



## Crew Selection and Recertification

OCHMO-TB-034

Rev A

## Executive Summary

Crew Selection and Recertification is designed to ensure the health, safety, and occupational longevity of NASA career astronauts. The standards used reflect the medical requirements to successfully complete specific mission tasks and the multifaceted training and performance required. These include, but are not limited to, flying in high performance aircrafts, extreme environment analogs, exposure to hypobaric and hyperbaric conditions, exposure to unique environments (e.g., microgravity), and conducting specialized operations (e.g., extra-vehicular activities, robotic arm operations). Health risk assessment is a complex and dynamic process, and the medical requirements and screening procedures take into account the fact that the risk for a medical event increases with mission duration. Even after a thorough astronaut selection process, a well-designed medical system is still necessary for healthcare issues that arise during spaceflight.



### Relevant Technical Requirements

NASA-STD-3001 Volume 1, Rev C  
[V1 3001] Selection and Recertification

OCHMO-STD-100.1A, NASA Astronaut Medical Standards, Selection and Annual Recertification



*2021 NASA Astronaut Candidates*

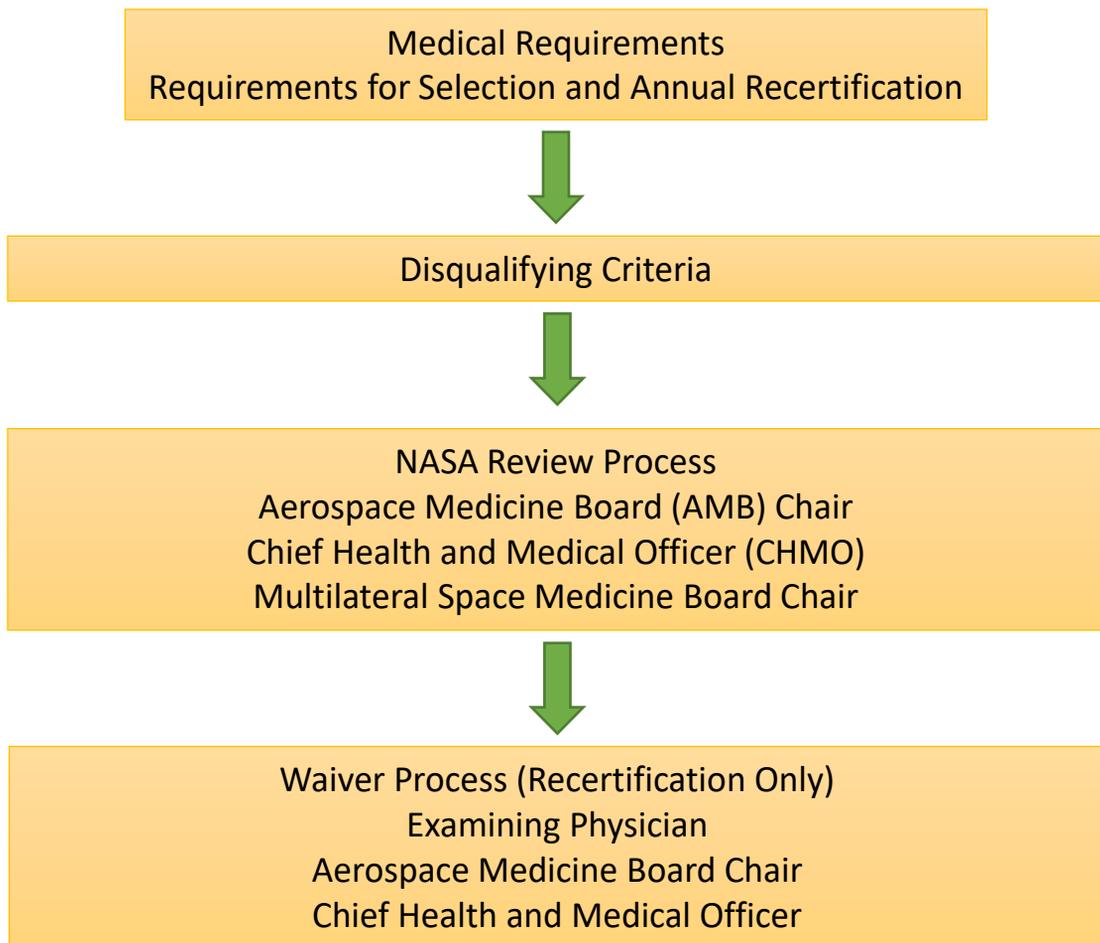
NASA Astronaut selection standards include testing for longevity of career, which may be reconsidered for non-career astronauts.



