

## Motion Sickness

Motion sickness is one of the most challenging yet most poorly understood responses to spending time at sea or other unstable platforms. Nearly all divers are affected by it at some time, although sensitivity varies greatly and some almost seem immune to it.

One of the reasons why motion sickness is so challenging is that the perception and sensory integration of motion itself is so complex. Various sensory systems collate input that is processed by the brain in an effort to determine orientation and acceleration of the body. Most activity involving vehicles of propulsion take the human physiology outside its original design specifications and therefore carry the potential of inducing stimuli to which the body would react in other than a normal way.

Teleologically, motion sickness is thought to have its origins in a survival strategy in prehistoric man on experimental diets – that is eating whatever is found and hoping that it isn't poisonous. Most plant poisons affect the nervous system, but tend to do so differentially. This means that they cause selective or partial disruption of nervous impulses. Over millennia, a survival strategy evolved to empty stomach contents when this occurred to void the noxious substance. The extrapolation to motion sickness is that acceleration and positional instability – particularly where there are conflicting stimuli between the various organs of orientation – may provoke this same survival strategy. However, the knowledge that you would have survived as a Neanderthal eating mushrooms and berries provides little comfort to a diver retching on a boat.

Motion sickness is not limited to nausea and vomiting, it is actually a spectrum of signs and symptoms that evolve over a period of time. Awareness of the early stages can sometimes delay or prevent progression to the grand finale – vomiting:

- Apprehension
- Hypersensitivity to smell
- Pale skin
- Restlessness and withdrawal
- Sweating
- Increased saliva production with swallowing and yawning
- Nausea
- Vomiting (this may be curative or continue to a point of collapse and dehydration)

From a practical perspective there are three key concepts regarding motion sickness:

- Everyone is at risk – but this risk / tendency varies
- Some things make it worse
- Some things make it better

### Determining the risk

By the time an individual reaches a “diving age”, they usually know whether or not they have a tendency to get car-sick, air-sick or easily become nauseous or dizzy. They also know whether or not they can read a book or follow a map in the car or can even risk sitting in the back. The response to driving in a car is useful to determine the likely sensitivity to motion sickness at sea. Although this division is neither exclusive nor particularly scientific, it is useful to determine the need and extent of precautionary measures by classifying divers in four degrees of sensitivity:

- Grade 0: Never get sick (at least not yet) – the back seat reader-types
- Grade 1: Get sick on the boat but feel better while diving – the non readers
- Grade 2: Also get sick underwater – the obligatory front seat passengers
- Grade 3: Stay sick after diving on return to shore; risk of dehydration – the must drive myself

group

For the back seat reader (Grade 0) types, no advice is needed other than to request their sympathy and support for the others and to remind them that in prehistoric times they would not have survived to adolescence.

For those who tend to get ill only during a prolonged time on dive boats or when the sea is rough (i.e., the Grade 1, non readers), basic precautions and simple prophylaxis is usually effective. For the others (Grade 2 & 3), prophylaxis is usually required to ensure dive safety, but comes with additional cautionary advice.

Things that make it worse

Sedating chemicals and dietary indiscretions: In general these appear to predispose to motion sickness. Most divers soon discover which food types are more suitable to dive with. In general, non fatty, complex carbohydrates (e.g., fruit or cereal) are well tolerated. All alcohol should be avoided by all Grade 2 and 3's. However it is not wise to dive on an empty stomach. Low blood sugar is a risk factor in diving. You should eat something.

Unfavourable sea states: Severe undulation at sea, especially when combined with an inability to see a fixed terrestrial reference point, or the horizon, is a significant risk factor for motion sickness. Grade 2 and 3 divers should find the least unstable part of the boat, usually in the middle of live-aboard or larger boats and towards the stern in ski-boats during short launches through surf.

