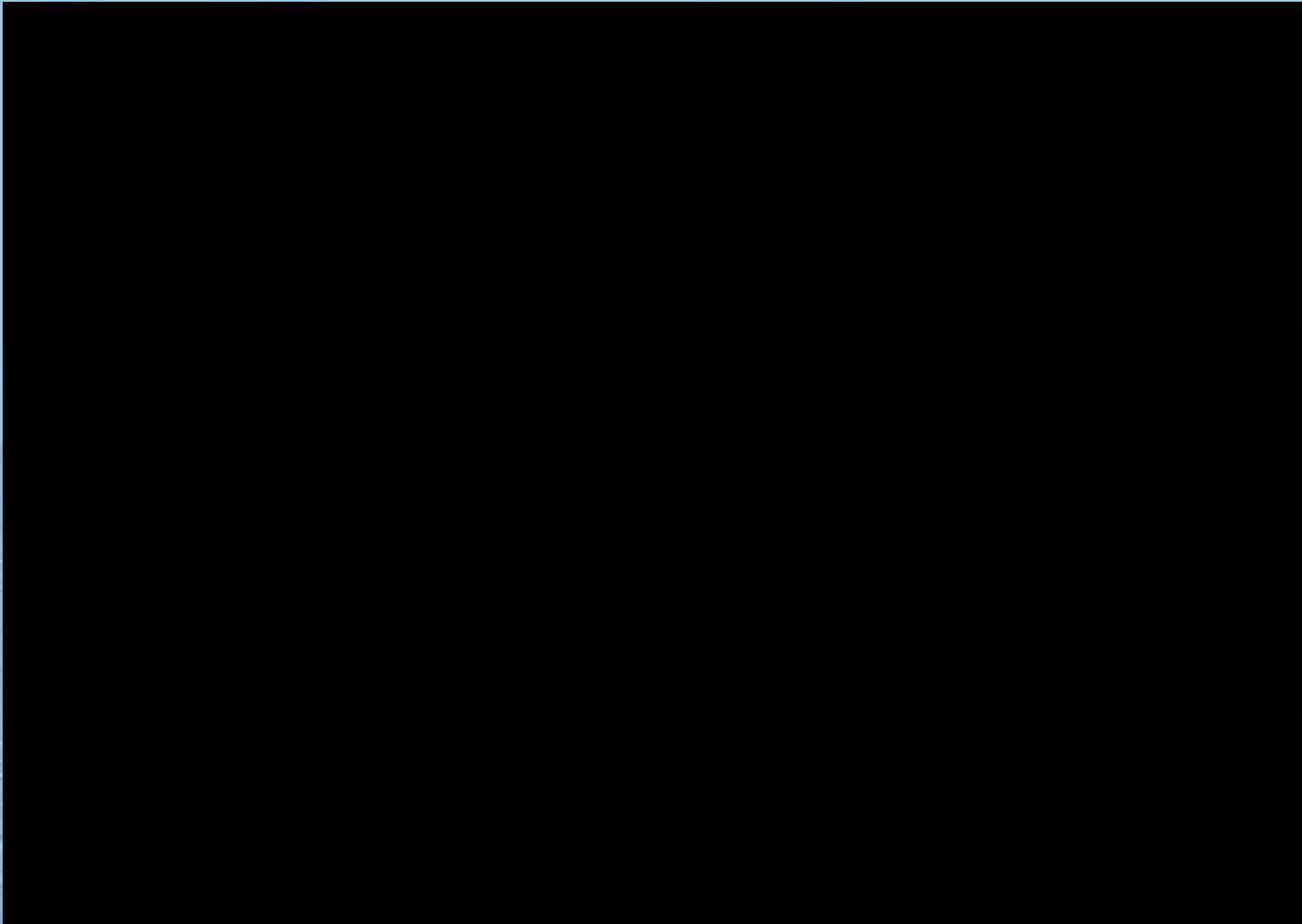


M 2011

Safety at Sea –Mystic 2014
Michael Jacobs, MD



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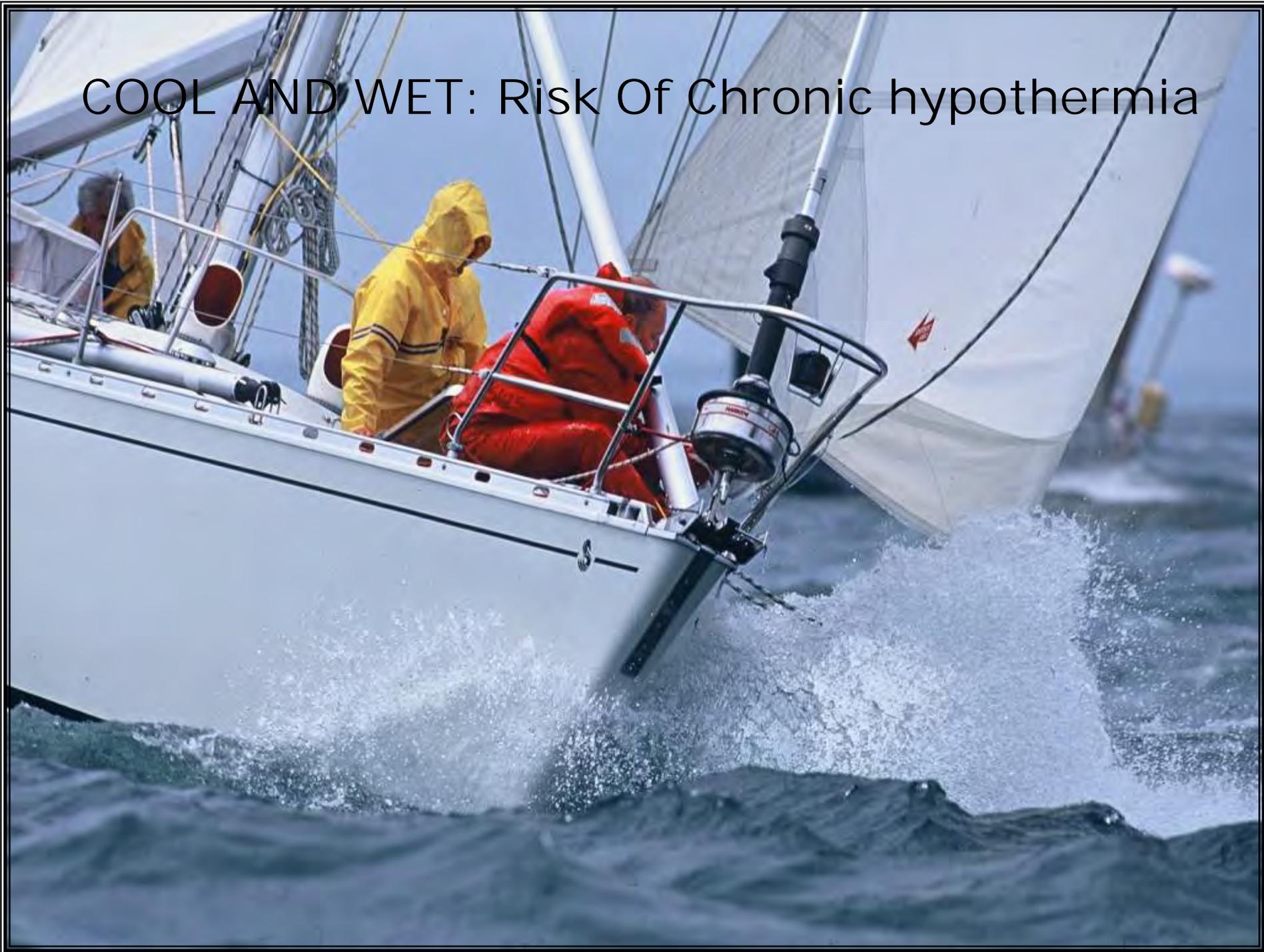
HYPOTHERMIA



Hypothermia

- CHRONIC: Slow drop in core temp over hours to days
 - prolonged exposure to elements: wet clothing, cool breeze
- ACUTE: Rapid drop in core temp over hours
 - Overboard: Immersion in water 77° F
 - Water conducts heat away from the body up to 25X faster than air at the same temp

COOL AND WET: Risk Of Chronic hypothermia



Hypothermia Signs

- Mild

35°C (95°F) Shivering

Mental Impairment

Physical Impairment



- Shivering is the the best dx sign
- Starts early, before a drop in core temp.
- Shivering powers metabolic (muscle) heat production (5X resting)
- Once shivering stops, the body has lost the capacity to actively rewarm itself

Hypothermia-Mild (Above 90°F)

- Sustained uncontrolled shivering
- Change in fine motor coordination
- Loss of strength
- Loss of balance-ataxia
- Impaired judgment, confusion
- FULLY CONSCIOUS
- UMBLES: fumble, bumble, stumble mumble, and grumble

Rx: Mild Hypothermia

- Get out of the cold
- Shelter, Dry skin
- Dress in layers, Wrap with insulation
- OK to give sweet fluids, snacks (fuel) if victim is alert
- External heat not necessary-NOT helpful
- Let victim shiver, limited exercise





