

STAN FAST FACTS

DAN's Quick Guide to

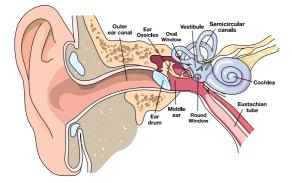
DCS, PFO, Diabetes, Flying After Diving, Ears

YOUR DIVE SAFETY ASSOCIATION

FAST FACTS ABOUT EQUALISATION The Ears & Diving

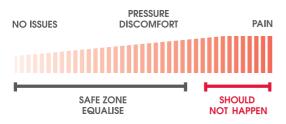
ANATOMY OF AN EAR

The ear is the organ of hearing and balance. Understanding its anatomy can help better illustrate why it's essential to equalise. The ear consists of three distinctive spaces filled with either air or liquid: the external, middle and inner ear.



As divers descend in the column of water, environmental pressure on the body increases in a linear fashion across the body.

DISCOMFORT SCALE



To prevent pressure-related injuries such as bleeding, edema (swelling) of soft tissues, leakage of fluid into the air space and membrane rupture, divers must actively enable air from the throat to enter through the Eustachian tubes into the middle ear by using equalisation techniques.

HOW TO EQUALISE

There are several techniques divers can employ to effectively equalise their ears.

PASSIVE

Requires no effort. Occurs during ascent.

VOLUNTARY TUBAL OPENING

Try yawning or jaw wiggling.

VALSALVA MANOEUVRE

Pinch your nostrils and gently blow through your nose.

TOYNBEE MANOEUVRE

Pinch your nostrils and swallow (good technique, if equalisation is needed during ascent).

FRENZEL MANOEUVRE

Pinch your nostrils while contracting your throat muscles and make the sound of the letter "k."

LOWRY TECHNIQUE

Pinch your nostrils and gently try to blow air out of your nose while swallowing (think Valsalva Manoeuvre meets the Toynbee Manoeuvre).

EDMONDS TECHNIQUEA

Push your jaw forward and employ the Valsalva Manoeuvre or the Frenzel Manoeuvre.

WHY YOU MUST EQUALISE

At 1 metre (3 feet)	 The water pressure outside of your eardrums is 10% greater than the pressure in your middle ears. Your eardrums flex inward to compensate – you may feel some pressure.
At 2 metres (6 feet)	 The pressure differential is 20% greater than at the surface and your eardrums bulge further. You feel definite pressure, and many begin to feel pain.
Beyond 2 metres (6 feet)	• Your eardrums are stretched to their limits. Unless you have equalised, you will feel significant discomfort or pain. The tissues and blood vessels in your ear may start to break, and as the pressure differential builds your Eustachian tubes will shut, making equalisation impossible.
At 3 metres (10 feet)	If your eardrums haven't broken yet, the pressure differential begins to draw blood and fluid from the surrounding tissues into your middle ears, causing middle-ear barotrauma. Pain may become a feeling of fullness which will remain for a week or more.
Beyond 3 metres (10 feet)	 If you haven't equalised, your eardrum can break and cause water to flood your middle ears. The sudden exposure can cause vertigo.

PRACTICE MAKES PERFECT

Divers who experience difficulty equalising may find it helpful to master several techniques. Many are difficult until practiced repeatedly, but this is one scuba skill you can practice anywhere – in a pool, on a plane or even at your desk. Just do it gently!







FAST FACTS ABOUT EQUALISATION 9 Tips for Easy Equalisation

I EQUALISE BEFORE YOU DIVE

Prior to descent, while you are neutrally buoyant with no air in your buoyancy control device (BCD), gently inflate your ears using your preferred equalisation technique to check that you are able to equalise.

2 DESCEND FEET FIRST

This allows air to travel upward into the Eustachian tube and middle ear, a more natural direction. Use a descent line or the anchor line to control the speed of descent.

3 EQUALISE OFTEN

Inflate your ears gently every few metres for the first 3-5 metres.

