

APPENDIX 1
DIVING MEDICAL EXAM OVERVIEW FOR THE EXAMINING PHYSICIAN

TO THE EXAMINING PHYSICIAN:

This person, _____, requires a medical examination to assess their fitness for certification as a Scientific
Applicant
 Diver for the _____ **MLML / CSU** _____ . Their answers on the Diving Medical History Form (attached) may
University
 indicate potential health or safety risks as noted. Your evaluation is requested on the attached SCUBA Diving Fitness Medical Evaluation Report. If you have any questions about diving medicine, you may wish to consult one of the references on the attached list or contact one of the physicians with expertise in diving medicine whose names and phone numbers appear on an attached list, the Undersea Hyperbaric and Medical Society, or the Divers Alert Network (Appendix 4). Please contact the undersigned Diving Safety Officer if you have any questions or concerns about diving medicine or the Moss Landing Marine Laboratories / California State University standards. Thank you for your assistance.

Diana L. Steller

Diving Safety Officer

 Diana Steller
Printed Name

 3/3/2022

Date

 831-771-4440
Phone Number

SCUBA and other modes of compressed-gas diving can be strenuous and hazardous. A special risk is present if the middle ear, sinuses, or lung segments do not readily equalize air pressure changes. The most common cause of distress is eustachian insufficiency. Recent deaths in the scientific diving community have been attributed to cardiovascular disease. Please consult the following list of conditions that usually restrict candidates from diving.

(Adapted from Bove, 1998: bracketed numbers are pages in Bove)

CONDITIONS WHICH MAY DISQUALIFY CANDIDATES FROM DIVING

1. Abnormalities of the tympanic membrane, such as perforation, presence of a monomeric membrane, or inability to autoinflate the middle ears. [5 ,7, 8, 9]
2. Vertigo, including Meniere's Disease. [13]
3. Stapedectomy or middle ear reconstructive surgery. [11]
4. Recent ocular surgery. [15, 18, 19]
5. Psychiatric disorders including claustrophobia, suicidal ideation, psychosis, anxiety states, untreated depression. [20 - 23]
6. Substance abuse, including alcohol. [24 - 25]
7. Episodic loss of consciousness. [1, 26, 27]
8. History of seizure. [27, 28]
9. History of stroke or a fixed neurological deficit. [29, 30]
10. Recurring neurologic disorders, including transient ischemic attacks. [29, 30]
11. History of intracranial aneurysm, other vascular malformation or intracranial hemorrhage. [31]
12. History of neurological decompression illness with residual deficit. [29, 30]
13. Head injury with sequelae. [26, 27]
14. Hematologic disorders including coagulopathies. [41, 42]
15. Evidence of coronary artery disease or high risk for coronary artery disease. [33 - 35]
16. Atrial septal defects. [39]
17. Significant valvular heart disease - isolated mitral valve prolapse is not disqualifying. [38]
18. Significant cardiac rhythm or conduction abnormalities. [36 - 37]
19. Implanted cardiac pacemakers and cardiac defibrillators (ICD). [39, 40]
20. Inadequate exercise tolerance. [34]
21. Severe hypertension. [35]
22. History of spontaneous or traumatic pneumothorax. [45]

23. Asthma. [42 - 44]
24. Chronic pulmonary disease, including radiographic evidence of pulmonary blebs, bullae, or cysts. [45,46]
25. Diabetes mellitus. [46 - 47]
26. Pregnancy. [56]

SELECTED REFERENCES IN DIVING MEDICINE

Available from Best Publishing Company, P.O. Box 30100, Flagstaff, AZ 86003-0100, the Divers Alert Network (DAN) or the Undersea and Hyperbaric Medical Society (UHMS), Durham, NC

