



PSYCHOLOGICAL ISSUES IN DIVING

*‘Scubadoc’ Discusses Schizophrenia,
Marijuana and Alcohol Use*



By Dr. Ernest Campbell

Little research exists to characterize the relationship between mental conditions and scuba diving. Other than the obvious reasons people shouldn't dive - they are out of touch with reality, severely depressed and suicidal or paranoid with delusions and hallucinations - many people with everyday anxieties, fears and neuroses can dive, and do.

Successful divers generally have profiles that are characterized by little or no neuroticism, and these divers score well on studies of self-sufficiency and emotional stability.

Some actual psychological disturbances are well known, but, as for their associated risks of scuba diving, they are poorly studied and documented. This group of disorders includes the depressions, bipolar disorder, anxiety and phobias, panic disorders, narcolepsy and schizophrenia.

In addition to the risks caused by the condition itself, we must consider the possible hazards of the effects of medications - taken singly or in combination. In diving, medications play a secondary role to the condition for which they are prescribed. A mood-altering medication, for example, should be used with care in diving. Likewise, drugs that carry warnings as dangerous for use while driving or when using hazardous equipment should be considered dangerous for divers.

The interaction between the physiological effects of diving and the pharmacological effects of medications is usually an educated, yet unproven, assumption. Each

situation requires individual evaluation: no general rule applies to all. Currently, there are no specific studies that indicate the safety or danger associated with drugs and diving.

Finally, divers have different personalities; each responds differently to abnormal physiological states and changes in the environment from the effects of various gases under pressure. Such states as inert gas narcosis, carbon dioxide toxicity, oxygen toxicity, high-pressure nervous syndrome (HPNS) and deep-water blackout all can cause reactions that are similar to a psychoneurotic reaction or an organic cerebral syndrome.

Before allowing or barring someone with psychological problems to dive, the certifying physician must know all the possibilities and variations in each individual case.

SCHIZOPHRENIA

Schizophrenia is a serious mental illness that affects one person in 100. It usually develops in the late teens or early twenties, though it can start in middle age or even much later in life. The earlier it begins, the more potential it has to damage the personality and the ability to lead a normal life. Although schizophrenia is treatable, relapses are common, and it may never resolve entirely. Sufferers typically have difficulty working and studying, relating to other people and leading independent lives. It causes great distress in families.

With this disorder, thoughts, feelings and actions are somewhat

disconnected from each other. This may be easier to illustrate by describing the symptoms: Positive symptoms are abnormal experiences; negative symptoms are more an absence of normal behavior; and disorganized symptoms indicate the extent of disorganization of the patient's thought processes and vocalizations.

Positive Symptoms

We normally feel that we are in control of our thoughts and actions, but schizophrenia interferes with this feeling of being "the captain of the ship." It may feel as though thoughts are being put into the mind or removed by some outside, uncontrollable force. At worst, the whole personality seems to be under the influence of an outside force. This is a terrifying experience, which the person tries to explain according to education and upbringing.

Hallucination is the experience of hearing, smelling, feeling or seeing something that is not there. Voices are the most common hallucination, and they often appear so real that the hearer is convinced that they come from the outside - as if from loudspeakers or a spirit world. These voices are distressing, as they talk about the person as well as to the person.

Delusions, false and usually unusual beliefs, cannot be explained by the believer's culture or changed by argument. These ideas may be fantastic, as in "I'm God's messenger!" or apparently reasonable - "Everyone at work is against me." Persecutory delusions are especially

distressing for the family if members are seen as the persecutors. Delusions may come out of the blue or may start as an explanation for hallucinations or the sensation of being 'taken over.'

Negative Symptoms

These affect interest, energy, emotional life and everyday activities. Those individuals with negative symptoms generally avoid meeting people, say little or nothing and may appear emotionally blank.

Disorganized Symptoms

Schizophrenia often interferes with a person's train of thought; it often becomes difficult to understand them. Those with schizophrenia will shout back at their voices or will comply with the instructions of the voices, often hurting themselves or others.

Some Background on Schizophrenia

The cause of this condition is unknown. However, approximately one in 10 persons with schizophrenia has a parent who suffers from the illness. The gene, or combination of genes, responsible has yet to be discovered.