PAIN IS NOT ACCEPTABLE

If there is pain, you have descended without adequately equalising. Ascend a few metres until the pain stops.

5 STAY AHEAD

If you do not feel your ears opening, stop and try again; you may need to ascend a few metres to diminish the pressure around you. Do not bounce up and down.

6 TRY TILTING

If you are having trouble equalising on one side, it may be helpful to tilt the blocked ear toward the surface.

STOP IF IT HURTS

If you are unable to equalise, abort the dive. The consequences of descending without equalising could ruin an entire dive trip or cause permanent damage and hearing loss.

B DO NOT DIVE WITH CONGESTION

Decongestants and nasal sprays may be used prior to diving to reduce swelling in the nasal and ear passages. If your doctor agrees with your decision to use oral decongestants, take them one to two hours before descent. They should last from eight to 12 hours, so you don't need to take a second dose before a repetitive dive. Nasal sprays should be used approximately 30 minutes before descent and usually last 12 hours. Take caution when using overthe-counter nasal sprays; repeated use can cause a rebound reaction resulting in increased congestion and possible reverse block on ascent. Decongestants may have side effects. Do not use them before diving if you do not have previous experience.

KNOW WHEN TO CALL IT

If at any time during the dive you feel pain, experience vertigo or note sudden hearing loss, abort the dive. If these symptoms persist, do not dive again and consult your physician.

GUIDELINES FOR Flying After Diving

HOW LONG SHOULD YOU WAIT? SUGGESTED MINIMUM SURFACE INTERVALS



Longer surface intervals further reduce DCS risk

These guidelines apply to divers who have no symptoms of decompression sickness (DCS) and will be flying at cabin altitudes of 2,000-8,000 ft (610 to 2,438 metres)

MILD DCS SYMPTOMS (TYPE 1)

- Musculoskeletal or joint pain
- Skin rashes, mottling or swelling
- Tissue tenderness associated with skin manifestations
- Mild constitutional symptoms

SERIOUS DCS SYMPTOMS (TYPE 2)

- Numbness, tingling or muscular weakness
- Difficulty walking or loss of coordination
- Confusion or impairment of cognitive functions
- Vertigo or spinning sensation
- Chest pain or difficulty breathing
- Bladder or bowel dysfunction
- Tinnitus or hearing loss

GUIDELINES FOR RECREATIONAL Diving with Diabetes

YOUR BUDDY SHOULD NOT BE DIABETIC

Inform your buddy and leader of your diabetes

WHO CAN DIVE?

18 yrs or older who have:

- Well controlled HbA1c (\leq 9%)
- · Good overall health
- Under medical supervision
- No new medications
- No history of hypoglycaemia unawareness
- No instances of hypoglycaemia requiring third party intervention



If you develop any symptoms while diving end the dive, surface and seek medical evaluation.

GLUCOSE MANAGEMENT ON THE DAY OF DIVING



Complete a minimum of three pre-dive BG tests to evaluate trends



Delay dive if BG is below 150 mg/dL or over 300 mg/dL

Carry rescue medications during dive and at surface

Monitor blood sugar frequently for 12-15hours after diving

DIABETICS SHOULD AVOID:





Depths greater than







Dives with mandatory decompression (e.g. cave, wreck stops



Overhead environments penetration)



Any situation that may exacerbate hypoglycaemia (e.g. prolonged

cold and arduous dives)

Patent Foramen Ovale (PFO)

WHAT IS A PFO?

It is a hole in the heart that failed to close properly after birth.

A "trap door" which can open letting the blood flow into the left atrium and bypassing the pulmonary filter.

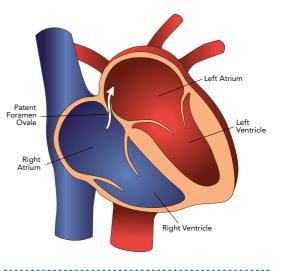
27% of people have a PFO 6% of people have a large PFO

IMPACT ON DIVERS

Without PFO

A PFO may let Venous Gas Emboli (VGE) pass to the arterial side (shunt) and cause decompression illness.