- Elliott, D.H. ed. 1996. *Are Asthmatics Fit to Dive?* Kensington, MD: Undersea and Hyperbaric Medical Society.
- Bove, A.A. 2011. The cardiovascular system and diving risk. *Undersea and Hyperbaric Medicine* 38(4): 261-269.
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- Douglas, P.S. 2011. Cardiovascular screening in asymptomatic adults: Lessons for the diving world. *Undersea and Hyperbaric Medicine* 38(4): 279-287.
- Mitchell, S.J., and A.A. Bove. 2011. Medical screening of recreational divers for cardiovascular disease: Consensus discussion at the Divers Alert Network Fatality Workshop. *Undersea and Hyperbaric Medicine* 38(4): 289-296.
- Grundy, S.M., Pasternak, R., Greenland, P., Smith, S., and Fuster, V. 1999. Assessment of Cardiovascular Risk by Use of Multiple-Risk-Factor Assessment Equations. AHA/ACC Scientific Statement. *Journal of the American College of Cardiology*, 34: 1348-1359. <http://content.onlinejacc.org/cgi/content/short/34/4/1348>
- Bove, A.A. and Davis, J. 2003. *DIVING MEDICINE*, Fourth Edition. Philadelphia: W.B. Saunders Company.
- Edmonds, C., Lowry, C., Pennefather, J. and Walker, R. 2002. *DIVING AND SUBAQUATIC MEDICINE*, Fourth Edition. London: Hodder Arnold Publishers.
- Bove, A.A. ed. 1998. *MEDICAL EXAMINATION OF SPORT SCUBA DIVERS*, San Antonio, TX: Medical Seminars, Inc.
- NOAA DIVING MANUAL, NOAA. Superintendent of Documents. Washington, DC: U.S. Government Printing Office.
- U.S. NAVY DIVING MANUAL. Superintendent of Documents, Washington, DC: U.S. Government Printing Office, Washington, D.C.
- Sadler, C., M. Alvarez Villela, K. Van Hoesen, I. Grover, M. Lang, T. Neuman, P. Lindholm. 2020. Diving after SARS-CoV-2 (COVID-19) infection: Fitness to dive assessment and medical guidance. *Diving and Hyperbaric Medicine*. 50(3): 278-287
- Sadler, C., M. Alvarez Villela, K. Van Hoesen, I. Grover, M. Lang, T. Neuman, P. Lindholm. 2022. Updated-UC San Diego Guidelines for Evaluation of Divers during COVID-19 pandemic.

APPENDIX 2
AAUS MEDICAL EVALUATION OF FITNESS FOR SCUBA DIVING REPORT

Name of Applicant (Print or Type)

Date of Evaluation (Mo/Day/Yr)

DOB (Mo/Day/Yr)

To The Examining Physician: Scientific divers require periodic SCUBA diving medical examinations to assess their fitness to engage in diving with self-contained underwater breathing apparatus (SCUBA). Their answers on the Diving Medical History Form may indicate potential health or safety risks as noted. SCUBA diving is an activity that puts unusual stress on the individual in several ways. Your evaluation is requested on this Medical Evaluation form. Your opinion on the applicant's medical fitness is requested. SCUBA diving requires heavy exertion. The diver must be free of cardiovascular and respiratory disease (see references, following page). An absolute requirement is the ability of the lungs, middle ears, and sinuses to equalize pressure. Any condition that risks the loss of consciousness should disqualify the applicant. Please proceed in accordance with the AAUS Medical Standards (Sec. 5.00). If you have questions about diving medicine, please consult with the Undersea Hyperbaric Medical Society or Divers Alert Network.

TESTS: THE FOLLOWING TESTS ARE REQUIRED:

DURING ALL INITIAL AND PERIODIC RE-EXAMS (UNDER AGE 40):

- Medical history
- Complete physical exam, with emphasis on neurological and otological components
- Urinalysis
- Any further tests deemed necessary by the physician. (See Tables 1 - 3 for COVID-19 specific protocols)

ADDITIONAL TESTS DURING FIRST EXAM OVER AGE 40 AND PERIODIC RE-EXAMS (OVER AGE 40):

- Chest x-ray (Required only during first exam over age 40)
- Resting EKG
- Assessment of coronary artery disease using Multiple-Risk-Factor Assessment¹
(age, lipid profile, blood pressure, diabetic screening, smoking)

Note: Exercise stress testing may be indicated based on Multiple-Risk-Factor Assessment¹

PHYSICIAN'S STATEMENT:

I have evaluated the above-mentioned individual according to the tests listed above. I have discussed with the patient any medical condition(s) that would not disqualify them from diving but which may seriously compromise subsequent health. The patient understands the nature of the hazards and the risks involved in diving with these conditions.