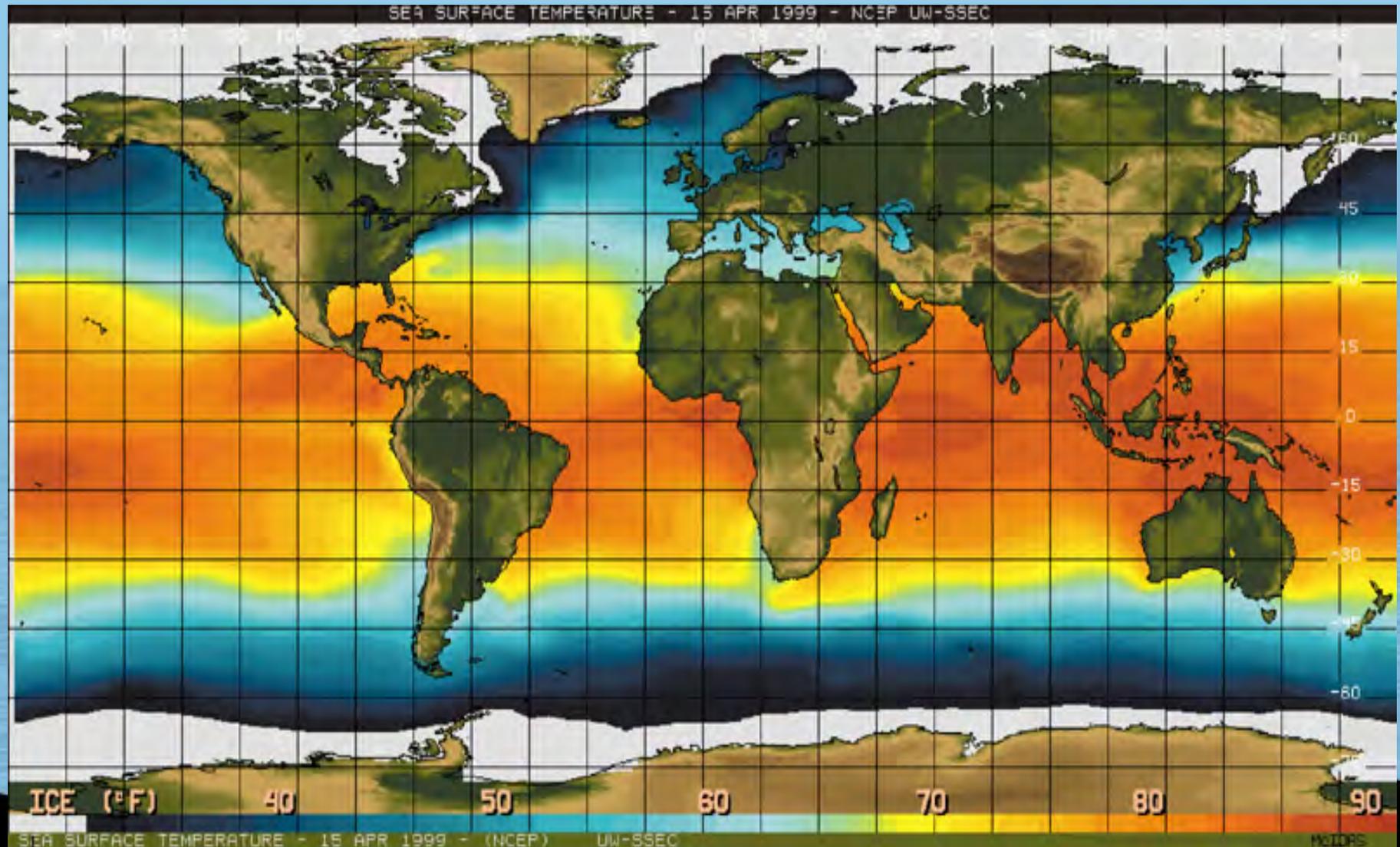
THE COLD SHOCK RESPONSE:

**ACCOUNTS FOR THE MAJORITY
OF DROWNING DEATHS
FOLLOWING ACCIDENTAL
IMMERSION IN OPEN WATER
BELOW 68°-77° F.**

In cold water, under 59° the risk of drowning increases by 5X

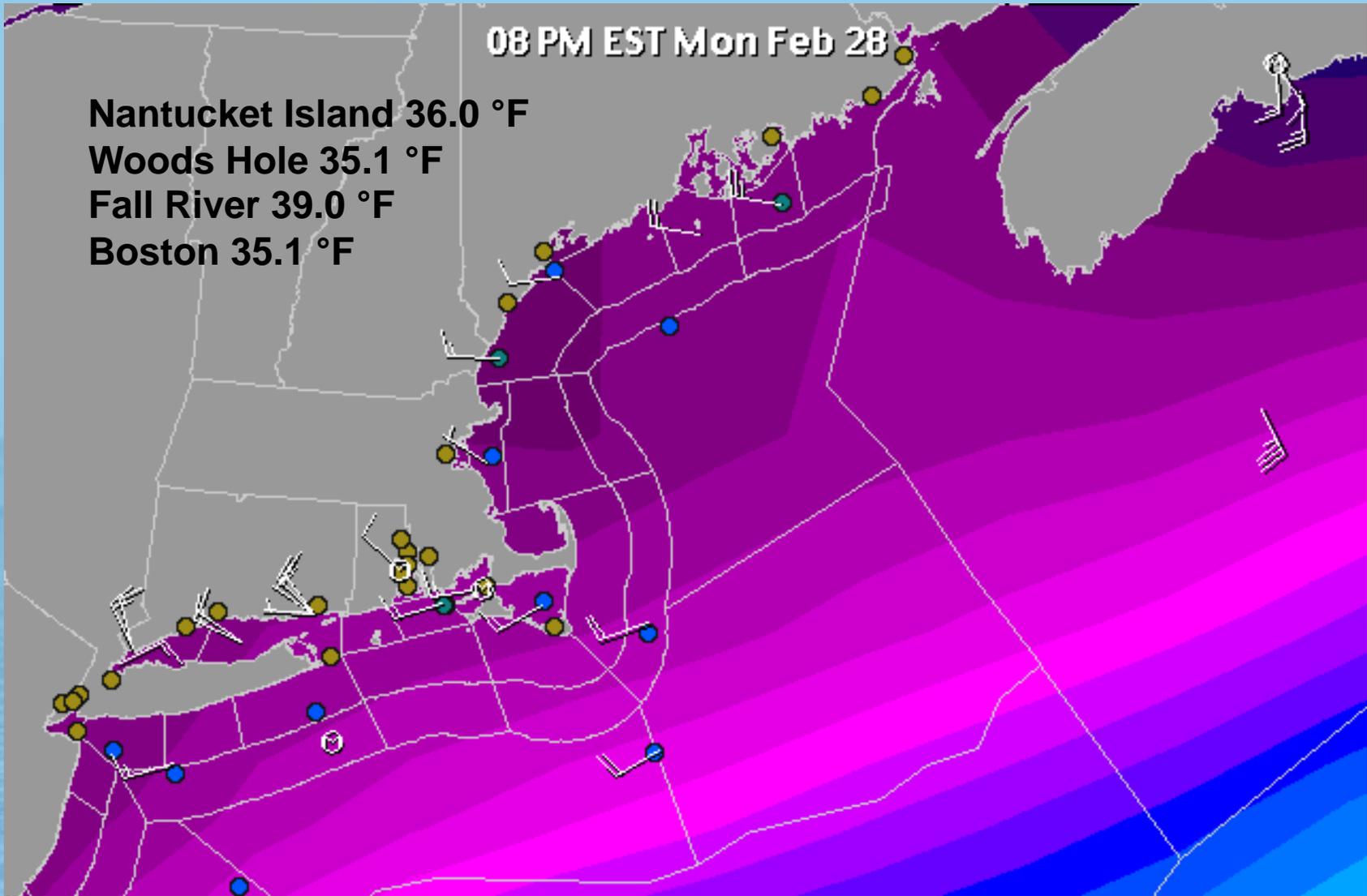


There is Plenty of Cold Water

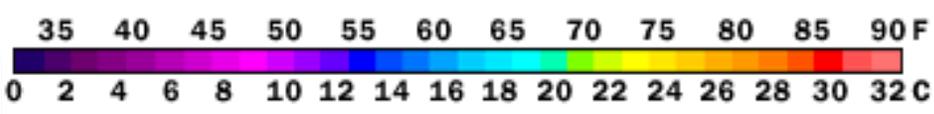


08 PM EST Mon Feb 28

Nantucket Island 36.0 °F
Woods Hole 35.1 °F
Fall River 39.0 °F
Boston 35.1 °F

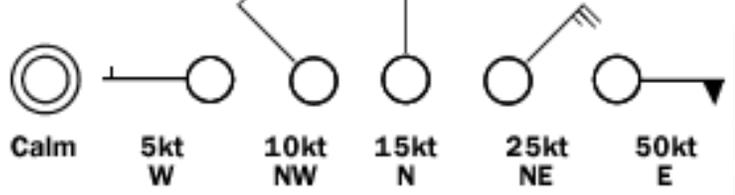


Sea Surface Temperature



◇ CMAN Station □ Moored Buoy ○ Ship or Land Station

Wind Barbs



RESPONSES TO COLD WATER IMMERSION

1. INITIAL RESPONSE (0-3 minutes)
"Cold Shock"
2. SHORT TERM RESPONSE (3-30 minutes)
"cold incapacitation"
3. LONG TERM RESPONSE (>30 minutes)
"Circum-rescue Collapse"
"Hypothermia"

Each response is initiated by cooling different parts of the body: skin, muscles & joints, then brain and heart

Initial Response

- Sudden cooling of the skin initiates a series of reflexes involving heart, blood pressure, and breathing.
- Peaks in 30 sec., last just 3min., and increases the risk of drowning

Cold Shock Response-Reflexes

- Immediate “gasp” reflex → inhaled water → drowning
- ↑ HR, BP, CO, Adrenaline → risk heart attack → drowning
- ↑ ↑ ↑ Rate and volume of breathing increases 5X

Cold Shock- Respiratory disaster

- Hyperventilation → confusion & loss of consciousness
- Hyperventilation → asynchrony of swim stroke and breathing, and aspiration
- Breath holding time <10 sec. → entrapment: Unable to escape from capsized craft –try a “delayed escape”

How To Modify the Cold Shock Response -post immersion

**MAKE A CONSCIOUS EFFORT TO
BRING BREATHING UNDER
CONTROL IN THE FIRST
1 - 2 MINUTES**

**“REMAIN CALM—DON’T PANIC”
STAY VERTICAL**



Cold Incapacitation- Short Term Response

- Short Term Response- 3 to 30 minutes
- Muscles, nerves and joints cool: loss of strength, coordination, dexterity (muscle blood flow dramatically reduced)
- Loss of movement= paralysis
- Quickly lose ability to maintain airway freeboard; swimming is arduous and ineffective

INJURY

Mechanisms of Injury N = 1,480

Cause of Injury

- Trip/Fall 30%
- Hit by object★ 22%
- Lines /Halyards 22%
- Winch 8%

Contributing Factors

- Heavy Weather 23%
- Tacking* 17%
- Jibing* 13%
- Sail Change 12%
- Repetitive Stress 7%
- Fatigue /Crew Error 5%
- Equipment Failure 4%