2.5x Greater risk of developing DCI with PFO Without PFO Without PFO 4x Greater risk of neurological DCI



PFO BECOMES A DCI RISK WHEN:

- A PFO is large
- Valsalva-like manoeuvre opens PFO
- VGE overload
- Target tissue saturated with gas



WHAT CAN DIVERS WITH A PFO DO?





With PFO



Dive more conservatively

fast facts about Decompression Sickness

THE SKIN BENDS – SKIN MANIFESTATIONS OF DECOMPRESSION SICKNESS

A post-dive itch or change in the colour or texture of your skin, such as a rash or a marbled appearance, may be decompression-related.

Skin manifestations of decompression sickness (DCS), also known as cutaneous DCS, are more common than you might think. Divers often mistake cutaneous DCS for a rash due to another cause, such as contact with marine life or an allergic reaction, or they may just ignore such symptoms. Although cutaneous DCS is usually a mild and self-limiting disease, disregarding it can sometimes lead to more severe manifestations of decompression sickness.



AN ITCHY RASH

The mildest form of cutaneous DCS is a rash, most commonly on the torso – the chest, belly, back, shoulders, arms or buttocks. Such rashes may look like a sunburn and are usually itchy; some people say it feels as if tiny insects are crawling on their skin. Divers frequently overlook a DCS-related rash, attributing it to other factors or assuming it is nothing serious. Such rashes usually go away in a matter of hours.



CUTIS MARMORATA

A condition called cutis marmorata, characterised by a marbled pattern on the skin, is a more severe form of cutaneous DCS. Such lesions typically appear on the same parts of the body as milder DCS rashes but are usually bright red, purplish or even bluish, with an uneven pattern. The colouration may appear in patches or, in severe cases, may begin on the chest and spread downwards. Cutis marmorata may be extremely itchy, and affected areas sometimes feel tender to the touch. Often, however, divers with cutis marmorata don't feel anything and become aware of the change in their skin only when they see it.



LYMPHATIC DCS

Lymphatic DCS affects your lymph system, a network of fluid-filled vessels that works in concert with your circulatory and immune systems. Its primary symptom is a swelling of the skin, most often on the chest or arms. Swollen areas will have a pitted appearance, like the skin of an orange, and may be painful. If a swollen area is pressed lightly with the tip of a finger, the resulting indentation will remain for a few moments. If you're affected by lymphatic DCS, you will usually be aware something is wrong.

ONSET AND EVOLUTION

DCS-related skin changes usually occur within several minutes to several hours after a dive. The more severe your dive exposure, the more quickly symptoms are likely to be evident.

AN ITCH

Is usually the first symptom to go away.

A RASH

May resolve within 24 hours.

MARBLING

Usually fades out over a few days and never changes colour to blue-green, as a bruise does.

LYMPHATIC DCS

May go away on its own, but both marbling and swelling will disappear more quickly with treatment.

20% of divers affected by cutaneous DCS also experience neurological effects that they may not be aware of.

These may include visual disturbances similar to a migraine aura. Some affected divers also report feelings of fatigue and breathing difficulties.

EMERGENCY WARNINGS

Abdominal, back or chest pain accompanied by skin mottling can quickly evolve into severe DCS and should be treated on an emergency basis. The shorter the time between a dive and the onset of symptoms, the more likely it is that severe DCS will develop.

WHAT TO DO...

RISK FACTORS

The main risk factor for cutaneous DCS is your dive profile. However, women and divers with a large patent foramen ovale (PFO) – a fairly common, congenital, generally benign hole between the heart's left and right chambers – may be at increased risk. A history of repeated cutaneous DCS or of DCS accompanied by other symptoms frequently leads to identification of a previously unsuspected PFO.