_____ 01 I find no medical conditions that may be disqualifying for participation in SCUBA diving.

Diver **IS** medically qualified to dive for:

_____ 2 years (over age 60)

_____ 3 years (age 40-59)

_____ 5 years (under age 40)

_____ 02 Diver **IS NOT** medically qualified to dive: _____ Permanently _____ Temporarily

_____ MD or DO

Signature

_____ Date (Mo/Day/Yr)

_____ Name (Print or Type)

_____ Address

_____ Telephone Number

_____ E-Mail Address

My familiarity with applicant is: _____ This exam only _____ Regular physician for _____ years

My familiarity with diving medicine is: _____

APPENDIX 2b
AAUS MEDICAL EVALUATION OF FITNESS FOR SCUBA DIVING REPORT
APPLICANT'S RELEASE OF MEDICAL INFORMATION FORM

Name of Applicant (Print or Type) _____

I authorize the release of this information and all medical information subsequently acquired in association with my diving to the _____ Diving Safety Officer and Diving Control Board or their designee at (place) _____ on (date) _____

Signature of Applicant _____ **Date** _____

REFERENCES

¹Grundy, S.M., Pasternak, R., Greenland, P., Smith, S., and Fuster, V. 1999. Assessment of Cardiovascular Risk by Use of Multiple-Risk-Factor Assessment Equations. AHA/ACC Scientific Statement. *Journal of the American College of Cardiology*, 34: 1348-1359. <http://content.onlinejacc.org/cgi/content/short/34/4/1348>

APPENDIX 3 DIVING MEDICAL HISTORY FORM

(To Be Completed By Applicant-Diver)

Name _____ Age _____ Wt. _____ Ht. _____

Sponsor _____ Date ____/____/____ DOB ____/____/____
(Dept./Project/Program/School, etc.) (Mo/Day/Yr) (Mo/Day/Yr)

TO THE APPLICANT:

SCUBA diving places considerable physical and mental demands on the diver. Certain medical and physical requirements must be met before beginning a diving or training program. Your accurate answers to the questions are more important, in many instances, in determining your fitness to dive than what the physician may see, hear, or feel as part of the diving medical certification procedure.

This form shall be kept confidential by the examining physician. If you believe any question amounts to invasion of your privacy, you may elect to omit an answer, provided that you shall subsequently discuss that matter with your own physician who must then indicate, in writing, that you have done so and that no health hazard exists.

Should your answers indicate a condition, which might make diving hazardous, you will be asked to review the matter with your physician. In such instances, their written authorization will be required in order for further consideration to be given to your application. If your physician concludes that diving would involve undue risk for you, remember that they are concerned only with your well-being and safety.

	Yes	No	Please indicate whether or not the following apply to you	Comments
1			Convulsions, seizures, or epilepsy	
2			Fainting spells or dizziness	
3			Been addicted to drugs	
4			Diabetes	
5			Motion sickness or sea / air sickness	
6			Claustrophobia	
7			Mental disorder or nervous breakdown	
8			Are you pregnant?	
9			Do you suffer from menstrual problems?	
10			Anxiety spells or hyperventilation	
11			Frequent sour stomachs, nervous stomachs, or vomiting spells	
12			Had a major operation	
13			Presently being treated by a physician	
14			Taking any medication regularly (even non-prescription)	
15			Been rejected or restricted from sports	
16			Headaches (frequent and severe)	
17			Wear dental plates	
18			Wear glasses or contact lenses	
19			Bleeding disorders	
20			Alcoholism	

	Yes	No	Please indicate whether or not the following apply to you	Comments
21			Any problems related to diving	
22			Nervous tension or emotional problems	
23			Take tranquilizers	
24			Perforated ear drums	
25			Hay fever	
26			Frequent sinus trouble, frequent drainage from the nose, post-nasal drip, or stuffy nose	
27			Frequent earaches	
28			Drainage from the ears	
29			Difficulty with your ears in airplanes or on mountains	
30			Ear surgery	
31			Ringing in your ears	
32			Frequent dizzy spells	
33			Hearing problems	
34			Trouble equalizing pressure in your ears	
35			Asthma	
36			Wheezing attacks	
37			Cough (chronic or recurrent)	
38			Frequently raise sputum	
39			Pleurisy	
40			Collapsed lung (pneumothorax)	
41			Lung cysts	
42			Pneumonia	
43			Tuberculosis	
44			Shortness of breath	
45			Lung problem or abnormality	
46			Spit blood	
47			Breathing difficulty after eating particular foods, after exposure to particular pollens or animals	
48			Are you subject to bronchitis?	
49			Subcutaneous emphysema (air under the skin)	
50			Air embolism after diving	
51			Decompression sickness	
52			Rheumatic fever	
53			Scarlet fever	
54			Heart murmur	
55			Large heart	