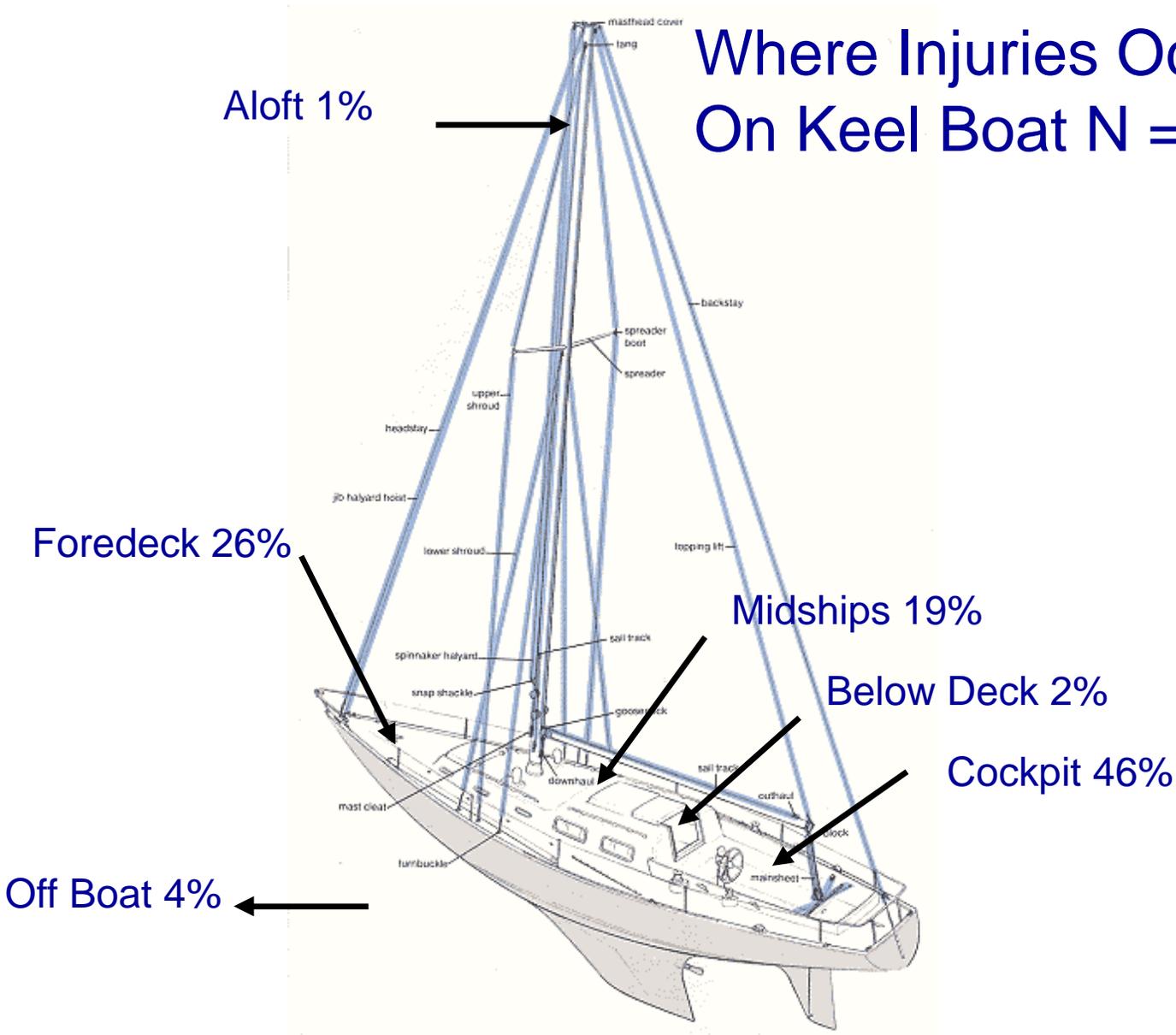
★Boom, spinnaker pole, sail clew, fellow crew member

* Crew coordinated sailing maneuvers





Where Injuries Occur On Keel Boat N = 1,080



INJURIES

- Soft tissue extremity injuries most common injury among sailors
- 30% caused by trips/falls
- Sailing maneuvers in heavy weather is major contributing factor
- Injuries include contusions, lacerations, sprains, and strains.



Sprains, Strains, & Soft Tissue Injury

- “Stable injuries”: No immediate loss of function; progress over first 24 hrs
- TREATMENT: RICE for 3-4 days
- Rest--splint as needed
- Ice -- 15-20 minutes every 4 hours x 72hrs
- Compression
- Elevation above the heart



HAND INJURIES

- Lacerations and contusions common
- Hand and upper extremity always exposed
- Risk to hands/fingers handling lines
- Winches and cleats are dangerous, especially in heavy weather
- BOAT IS HIGH THREAT ENVIRONMENT







Figure 10-3. Improper way to add wraps to a winch.



Medical Society. All rights reserved.

Head Injury-Fisher's data

- 34 head injuries
- 24 caused by a "flying boom"
- > 50% fatal



Western Medical Society. All rights reserved.