TREATMENT

Oxygen first aid should immediately be commenced for a diver exhibiting DCSrelated skin changes, and the diver should be evaluated by a physician. A rash unaccompanied by other symptoms usually doesn't need to be treated by recompression. But if your physician discovers signs of neurological effects, hyperbaric oxygen treatment in a recompression chamber is usually advised. Appropriate treatment for skin mottling or swelling will depend on the results of a physical examination. Skin changes associated with any other manifestations of DCS should be treated as an emergency.

PRESERVING THE EVIDENCE

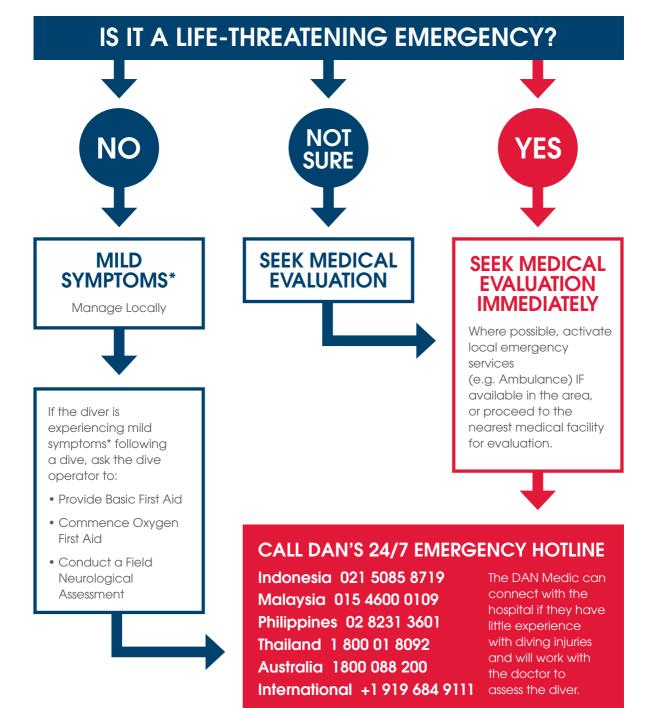
If you experience any skin change after a dive, be sure to take a photo of it because it may have disappeared by the time you are able to see a physician. We also invite you to send such photos, along with a description of your symptoms and any treatment you received, to DAN, at medic@dan.org, to help educate other divers.

FIRST AID

In all cases call the DAN Diving Emergency Hotline promptly for advice.

DAN Emergency Hotline 1800 088 200 (within Australia) +1 919 684 9111 (International)

Diving Accident Action Plan



MILD SYMPTOMS

Mild symptoms following a dive can include:

- Numbness
- Tingling
- Dizziness (no spinning sensation)
- Joint Pain
- Unusual Fatigue
- General feeling
 of being unwell
- Skin Rash

 Not all incidents will require recompression. Getting assessed at a hospital or medical facility first is essential.

- When calling DAN, make sure you have a call-back number available in case the call drops out or a follow-up call is required.
- If you have current DAN coverage, be sure to inform the DAN Medic.
- Who can make the call to DAN? If able to, the diver can call, otherwise, your dive buddy, diver instructor/ operator, even the hospital can call DAN on your behalf.

- Don't delay action, whether that is commencing oxygen first aid, contacting local emergency services, getting to a medical facility, or calling the DAN Hotline.
- All divers can call the DAN Hotline for advice, however, DAN can only arrange an emergency evacuation/treatment and pay for associated costs for divers with DAN coverage and within the limits of their DAN coverage option.
- Do NOT use email or social media to contact DAN if it is an emergency. Call the DAN Hotline.
- For steps to creating an Emergency Action Plan visit DAN.org/EAPinstructions



- MEDICAL SERVICES
- SAFETY SERVICES
- **RESEARCH**
- EDUCATION
- EMERGENCY RESPONSE GEAR
- RESOURCES FOR CONSUMERS & PROFESSIONALS

VISION

Striving to make every dive accident and injury free. DAN's vision is to be the most recognized and trusted organization worldwide in the fields of diver safety and emergency services, health, research, and education by its members, instructors, and the diving community.