	Yes	No	Please indicate whether or not the following apply to you	Comments
56			High blood pressure	
57			Angina (heart pains or pressure in the chest)	
58			Heart attack	
59			Low blood pressure	
60			Recurrent or persistent swelling of the legs	
61			Pounding, rapid heartbeat or palpitations	
62			Easily fatigued or short of breath	
63			Abnormal EKG	
64			Joint problems, dislocations or arthritis	
65			Back trouble or back injuries	
66			Ruptured or slipped disk	
67			Limiting physical handicaps	
68			Muscle cramps	
69			Varicose veins	
70			Amputations	
71			Head injury causing unconsciousness	
72			Paralysis	
73			Have you ever had an adverse reaction to medication?	
74			Do you smoke?	
75			Have you ever had any other medical problems not listed? If so, please list or describe below;	
76			Is there a family history of high cholesterol?	
77			Is there a family history of heart disease or stroke?	
78			Is there a family history of diabetes?	
79			Is there a family history of asthma?	
80			Date of last tetanus shot? Vaccination dates?	
81			Status of suspected COVID-19 illness. (refer to Table 1 for categories and answer Table 2 questionnaire if 0.5 or above.)	Category Number (circle one) 0 0.5 1 2 3

Please explain any "yes" answers to the above questions.

APPENDIX 4
RECOMMENDED PHYSICIANS WITH EXPERTISE IN DIVING MEDICINE

A List of Medical Doctors that have training and expertise in diving or undersea medicine can be found through the Undersea and Hyperbaric Medical Society or Divers Alert Network. See links below:

<https://www.uhms.org/resources/diving-medical-examiners-list.html>

<https://www.diversalertnetwork.org/medical/physicians.asp>

1. Name: _____

Address: _____

Telephone: _____

2. Name: _____

Address: _____

Telephone: _____

3. Name: _____

Address: _____

Telephone: _____

4. Name: _____

Address: _____

Telephone: _____

5. Name: _____

Address: _____

Telephone: _____

SARS-CoV2 and Diving

In what we know of the pathophysiology of the disease, the pulmonary, cardiac, and thromboembolic/hypercoagulable disease seems to be relevant to divers. Potential long-term sequelae include decreased exercise tolerance, increased susceptibility to cardiac events such as heart failure, pulmonary edema, and arrhythmia, structural changes of the lung leading to increased risk for barotrauma, and increased risk of decompression sickness from underlying hypercoagulability.

We define a COVID-19-suspected illness as a diver who had symptoms consistent with COVID-19 with or without a positive PCR or rapid antigen, given that testing is still not universally available or reliable. We are currently using the CDC case definition (updated Aug 24, 2021) of COVID-19 for those patients who did not have PCR or rapid antigen confirmed illness.

Please refer to the following tables to assess your current condition in diving health as it related to COVID-19 infection and exposure (Sadler et al. 2020, Sadler et al. 2022):

**UPDATED GUIDELINES FOR DIVER EVALUATION:
(AS OF FEBRUARY 4, 2022)**

Table 1) Classification of divers based on severity of COVID-19 suspected illness

<p>Category 0 <i>NO</i> history of COVID-19 suspected illness</p>	<p>Category 0.5 <i>VERY MILD</i> COVID-19 suspected illness</p>	<p>Category 1 <i>MILD</i> COVID-19 suspected illness</p>	<p>Category 2 <i>MODERATE</i> COVID-19 suspected illness</p>	<p>Category 3 <i>SEVERE</i> COVID-19 suspected illness</p>
<p>Definition</p>	<p>Definition</p>	<p>Definition</p>	<p>Definition</p>	<p>Definition</p>
<ul style="list-style-type: none"> • No history of COVID-19 or asymptomatic positive screening test 	<ul style="list-style-type: none"> • Isolated upper respiratory or systemic symptoms (rhinorrhea / congestion / pharyngitis / loss of taste or smell), fevers, fatigue, or myalgias but WITHOUT lower respiratory or cardiac symptoms. • Returned to baseline exercise tolerance. 	<ul style="list-style-type: none"> • Symptomatic COVID-19 including any of the following: Any lower respiratory or cardiac symptoms, including chest pain, palpitations, significant* cough, shortness of breath with exertion or at rest. • Outpatient treatment only without evidence of hypoxemia. • Did not require supplemental oxygen • Imaging was normal or not required • Returned to baseline exercise tolerance. 	<ul style="list-style-type: none"> • Required supplemental oxygen or was hypoxic • Had abnormal chest imaging (chest radiograph or CT scan) • Admitted to the hospital but did NOT require assisted ventilation (BIPAP, CPAP, or ventilator) or ICU level of care. • If admitted, had documentation of a normal cardiac work up including normal ECG and cardiac biomarkers e.g. troponin or CK-MB and BNP • Returned to baseline exercise tolerance. 	<ul style="list-style-type: none"> • Required mechanical or assisted (CPAP, BIPAP) ventilation, or ICU admission • Cardiac involvement defined as abnormal ECG, abnormal echocardiogram, or elevated cardiac biomarkers; e.g. troponin or CK-MB and BNP (or absence of documented work up) • Thromboembolic complications (such as PE, DVT, or other coagulopathy) • Returned to baseline exercise tolerance.