Seasickness



Seasickness

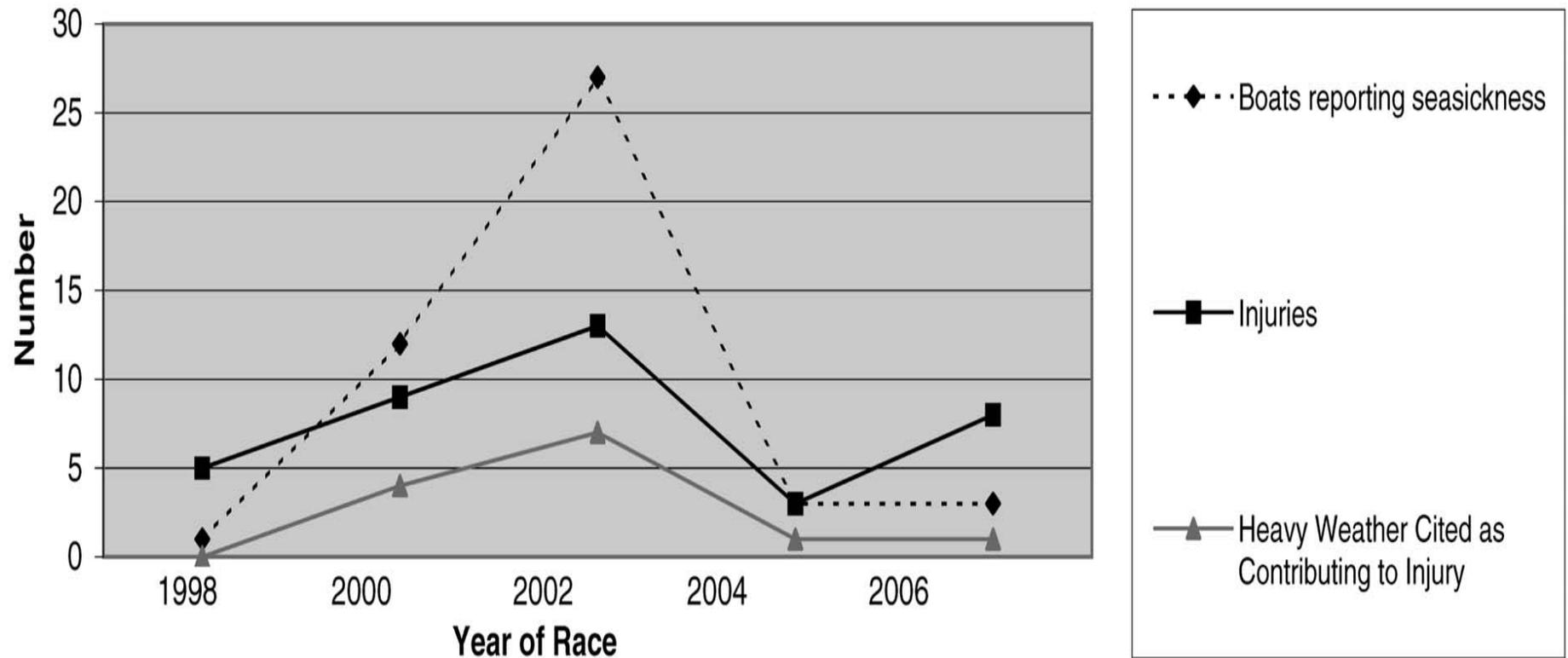
- A common hazard to safety at sea
- Seasickness may be at least annoying or disabling, but may also lead to fatal consequences.
- Nearly everyone will develop seasickness with sufficient stimulus; however, individual susceptibility is enormously variable.



NEWPORT-BERMUDA RACE 1998-2006

863 yachts

Seasickness, Heavy Weather and Injuries



Seasickness

Every year, many seaworthy yachts are abandoned because their exhausted and despondent crews have lost their collective will to persevere.

“They are wet, seasick, scared, and want to go home,” observed a merchant marine captain.



Why are sailors making poor decisions?

- Seasickness impairs memory and cognitive function.
- Inability to integrate and analyze complex data → impaired judgment and faulty decisions



OTHER FACTORS CAUSING IMPAIRED JUDGEMENT



- MEDICATIONS FOR SEASICKNESS MAY IMPAIR COGNITIVE FUNCTION
- DEHYDRATION (FLUIDS)
- LOW BLOOD SUGAR (FOOD)
- SLEEP DEPRIVATION (FATIGUE)
- FEAR, PANIC, INJURY (FITNESS)
- HYPOTHERMIA (FARENHEI)

THE FEARSOME FIVE

Photo: On Edition



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Seasickness: Mechanism

- The brain's balance center receives sensory data from the eyes, inner ear, and position sensors to estimate motion and spatial orientation of the head and body.
- A sensory conflict is generated when data from these structures arrives in the brain in conflicting combinations.
- Conflict activates the vomiting center in the brain



What is the visual cue to your body's orientation?



What is the inner ear's cue to your body's orientation?



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If your eyes are seeing
what your ears are feeling,
and what your brain
expects, you have a better
chance of having a great
day.