Psychological factors: These definitely play a role. Fear of diving may reduce onset time, and fear of becoming sea sick is a self-fulfilling prophecy. Offensive odours such as diesel or petrol fumes from the boat engines, raw or decaying food or even the smell of cooked food may tip some over the edge. Also the auditory and olfactory assault of fellow divers hurling over the bows is likely to encourage sympathetic participation by others.

Things that make it better

Faith / traditional remedies: It is said that any remedy, given and taken in good faith, is effective against motion sickness. Although this is not entirely true, it is certainly inappropriate to ridicule or erode the faith of an individual who has discovered a useful and safe remedy. Accordingly, wrist bands, ginger and other remedies have merit. If it works, it works.

Age: With increasing age, sensitivity to motion sickness appears to decrease. At least not all of aging is bad.

Maintaining orientation: Minimising the time on the boat (when possible) and reducing the time of not being able to look at the shore or horizon by placing and organizing the dive gear for easy access, assembly and kit-up, is invaluable. Usually a moving boat is less troublesome than a stationary one – pitching and yawing in the swells. Therefore, use the time on the boat wisely, and plan your activities around this.

Medication: Sea sickness medication is controversial due to its sedating or other potentially adverse effects. However, divers will take medication to avoid the unpleasantness of sea sickness, and it is pointless ignoring this reality. Accordingly it is better to provide appropriate advice and precautions on its use. Notably, prevention is better than cure – once motion sickness starts it is more difficult to suppress.

There are four primary considerations when selecting an anti-motion sickness drug:

- Sensitivity to motion sickness (Grades 1-3)
- Duration of the exposure (1-3 days; 3-5 days; > 5 days)

- Type of drug and its potential side-effects
- Type of diving planned (risk of nitrogen narcosis or loss of situational awareness)

Anti-motion sickness drugs:

(1) Scopolamine patches: These are very effective when applied to clean, thin skin (usually behind the ear) 3 to 6 hours before diving. There are definite contra-indications for these drugs and there are real risks of serious neurological side-effects including hallucinations, loss of co-ordination, sleepiness, dry mouth, blurred vision, etc. Accordingly it is only recommended for shallow (less than 100 fsw/30 MSW) diving over multiple days (> 3 days of continuous boat diving), for Grade 2 & 3 individuals, who have used it previously without ill effects. Wash the hands immediately after applying the patch, as inadvertent rubbing of the eyes with contaminated fingers will result in full dilation of the pupil and many hours of blurred vision and light sensitivity. Patches are replaced every three days.

(2) Dimenhydramine: This is an effective but significantly sedating drug. It may be considered for < 3 days of continuous, shallow diving in Grade 2 & 3 individuals who have used it previously without difficulty. The usual dose is 50 mg every 6 hours.

(3) Cyclizine & Metoclopramide: Moderately effective for Grade 1 and 2 motion sickness. Again, deep diving is not recommended. Cyclizine dosage is 50 mg 4 hourly while Metoclopramide is 10 mg 8-hourly. Prior use to confirm individual safety is recommended.

(4) Cinnarizine / Cinnarizine and Domperidone: Effective for Grade 1 and 2 motion sickness. Minimal side-effects. Dosage of Cinnarizine is 25-75 mg 6 hourly with or without 10 mg of Domperidone. Prior use to confirm individual safety is recommended.

(5) Phenytoin: This anti-epileptic drug has been used successfully by astronauts in the prevention of space sickness. It appears to be most effective in Grade 3 motion sickness, and has minimal side effects over 3-5 days of diving. The dosage is 5 mg/kg either as a single dose the night before or in a divided dose, mornings and evenings, during a dive trip. Its safety is unproven for long term use (> 5 days). There are important contra-indications to the use of this prescription drug. To confirm individual safety, use is recommended prior to diving.

In closing, motion sickness is common in boat diving. With a little planning it can be limited or even entirely prevented in most people. A few individuals will not be able to dive due to incapacitating motion sickness, but they are unlikely to even attempt diving. For the average person, motion sickness is manageable.