* for example, cough that is productive, prevents from sleeping, or requires medication, ultimately defined at the discretion of the evaluating physician
 * Other factors may be taken into consideration including vaccination status, as there is evidence that breakthrough infections in those vaccinated against COVID-19 results in milder disease, and regional prevalence of variants (omicron vs delta, etc).

Table 2) COVID-19 Suspected Illness Questionnaire (only to be filled out if deemed Category 0.5 or above)

	Yes	No	Please indicate whether or not the following apply to you	Comments
1			Did you seek healthcare related to COVID-19 symptoms experiences?	If 'yes', please indicate: <input type="checkbox"/> Outpatient <input type="checkbox"/> Hospital admission <input type="checkbox"/> Intensive care unit
2			Did you have a low blood oxygen level or require supplemental oxygen?	
3			Was a chest x-ray or CT scan done?	If 'yes', please indicate: <input type="checkbox"/> Normal <input type="checkbox"/> Abnormal
4			Did you require assisted ventilation (BiPAP, CPAP, ventilator)?	
5			Was an evaluation of your heart done (EKG, echocardiogram, blood tests)?	If 'yes', please indicate: <input type="checkbox"/> Normal <input type="checkbox"/> Abnormal
6			Did you have any blood clots or blood clotting problems?	

Table 3) Recommendations for evaluations of divers or diving candidates

Category 0 <i>NO</i> history of COVID-19 suspected illness	Category 0.5 <i>VERY MILD</i> COVID-19 suspected illness	Category 1 <i>MILD</i> COVID-19 suspected illness	Category 2 <i>MODERATE</i> COVID-19 suspected illness	Category 3 <i>SEVERE</i> COVID-19 suspected illness
<ul style="list-style-type: none"> Initial/annual exam per ADCI / AAUS / NOAA / RSTC guidelines Chest radiograph only if required per ADCI / AAUS / NOAA / RSTC guidelines <p>No additional testing required</p>	<ul style="list-style-type: none"> Initial/annual exam per ADCI / AAUS / NOAA / RSTC guidelines Chest radiograph only if required per ADCI / AAUS / NOAA / RSTC guidelines <p>No additional testing required</p>	<ul style="list-style-type: none"> Initial/annual exam per ADCI / AAUS / NOAA / RSTC guidelines Spirometry Chest radiograph (PA & Lateral) if abnormal, obtain Chest CT If unknown (or unsatisfactory) exercise tolerance, perform exercise tolerance test with oxygen saturation 	<ul style="list-style-type: none"> Initial/annual exam per ADCI / AAUS / NOAA / RSTC guidelines Spirometry Chest radiograph (PA & Lateral) if abnormal, obtain Chest CT ECG Echocardiogram (if no work up was done as an inpatient. Can forgo if had negative work up) If unknown (or unsatisfactory) exercise tolerance, perform exercise tolerance test with 	<ul style="list-style-type: none"> Initial/annual exam per ADCI / AAUS / NOAA / RSTC guidelines Spirometry Chest radiograph (PA & Lateral) (if abnormal, obtain Chest CT) ECG Repeat Cardiac troponin or CK-MB and BNP to ensure normalization Echocardiogram Exercise Echocardiogram with oxygen saturation

			oxygen saturation • Investigation and management of any other complications or symptoms per provider and ADCI / AAUS / NOAA / RSTC guidelines	• Investigation and management of any other complications or symptoms per provider and ADCI / AAUS / NOAA / RSTC guidelines
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I certify that the above answers and information represent an accurate and complete description of my medical history.

Signature

Date. (Mo/Day/Yr)