**“INFLATABLE VOMITORIUM” WHY?
It’s a sensory conflict chamber!!**



Prevention

Prior to Departure:

- Start trip on medication * * *
- Start trip well-hydrated, avoid alcohol
- Eat lightly 1-2 hrs before, especially carbohydrates.
- Prepare gear, navigation, ship's stores
- Try powdered ginger root capsules (1gm every 6 hrs), Vitamin C 3-5gms
- Try acustimulation



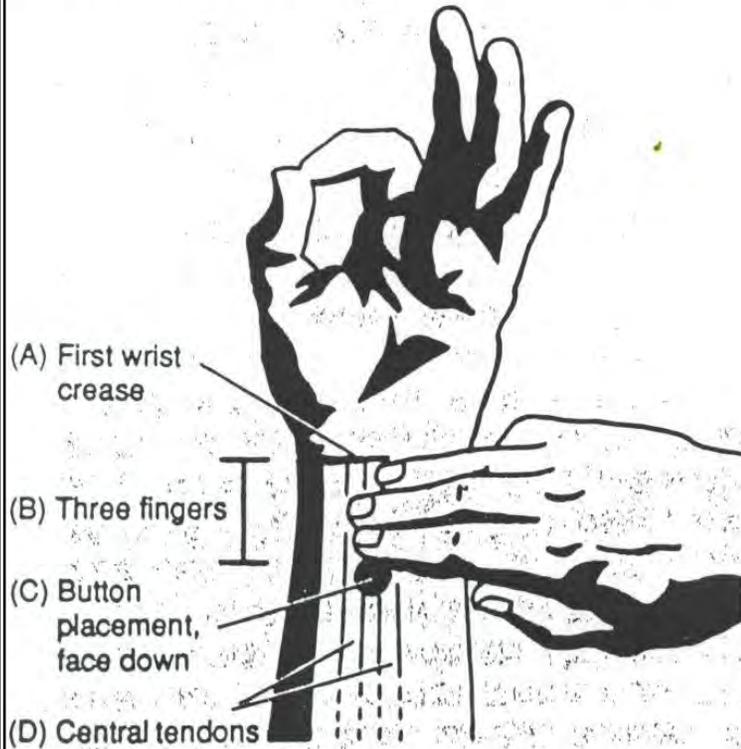
*** Medication is more effective in preventing symptoms than in treating reversing them- start trip on medication!! WHY?

DRUGS SIMPLY RAISE THE THRESHOLD FOR SEASICKNESS



MUST BE WORN PROPERLY TO BE EFFECTIVE.

The bands must be worn on both wrists. Position the button as follows (see illustration): Starting at the first wrist crease (A), use your three middle fingers (B) to measure to a point on the underside of each wrist (C). Position the button downward over this point, between the two central (flexor) tendons (D).



Davis Instruments
3465 Diablo Ave., Hayward, CA 94545, U.S.A.

यात्रियों के लिये कलाई

Queaz-Away™ एक ऐसा उपकरण है जो आपको पहाड़ी रास्ता, अथवा जहाज तथा दुलती रेल गाड़ी के झटके से दबा कर क्रियाशील बनाने या बार बार पहन सकते हैं। एक ही। इसे आप पहन सकते हैं। प्रत्येक ठीक तरह पहनना आवश्यक है। कलाई पर पहनें। कलाई के (A), और दूसरी, तीसरी एवं चौथी एक स्थान को हर कलाई के अलग कर (C)। इस स्थान पर, दोनों बटन को बिठाए (D)।

トラベル用リ

Queaz-Away™は、カーブのつた海上での船旅、悪天候で列車の旅などが引き起こす乗客の疲れを軽減する製品です。このツボを押すことにより作用を返し着用のいずれも可。力を発揮するように正しく着用：両手首に装着のこと。近い線を起点として (A)。(B) 各手首より下側にあるここにバンドのボタンを付いた腕2本の間 (D) にボタン

旅行者

Queaz-Away™系非藥物性。由曲折公路・顛簸海面・見不止の火車旅途所引起。使用時將該品輕壓於雙腕。效驗。可連續佩戴或反復。人可用。不怕洗滌。必須效 (如圖)：應佩於雙腕。第一處褶皺 (A) 開始。使。在每一手腕的內側定出一點。置於該點之上，兩根中央筋

여행용 손목

Queaz-Away™는 비독성 손목 밴드입니다. 또는 흔들리는 기차 여행은 비승객성 악몽입니다. 양 손목에 눌러 주도록 착용하지만 꼭해서 사용하셔도 됩니다. 크기 조절이 가능하며, 세탁도 하실 수 있습니다. 내기 위해서는 정확하게 사용하십시오. 양 손목에 모두 착용하십시오. 양 손목에서 시작하십시오(A), 각 손목에서(B) 양 손목의 안쪽에(C) 단추가 있는 안쪽 아래쪽 중앙인대의 사이에 있는 지압점 위



RELIEFBAND[®] For the Relief of Motion Sickness
DEVICE

DRUG FREE
EASY-TO-USE
NON-INVASIVE

CAR BOAT PLANE

CAR BOAT PLANE

**Arm Yourself Against
Motion Sickness**



DISPOSABLE
Model No. RB-6 Plus
144 HOURS
USEFUL LIFE
On Power Level 2

Contains: ReliefBand[®] Device (1), Conductivity Gel (.34 Fl. oz/10 ml), Alcohol Wipes (5), Carrying Case.



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No drowsiness

All natural

Easy to swallow

Sailors'  Secret™

Premium
Ginger

Zingiber officinale Root

For
Motion
Comfort*

Dietary Supplement

36 CAPSULES · 250 MG. EACH



MS

So what's wrong the “placebo effect”??