An episode of schizophrenia can occur after a stressful event - and, though it cannot be the cause, it may help to bring on the illness. Long-term stress, such as family tensions, may also make it worse. Street drugs like ecstasy, LSD, amphetamines and marijuana (as well as hashish and ganja) are thought to help bring on schizophrenia in some individuals. There is no evidence that it is brought on by disturbed families.

Before the advent of the anti-psychotic drug Thorazine" in the 1950s, many people with schizophrenia spent most of their lives in mental hospitals. Things have changed since then, and most people with the illness are treated outside hospitals for most of their lives.

After a first episode of schizophrenia, about a quarter of the individuals experiencing it make a good recovery within five years; two-thirds (60-65 percent) will have multiple episodes with some degree of disability between these episodes; and 10-15 percent will develop severe continuous incapacity. Although the illness is severe and disruptive, many people who experience it are eventually able to settle down, work and build lasting relationships.

Medications

Since 1954, physicians have used a number of drugs to treat schizophrenia. Most work by blocking the path of dopamine, a particular chemical messenger in the brain. The drugs usually suppress the so-called positive symptoms, delusions and hallucinations. These symptoms gradually go away in a few weeks, but side effects can occur, causing stiffness and shakiness, like Parkinson's disease. These symptoms can be reduced by giving anti-Parkinsonian drugs.

Anti-schizophrenia drugs may also cause slowing up, sleepiness and weight gain. The worse consequence, unwanted and lasting movements of the mouth and tongue, is tardive dyskinesia (TD). This affects individuals who have

taken anti-schizophrenia drugs for a year or more. This condition may not end even if the drugs are stopped.

Fortunately, new drugs block different chemical messengers, and they are much less likely to cause side effects. They may also help the negative symptoms, on which the older drugs have very little effect.

Because of the risk of repeated episodes, it is usually advisable to take drugs for years, if not for a lifetime. Although the dose is less than for an acute episode, some drugs can still cause side effects.

Advice About Diving

Merits of each case, the type of drugs required, the response to medication, and the length of time free of the disorder should determine whether a person with schizophrenia should be certified as fit to dive. Most probably should not consider diving.

However, some individuals who have responded well to medications over a long term may be considered for diving. Authorities should consider how one's decision-making ability, responsibility to other divers and any drug-induced side effects might limit a diver's ability to gear up and move in the water. Prospective divers should fully disclose such information to the dive instructor and certifying agency. Individuals responsible for divers should be alert to divers with inappropriate responses or activity, paranoid behavior or unusual ideas and be quick to ask about the possibility of schizophrenia.

MEDICATIONS for SCHIZOPHRENIA

NOTE: In all cases, the generic name is first, followed by various brand names.

Clozapine / Clozaril

Clozaril is used to treat nervous, mental and emotional conditions such as preoccupation with troublesome and recurring thoughts and unpleasant and unusual experiences such as hearing and seeing things not normally seen or heard.

Blood tests:

- Clozapine can cause a low white blood cell count in 1-2 percent of patients, which usually occurs between six to 18 weeks after starting Clozapine. White blood cells help to fight infections. Diving could possibly increase the risks of severe vibrio (aquatic bacteria) infection.

Possible adverse side effects for divers:

- *Seizure:* This has occurred in 1-2 percent of patients taking less than 300 mg / day; 3-4 percent taking 300-600 mg / day; and 5 percent over 600 mg / day. If a seizure occurs, contact your physician immediately.
- *Increased saliva production:* Most patients will experience this side effect, with some tolerance developing after eight-12 weeks. Increased salivation could increase the production of swallowed air, with attendant difficulty on ascent.
- *Tiredness, dizziness:* This usually improves or goes away in three to four weeks.
- *Low blood pressure with standing:* This condition usually improves over time. Discuss the dosage with your physician.
- *Faster heartbeat:* This usually is not serious, and tolerance may develop.
- *Restlessness, tremors, stiffness, muscle spasms* are uncommon, but can be treated.

Quetiapine / Seroquel

Quetiapine is used to treat psychotic symptoms and disorders.

Possible adverse side effects for divers:

- *Low blood pressure:* This usually occurs with standing from a lying or sitting position. Arise slowly and allow your body more time to adjust the blood pressure.
- *Sleepiness:* This is common, but usually mild and transient.
- *Cataracts:* One study with dogs showed a possible increase in cataract formation. This has not yet been reported in humans. You should have your eyes examined every six months.
- *Other occasional side effects* may include headache, dry mouth, dizziness, insomnia, constipation and agitation.