4 0 Y E A R S

24/7 EMERGENCY HOTLINE

International language and country specific hotlines

English:	+1 919 684 9111
Indonesia:	021 5085 8719
Malaysia:	015 4600 0109
Thailand:	1 800 01 8092
Philippines:	02 8231 3601
Australia:	1 800 088 200



World.DAN.org/Health-Medicine/Medical-Services

MEDICAL SERVICES

DAN's medical assistance services are available to divers, dive professionals and health care providers. We offer an emergency hotline, medical information, physician consultations, continuing medical education, and a worldwide referral network of doctors who evaluate and treat divers. We provide real-time assistance during dive emergencies and work to prevent injuries and promote dive safety.



24/7 EMERGENCY HOTLINE

When you need it most, DAN will be here to help. We are on call 24 hours a day, 365 days a year to assist you in the event of a dive emergency. In an emergency, contact local EMS, then call the DAN Hotline: +1 (919) 684-9111 (English) or +52 557 100 0540 (Spanish).



MEDICAL INFORMATION LINE

DAN staff members are available during regular business hours to answer your questions about dive medicine and fitness to dive. Our team of doctors, nurses, paramedics and EMTs offers medical information, referrals, evacuation assistance and more via phone and email.



DIVER HEALTH & SAFETY RESOURCES

This collection of online resources provides valuable information about the most important aspects of diver health and safety such as cardiovascular health, ears and equalization, decompression sickness, hazardous marine life injuries, and much more.



REFERRAL NETWORK

DAN maintains a worldwide network of physicians and chambers that serve the diving public. If you are looking for a diving physical or would like to speak with a dive medicine specialist near you, give us a call.

SAFETY SERVICES

DAN's primary mission is to assist injured recreational divers. An important secondary mission is to prevent diving injuries. As part of a global campaign to reduce dive injuries and fatalities, DAN strives to fulfill its vision of making every dive accident- and injury-free by identifying and mitigating risks associated with diving operations.

DIVER SAFETY

DAN offers informational resources on a wide range of health and safety topics. These resources help divers make informed decisions and stay safe before, during, and after dives.

DIVE OPERATION SAFETY

DAN works directly with dive operators on a variety of initiatives including hazard identification and risk assessment training, emergency planning tools, and more. We focus on realistic and pragmatic solutions to help owners, operators, and staff identify hazards before they lead to injuries or losses.

CHAMBER SAFETY

DAN engages with chambers in a variety of ways. DAN's recompression chamber network is a database of chambers that are available to treat injured divers. Our Recompression Chamber Assistance Program (RCAP) supports chambers in need through safety assessments, staff training, and grants.



RETURN TO DIVING SAFELY PROGRAM

DAN has created a comprehensive plan to help you return to diving safely. If you've been out of the water for a while, take time to assess your health and fitness, refresh your skills and equipment, and review your travel plans before your next dives. World.DAN.org/Return



World.DAN.org/Health-Medicine/Medical-Services









DAN CAN HELP FUND YOUR RESEARCH

DAN has established a grant program to promote research in various areas related to dive safety, including:

- Health and Diving
- ► Decompression Safety
- Prevention of Diving Injuries
- ► Treatment of Diving Injuries

We support research that builds strong theory and empirical evidence that contributes to a body of knowledge to improve the safety of divers.

APPLY FOR FUNDING

Scan the QR code below or contact DAN Research at research@dan.org to apply for a grant.



World.DAN.org/Research

RESEARCH

DAN Research supports DAN's mission of advancing dive safety by promoting evidence-based preventive measures. The DAN research team collaborates with leading scientists and research institutions to address questions about the safety of underwater exploration.