NOTHING! IF IT WORKS,
WE'LL TAKE IT



Sea Sickness: Prevention

After Departure:

- Stay on deck, amidships, avoid fly bridge
- Avoid areas with fumes & odors
- Avoid close-focused visual tasks- e.g., reading, using binoculars
- Look at the horizon, take the helm
- Take medication at regular intervals (Use long-acting drugs while offshore)
- Snacks and fluids: granola, trail mix, fruit, crackers, pop corn, energy bars, gatorade



Seasickness: *Signs*

Early (the window of opportunity for Rx)

- Yawning, Drowsiness/Lethargy/Apathy
- Salivation/Dry mouth/Belching/Passing gas
- Stomach awareness/ Mild nausea
- Dizziness
- Headache
- Hyperventilation
- “I don’t feel good”
- IT TAKES TIME FOR THE LINKAGE BETWEEN SENSORY CONFLICT AND NAUSEA TO DEVELOP



Seasickness: Prevention and Early Treatment

- “Fight back and act quickly” Take the helm
- Obtain good broad view of horizon:
 - Use “earth-fixed” reference frame
- Steer boat by reference to oncoming waves, clouds, horizon and distant marks
- Ride the waves with your whole body*
 - Alter boat’s course for comfort & wear a safety harness
- Take additional medication





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Why Take the Helm?



Practical Sailor contributor Evans Starzinger runs before a gale off the coast of Lituya Bay aboard Hawk.

- His brain can utilize the self-generated motor commands used to balance himself and control the boat to help anticipate and orient his body to the motion

*Posture yourself to anticipate the boat's motion and "ride the waves."
Keep your head and shoulders balanced over your hips and gain postural control gracefully.

"GIMBLE YOURSELF"





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Late Treatment

- Lie down, supine, head still, “wedge” yourself in a secure well ventilated bunk
- Close your eyes, try to sleep (turns off “BB”)
- Small amounts of fluids, and candy
- Medication--suppositories or IM
- Pray



Seasickness Medication: (best for prevention)

- | | | |
|------------------------|--|----------|
| • OTC Diphenhydramine | 25-50mg liq/cap/chew | 6-8 hrs |
| • OTC Bonine | 25 mg chew | 6-8 hrs |
| • OTC Meclizine | 25/50 mg tab | 6-8 hrs |
| • OTC Stugeron * | 15mg tabs | 6-12hrs |
| • Rx Transderm-Scop | 1.5mg patch | 2-3 days |
| • Rx Phenergan | 25mg tabs | 12 hrs |
| with dexedrine | 5-10mg tabs, XR capsule | 24 hrs |
| • Rx Phenergan (alone) | 12.5,25,50 mg tab,
suppository, deep IM injection | 12 hrs |

*UK, Canada, Mexico, Europe & Bermuda



- The protection conferred by drugs is a matter of degree
- No drug (or non drug therapy) has been found which can act as a magic bullet, totally preventing seasickness in everyone
- All drugs have side effects-



least sedation and
cognitive side effects

“BEST BET”: Bonine (Meclizine) + Sudafed
Use Phenergan 25 mg when necessary



COASTAL MEDICAL KIT: 12-24 hrs



PRESCRIPTIONS

RX
PICK UP

RX
DROP OFF

25%
OFF
All
Other Name
Brand
Rx Stock

WALGREEN BRAND MEDICATIONS

all

Zyrtec

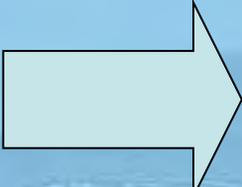


SELECTION OF MEDICAL SUPPLIES

- Waterproof containers
- Rx Endemic diseases, crew's health
- Rx Hazardous marine life, infections, seasickness, trauma, submersion, sun burn
- Medical expertise aboard
- Drugs not causing photosensitivity
- Access to reliable and comprehensive medical care; HOW FAR, HOW GOOD?



GOALS OF MEDICAL OFFICER

- Increase self-reliance at sea- do the “right thing at the right time”.
- Prevent minor problems  major
- Avoid **high risk** medical evacuation for a **low risk** medical problem
- Promote health and safety of crew





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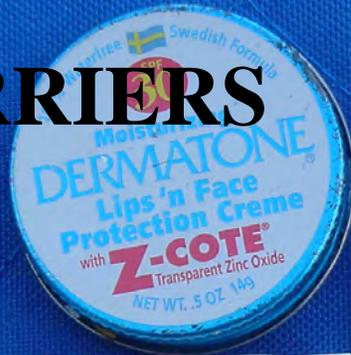


Solar Injury-Sunscreens

- Apply early (½ hour before), liberally, & frequently: Q 2H
- - Use "very water resistant"
- - SPF (UVB) 25-30 with UVA
- - Apply in recommended dose: Shot Glass
- - Opaque barriers: ideal for nose, ears, lips: zinc oxide, Titanium dioxide



OPAQUE BARRIERS



ADVENTURE MEDICAL KITS

MARINE MEDICINE

A Comprehensive Pocket Guide

2nd Edition



- Prepare for marine travel
- Identify hazardous marine life
- Learn over 50 improvised techniques
- Stay safe—and confident!



THE MOUNTAINEERS BOOKS

Eric A. Weiss, MD
Michael Jacobs, MD



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