Quetiapine may cause muscle stiffness, hand tremors, face and mouth movements and, rarely, neuroleptic malignant syndrome, or high fever, stiffness, and flu-like symptoms. These symptoms occur less often than with older typical anti-psychotic medications.

Risperidone / Risperdal

Risperidone is used to treat nervous, mental and emotional conditions such as preoccupation with troublesome and recurring thoughts and unpleasant and unusual experiences such as hearing and seeing things not normally seen or heard.

How does it work?

The effects of this medication appear to be related to reducing activity of dopamine in the brain. It also blocks some serotonin activity in the brain. Some of the benefits may occur in the first few days, but it is not unusual for it to take several weeks or months to see the full benefits. In contrast, many of the side effects are worse when you first start taking it.

Possible adverse side effects for divers:

- All medications that act on dopamine can sometimes have side effects involving muscle coordination or muscle tension. It appears that risperidone is somewhat less likely to cause this type of side effect than others. Examples can include stiffness in the arms, back or neck. Sometimes patients experience shakiness or problems with muscle coordination.
- Some people who take risperidone may become more sensitive to sunlight. When you first begin taking this medicine, avoid too much sun and do not use a sun lamp until you see how you react, especially if you tend to burn easily. If you burn easily or have a severe reaction, contact your physician.

New Drugs for Schizophrenia

Atypical antipsychotic drugs on the market currently include clozapine, risperidone (described above) and olanzapine (described below). Use of these medications in selected patients who do not benefit from, or cannot tolerate, traditional agents is an important step in improving their lives.

The use of traditional antipsychotic medications has been limited - by their substantial side effects and the failure in some cases to achieve long-term control of symptoms. New 'atypical' antipsychotic drugs show promise for the treatment of resistant cases of schizophrenia and improvement in patient tolerance and compliance. These medications have been more successful than traditional antipsychotic drugs in treating the negative symptoms of schizophrenia, such as social withdrawal and apathy.

The atypical antipsychotic drugs produce fewer side effects and no tardive dyskinesia or abnormal tonicities in muscles. However clozapine can produce fatal agranulocytosis, an acute condition where there is a great reduction in the production of white blood cells.

Olanzapine / Zyprexa

Olanzapine is used to treat psychotic symptoms and disorders.

Possible adverse side effects for divers:

- Tiredness, dizziness, insomnia, nervousness, restlessness, nausea, vomiting, constipation, dry mouth, runny or stuffy nose, increased salivation, weight loss or gain, increased heart rate and low blood pressure withstanding.
- Olanzapine may cause muscle stiffness, hand tremors, face and mouth movements, and rarely neuroleptic malignant syndrome (high fever, stiffness, and flu-like symptoms). These symptoms occur less often than with older typical anti-psychotic medications.

Alcohol & Diving

Does drinking alcoholic beverages and diving pose any danger? The short answer is this: By drinking alcohol before and during diving trips, a diver severely endangers not only himself but his buddy!

Blood Alcohol Concentration (BAC)

Research has shown that one's ability to process information diminishes, particularly in tasks that require undivided attention for many hours after the blood alcohol level has reached 0.015 percent. This means that the risk for injury of a hung over diver increases significantly, particularly if high BAC levels were reached during the drinking episode.

The upper limit of the BAC for driving a vehicle in many places is around 0.05 percent. Surely diving with any alcohol on board would be foolish, considering the alien environment (water) and the complex skills required to follow no decompression procedures.

Alcohol Impairment

The following behavioral components required for safe diving diminish when alcohol is on board or has been on board in the previous 24 hours:

- Reaction time
- Visual tracking performance
- Concentrated attention
- Ability to process information in divided attention tasks
- Perception (judgment)
- The execution of psychomotor tasks.

The individual who has alcohol on board may not feel impaired or even appear impaired to the observer, but that person definitely is impaired. This can persist for extended periods. The use of alcohol, even in moderate doses, clearly carries a self-destructive aspect of behavior and leads to higher probabilities for serious accidents.

Alcohol is a Diuretic

In addition, alcohol produces dehydration, which is a major contributor to decompression illness. In any form, alcohol has a direct effect on the kidneys, causing an obligatory loss of body fluids.

Many divers appreciate a cool beer, but drinking and diving can turn a safe sport into a nightmare for partners in the dive. They should think twice before drinking alcohol before diving.