RESEARCH STUDIES

For decades, DAN Research has conducted studies on subjects of practical interest to divers such as flying after diving, preventing decompression illness, and diving with diabetes. These studies, conducted both in the field and in the lab, provide a solid foundation for globally accepted standards of safe diving.

PUBLICATION LIBRARY

DAN provides free access to publications, articles and reports related to dive research, medicine, and safety. You can read DAN's annual diving reports, risk assessment guides, workshop proceedings, and more.

GRANTS & COLLABORATION

In addition to conducting our own studies, DAN supports and promotes the work of others in the field through collaboration and funding. Our efforts enable us to share knowledge, propose solutions and reach beyond our limitations to discover innovative ways to improve safety for divers everywhere.









EDUCATION

Promoting dive safety through education is at the core of DAN's mission. We offer first-class safety training to divers, dive professionals, dive operators, and medical professionals around the world. DAN Instructors are among the most experienced and capable in the industry.

E-LEARNING

Learn at your own pace from wherever you are with DAN E-Learning. Whether you want to gain new first aid skills, refine the safety of your dive operation, or better educate your students about dive safety or diving science, DAN has a course for you.

BECOME A DAN INSTRUCTOR

When you become a DAN Instructor you can help build a more skillful and better trained community of divers. As a DAN Instructor, the possibilities for professional growth are endless.

DAN FIRST AID COURSES

- Basic Life Support: CPR and First Aid (BLS)
 - Emergency Oxygen for Scuba Diving Injuries (EO2)
- Diving First Aid for Professional Divers (DFA Pro)

Although these courses are all diving-focused, they are appropriate for the general public – not just the diving community.

PREPARED DIVER COURSE

Available via DAN E-Learning, our free Prepared Diver course includes five video modules, each covering one of the five main triggers of dive accidents. Prepared Diver helps reinforce divers' need to:

- Respect their limits
- ► Be aware of their air
- Pay attention to their ears
- Maintain good buoyancy
- ► Control their ascents

The perfect complement to any training course, Prepared Diver is a great tool to help your customers avoid accidents and help you mitigate risk.



World.DAN.org/ Education-Events









TRUSTED WORLDWIDE

Every day, divers and emergencyresponse personnel around the world trust DAN's oxygen units and first aid kits to perform in an emergency. That's because DAN's products have been developed, tested, and refined with input from leading doctors and researchers to meet the unique needs of the diving community. Be ready to respond. Explore DAN. org/Store to make sure you are prepared with the latest safety equipment to effectively handle any dive emergency. To ensure you receive your DAN Business Member or Professional Member discount, instead of placing your order online, email us for a quote at info@world.dan.org.



DAN.org/Store

EMERGENCY Response gear

Every day, divers and emergency medical personnel around the world trust DAN's oxygen units and first aid kits to perform in an emergency. That's because DAN's products have been developed, tested and refined with input from leading doctors and researchers to meet the unique needs of the diving community.



OXYGEN UNITS

DAN's oxygen units are designed to withstand the rigors of professional use. Rugged, waterproof cases provide protection for the internal components.

FIRST AID KITS



DAN's first aid kits enable divers to be prepared in the event of an emergency on the boat, on the beach, or in the dive shop. We offer a variety of kits so you can be ready for anything.





FIRST AID & SAFETY ACCESSORIES

DAN's first aid and safety accessories are ideal complements to your emergencyresponse gear. Add these items to any kit and be prepared for whatever happens during your diving adventures.

TRAINING MATERIALS

DAN Training educates divers, dive pros, and medical professionals about the best practices in providing care for injuries and illnesses – in the water and out.

RESOURCES FOR CONSUMERS & PROFESSIONALS

DAN's mission is to deliver extensive educational resources to help you stay safe - both in and out of the water.

DIVER RESOURCES

Health & diving reference library

A comprehensive dive into general fitness and medicallyrelated topics that most commonly affect divers.

Smart guides

Quick reference guides to health and safety issues most relevant to divers.