## Background

### NASA Astronaut Medical Standards, Selection and Annual Recertification, OCHMO-STD-100.1A

This NASA Technical Standard provides medical requirements and clinical procedures designed to ensure crew health, safety, and occupational longevity of NASA career astronauts. It is used for selection and annual recertification of astronauts and reflects the medical requirements to successfully complete specific mission tasks and the multifaceted training and performance required of an astronaut. NASA policy for establishing standards to protect the health and safety of crew and for providing health and medical programs for astronauts during all phases of spaceflight is authorized by NPD 1000.3 - The NASA Organization, and by NPD 8900.5B - NASA Health and Medical Policy for Human Space Exploration. The NASA Astronaut Medical Standards, Selection and Annual Recertification applies to all NASA career astronaut candidates. The following graphic details the NASA Medical Requirements, Disqualifying Criteria, Acceptance Process, and Waiver Process for recertification for NASA Career Astronauts:



View the NASA Astronaut Medical Standards, Selection and Annual Recertification document:  
<https://www.nasa.gov/organizations/ochmo/aerospace-medical-certification-standard/>

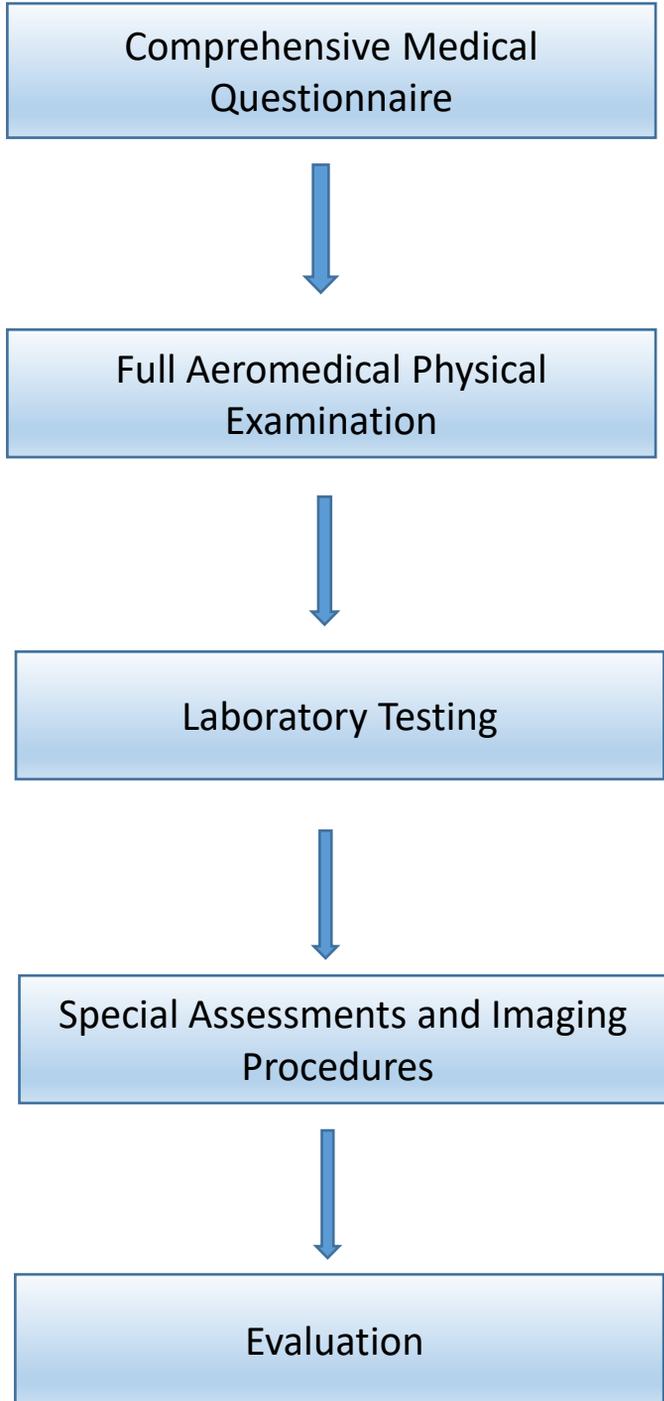


## Background

Candidate astronauts undergo a comprehensive medical evaluation as part of their selection and annual recertification. The medical evaluation process includes an extensive medical history and physical examination by aeromedical physicians and clinical specialists, laboratory screening tests, special diagnostic tests, and psychiatric evaluation. The specific medical evaluation procedures used are designed to select and certify individuals who are free from medical conditions that may: compromise the astronaut's health and safety, compromise the completion of mission objectives, and be seriously aggravated or progress as a result of the performance of duties during training (e.g., in the Neutral Buoyancy Laboratory [NBL] and U.S. Air Force T-38 aircraft) or spaceflight exposures.



## Selections Overview



## Reference Data

### Comprehensive Medical Questionnaire

The following areas are included but not limited to:

- Past medical history and background information
- Psychosocial and Psychiatric history including:
  - DWI and drug-related convictions
- Personal habits/lifestyle
- Travel history (past year)
- Medication review, including:
  - non-prescription and herbal medications
  - food supplements
  - vitamins and minerals
- Symptomatic review of all body systems
- Physical activities and sports



This may be completed using the NASA Medical Survey or other similar questionnaire(s).

