonstrated an increased susceptibility to CNS O2 toxicity in the presence of PDE5 inhibitors. These effects were noted only at very high partial pressures of oxygen (6.0 ATA) and do not reflect the operational conditions of CF diving (max PPO2 of 1.9 ATA). Common side effects of PDE5 inhibitors include headache, nasal congestion, facial flushing, myalgias, and cyanopsia; all of which may be problematic for diving. For this reason, divers should be considered unfit for 24 hours after having used these medications. sildenafil and vardenafil have relatively short half-lives (~ 4-5 hours) and are preferred to the longer acting tadalafil (T1/2 of 18 hours).

z) **GOUT PROPHYLAXIS**

Allopurinol, febuxostat, colchicine, and probenicid are acceptable for gout prophylaxis in divers. Particular attention should be paid to hydration and gastro-intestinal side effects. An NSAID, colchicine, or a corticosteroid should be co-prescribed upon the initiation of allopurinol, febuxostat or probenicid. An initial 7 day period of no diving is recommended.

aa) **ALCOHOL**

Any diver exhibiting the acute effects of alcohol intoxication or hangover is unfit to dive in accordance with the CF Dive Manual. The diving supervisor is responsible for making the decision that a diver is under the influence of alcohol and therefore unfit to dive. Any diver undergoing active treatment for alcohol dependency is unfit diving. Once treatment has been successfully completed, fitness to return to diving duties may be reconsidered. C/DM consultation is required in these circumstances.

bb) **HERBAL AGENTS AND DIETARY SUPPLEMENTS**

Scientific evidence concerning the potential side effects of herbal agents and dietary supplements is generally lacking. Information on the effects of these substances under hyperbaric conditions is non-existent. Their use by divers is generally not recommended. Specific compounds that should be avoided include: ephedrine, kava-kava, St. John's wort, and valerian root. Glucosamine and chondroitin appear to be safe for use in divers. Divers using creatine should do so within recommended dosage levels and should pay particular attention to maintaining hydration during periods of exertion. General information about specific herbal agents and dietary supplements may be found at http://nccam.nih.gov/health/backgrounds/biobasedprac.htm.

cc) **BENIGN PROSTATIC HYPERTROPHY**

(i) ***5 alpha reductase inhibitors*** – finasteride and dutasteride are compatible with diving following a 7 day initiation period.

(ii) ***Alpha blockers*** – alfuzosin, doxazocin, tamulosin, and terazocin may cause orthostatic hypotension, dizziness, and syncope as adverse effects. A 14 day initiation period is recommended to ensure that these side effects do not occur in active divers.

dd) **IMMUNIZATIONS**

A minimum no-diving period of 36 hours should follow all immunizations except the following: oral polio, Dukoral, immune globulin, and the third and fourth typhoid doses. Delayed reactions are commonly seen with yellow fever and

japanese encephalitis immunizations. A 10 day no-diving period is recommended following these latter vaccinations.

ee) **ALLERGY DESENSITIZATION**

All injections for allergy desensitization should be followed by a 4 hour restriction from diving.

ff) **DISEASE MODIFYING ANTIRHEUMATIC DRUGS (DMARDs)**

DMARDs include antimalarials (choroquine), sulfasalazine, methotrexate and TNF alpha blockers. These medications are recommended for disease suppression in rheumatoid arthritis and plaque psoriasis. Normally, the condition for which DMARDs are prescribed will be disqualifying, but in some instances the condition will be maintained in a state compatible with the performance of diving duties.

TNF alpha blockers (etanercept, adalimumab, infliximab) have a range of potential serious adverse effects including immunosuppression. The latter effect can lead to an increased susceptibility to serious infections such as TB, bacterial sepsis, and invasive fungi. As CF divers may be required to dive in contaminated waters, this class of drugs is generally contra-indicated. In some circumstances, a C/DM my grant exception to this rule.

CONCLUSION

There is no universally accepted list of medications considered safe for use in divers. Caution must be exercised when prescribing a new medication to a diver, or when considering the medical fitness of a potential diver who is already taking a medication.

The underlying condition for which a medication is prescribed should be the primary consideration when determining fitness to dive. When prescribing short-term medications for the treatment of an acute condition (less than 14 days), it is often prudent for a diver to remain unfit diving until that condition is resolved. Chronic conditions must be controlled and stabilized prior to a resumption of diving activities. For most medications, an initial period of no-diving is warranted to exclude significant side effects and/or allow for adaptation to those effects.

In many circumstances ‘case-specific’ considerations may influence the determination of fitness to dive. In such situations, consultation with a C/DM is strongly encouraged.