Infographics

Summarized guidelines on diving with diabetes, flying after diving and more.

Reference books

Comprehensive dives into general fitness and medical topics that most commonly affect divers.

Proceedings summaries

Brief overviews of key research findings on flying after diving, diving with diabetes and other topics.

PRO & BUSINESS RESOURCES

Prepared diver program

Use this free, online course with your students to help prevent the most common accidents in diving.

Giant Stride

This guide is the ideal resource for new divers and includes information about dive equipment, dive planning, underwater health and more.

Case summaries

Reported incidents, analyzed and summarized by DAN experts, ideal for learning safe diving behaviors.

Scientifics guides

Study synopses to make inform decisions in managing diver health and safety.

Workshop proceedings

Proceedings from DAN's workshops.

DAN annual diving report

Understanding the contributing factors could lead to safer diving. The primary goal of DAN's Annual Diving Report on Diving Incidents, Injuries and Fatalities is to further this understanding.

Online webinars

Learn more about dive safety without having to leave the comfort of your home by accessing DAN's library of online seminars and lectures.





DIVE ACCIDENT ASSISTANCE PACKAGES

While diving accidents can be expensive, DAN World's Assistance Packages are affordable and provide coverage against the costs of dive injuries that are often left uncovered by typical health and travel insurance.

- Emergency Evacuation Assistance
- ▶ 24/7 Emergency Medical Hotline
- Dive Accident Treatment Coverage
- ▶ 12-Months Protection

	US \$65 Per Year / Per Person	US \$100 Per Year / Per Person	US \$125 Per Year / Per Person
	Local Diver (Domestic)	Master (Worldwide)	Preferred (Worldwide)
Dive Accident Medical Expenses	Up to US\$50,000 ^{LT}	Up to US\$125,000 ^{LT}	Up to US\$250,000 ^{PO}
Emergency Evacuation	Up to US\$10,000	Up to US\$150,000	Up to US\$150,000
Permanent & Total Disability	N/A	Up to US\$10,000	Up to US\$25,000
Accidental Death & Dismemberment	N/A	Up to US\$10,000	Up to US\$25,000
Extra Transportation	N/A	Up to US\$1,000	Up to US\$5,000
Extra Accommodation	N/A	Up to US\$1,000	Up to US\$5,000^
Vacation Cancellation	N/A	N/A	Up to US\$5,000
Vacation Interruption	N/A	N/A	Up to US\$5,000
Age	8-70	8-70	8-70

TRAVEL ASSISTANCE PACKAGES

DAN World's Travel Assistance Packages** cover you on every trip[†] you take during the year anytime you travel 80 kilometres or more from home.

	Per Year / Per Person	US \$225 Per Year / Per Person
Annual Travel Assistance Package Premium	Master Travel	Preferred Travel
Medical Expenses from Accident or Sickness	Up to US\$50,000	Up to US\$100,000
Accidental Death & Dismemberment	Up to US\$10,000	Up to US\$25,000
Permanent & Total Disability	Up to US\$10,000	Up to US\$25,000
Trip Cancellation	Up to US\$1,500	Up to US\$2,500
Trip Interruption	Up to US\$1,500	Up to US\$2,500
Baggage Coverage	Up to US\$1,500	Up to US\$2,500
Baggage Delay	Up to US\$250	Up to US\$500
Age	8-70	8-70

EVERY DIVER SHOULD BE A DAN MEMBER

WORLD.DAN.org

Local Diver program is domestic-only coverage. Master & Preferred programs provide worldwide coverage. ** Only available when selecting the Master or Preferred Dive Accident Assistance Package and at an additional premium. ^ US\$400/day limit. † The trip must be at least 80 kilometres or more from the Insured Person's home; the duration of travel may not exceed 90 consecutive days; travel is not to obtain health care or medical treatment of any kind; and travel is not to a destination where the Insured Person; home; the Australia. PO = Per Occurrence, LT = Lifetime Maximum.