Recent discussions in scuba magazines, chat rooms and scuba forums have concluded that it's OK to drink beer between dives during a surface interval. Some divers insist on drinking beer before and after their dives. ***Does drinking alcoholic beverages and diving pose any danger?*** The short answer is this: By drinking alcohol before and during diving trips, a diver severely endangers not only himself but his buddy!

A study by Perrine, Mundt and Weiner found scuba diving performances significantly degraded at blood alcohol levels of 40 mg / dl (0.04 percent BAC). The study also cites a clear increase in the risk of injury at this level, which can be

reached by a 80-kilogram man who ingests two 12-ounce / 336-gram beers in one hour on an empty stomach. This study once again points out that one experiences a diminished awareness of cues and reduced inhibitions at relatively low levels of blood alcohol. Their study used well-trained divers who were being paid to do their best; their diving performances were being videotaped.

Dr. Glen Egstrom, Ph.D., has stated the problem succinctly: his review of more than 150 studies on the effects of alcohol on performance has resulted in the following observations:

1. Ingestion of even small amounts of alcohol does not improve performance; to the contrary, it degrades performance.
2. While certain variables can speed up or delay the onset of the effects of alcohol, they are minor issues, which do not overcome the decrements to the central and peripheral nervous system.
3. Alcohol can be cleared from the blood at a predictable rate, usually 0.015 percent BAC per hour. This does not necessarily mean that the deminished performances have been completely eliminated in that time.
4. Alcohol, a depressant drug, slows certain body functions by depressing the entire central nervous system. Effects are noticeable after one drink.
5. The effects are mood elevation, mild euphoria, a sense of well being, slight dizziness and some impairment of judgment, self control, inhibitions and memory.
6. Increases in reaction time and

Effects of Marijuana Use

decreases in coordination follow the dose / response curve quite well.

7. Alcohol is involved in roughly 50 percent of all accidents involving persons of drinking age.

8. Persons who have been drinking alcohol consistently underestimate its deleterious effects on performance.

9. Alcohol affects divided attention tasks to a greater degree than those tasks requiring a single focus of concentration. For example, a diver will be affected to a greater degree by a shallow water head-first dive, which required many interrelated decisions necessary to a successful dive than by lifting a heavy weight.

Naltrexone / Revia

Naltrexone is used to treat alcoholism, by diminishing craving and the effect of alcohol. It is also used to decrease impulsivity associated with self-destructive behaviors.

Possible adverse side effects for divers:

- *Dizziness:* This is a fairly common side effect, which often disappears with continued use.

- Less common side effects may include: headache, constipation, nervousness, fatigue, insomnia, limb or abdominal pain, and weight loss.

- The more marijuana is used, the shorter its effects last.
- Tolerance to the psychoactive effects develops with continued use.
- Psychological and mild physical dependence gradually occurs with regular use.

Withdrawal symptoms include:

- Restlessness, insomnia, nausea, irritability, loss of appetite, sweating.
- Risk of adverse reactions is greater for persons who have had schizophrenia or other psychotic disorder, depression, dysthymia (mood disorder), and bipolar disorder (manic depression).
- Tar content of marijuana is significantly greater than cigarettes, with more carcinogens (substances producing or inciting cancer).

Potentially harmful effects to divers include:

- Accidents and deaths caused by distortions in perception of time, body image and distance.
- Impairment of recent memory, confusion, decreased concentration.
- Decreased muscle strength and balance.
- Decreased blood flow in brain.
- Impaired ability to perform complex motor tasks.
- Poor memory.
- Amotivational syndrome.
- Depression, especially in new users.
- 50 percent of users will have a 'bad trip,' a severe panic reaction with fear of dying or losing one's mind.
- Fast heart rate and lower exercise tolerance.
- Dry mouth and throat.

High doses may cause:

- Hallucinations.
- Depersonalization.
- Paranoia.
- Agitation.
- Extreme panic.

Chronic use may cause:

- Bronchitis, sinusitis, pharyngitis (inflammation of the mucous membrane and underlying parts of the pharynx), chronic cough, emphysema, lung cancer.
- Poor immune system functioning; severe marine infections.
- Poor motivation, depressed mental functioning.

ABOUT THE AUTHOR

Ernest Campbell, M.D., FACS is the Webmaster at Diving Medical Online. He can be reached c/o Webmaster@Diving Medicine, online <http://www.gulftel.com/~scubadoc>