### Full Aeromedical Physical Examination

The following areas are included but not limited to:

- Vital signs: height, weight, pulse and blood pressure (recumbent, sitting, & standing), body temperature, respiratory rate
- Head and face (nares/nasal mucosa, sinuses, maxillary and frontal), oropharynx
- Ears (external meatus, tympanic membrane, and response to valsalva)
- Eyes (general appearance, extra-ocular movements, pupil reactivity, and ophthalmoscopic exam)
- Neck (thyroid, vascular exam, motion)
- Heart and lungs (cardiovascular exam, including cardiac auscultation, carotid and venous upstrokes and peripheral pulses)
- Abdomen (auscultation, palpation of major organs and herniations)
- Rectum/anus (to include prostate exam for males, rectal vault and occult blood testing)
- Genitourinary exam (appearance, general exam, and herniations)
- Breast/chest exam
- Pelvic exam (for female candidates)
- Extremities (to include range of motion and general strength assessments on a 1-5 scale)
- Spine (general appearance and mobility)
- Skin (includes lymphatics and identifying body marks)



## Reference Data

### Laboratory Testing

Clinical laboratory studies are performed to establish baseline values and to aid in the detection of any progressing disease. They are limited to those tests pertinent to the identification of the presence of, or predilection for disease states, that might compromise individual health, mission effectiveness, or safety.

#### Laboratory Tests on Selection of NASA Astronauts

##### Hematology/Thrombophilia Screen

- Complete Blood Count
- Reticulocyte count
- Screening tests for thrombophilia: Prothrombin time (PT) and partial thromboplastin time (PTT)
- Hemoglobin evaluation

##### Biochemistry

- Liver function
- Total serum protein
- Renal function
- Endocrine
- Fasting blood glucose
- Cardiovascular profile
- Calcium, Magnesium, Inorganic Phosphate
- Ionized calcium
- Prostate specific antigen (males over age 40)
- Serum ferritin

##### Infectious Disease Screen

- Serologic screen for
  - Hepatitis
  - Hepatitis C
  - HIV
- Tuberculosis (TB) screening

##### Urinalysis

- Routine (specific gravity, glucose, protein, pH, ketones, blood), microscopic
- Human chorionic gonadotropin (hCG) (females) (urine)

##### Special Studies

- Prolactin
- Carbohydrate Deficient Transferrin
- Ethyl glucuronide
- Tissue transglutaminase (TTG) IgG
- Tissue transglutaminase(TTG) IgA

##### Drug Screening (Urine)

- Drug screen in-house for illicit drugs
- Expanded drug screen



## Reference Data

**Special Assessments and Imaging Procedures**  
Specialty examinations are performed to further detect and identify any potential disorders within a specific area. Throughout the selection and subsequent annual examinations, emphasis is placed on the early detection of latent pathological processes, and suitability for spaceflight and the physiological effects of reduced-gravity exposure. Tools like ultrasound, 12-lead electrocardiogram, X-ray, and MRI are used to perform some of these specialized medical assessments.



Ophthalmology Specialist assessment (optometrist)	Selection	Annual
Visual acuity (Snellen or Landolt-C)	✓	✓
Near vision	✓	✓
Color vision (computer-based test, Ishihara, or equivalent pseudo-isochromatic plates [PIPs] to include red-green and blue-yellow)	✓	✓
2Cycloplegic refraction	✓	✓
Phorias	✓	✓
Tonometry	✓	✓
Perimetry	✓	✓
Fundoscopic examination	✓	✓
Retinal photographs	✓	✓
Corneal topography	✓	

Example of specialist assessments, refer to OCHMO-STD-100.1A for additional details.



**Houston We Have a Podcast:**  
Be a NASA Astronaut with NASA astronaut Kayla Barron and Anne Roemer, astronaut selection manager  
[Ep136: Be a NASA Astronaut | NASA](#)



## Reference Data

### Evaluation - Medical Conditions to Consider for Selection and Annual Recertification of NASA Astronauts

The standards used reflect the medical requirements to ensure occupational longevity and ensure the ability to complete specific mission tasks and the multifaceted training and performance required. Table 7, Disqualifying Medical Standards, of OCHMO-STD-100.1A details those medical conditions that are medically disqualifying for the selection and retention of NASA astronauts, or that may require further testing and evaluation to assess medical suitability. Annual medical recertification ensures the individual has not developed any new medical conditions that would preclude safe performance of training and/or spaceflight duties or participation.

<b>7A GENERAL</b>
1. Any medical condition that, in the judgment of the AMB, may compromise mission operations, performance of duties, or crew health or safety.
2. All injuries, contusions, fractures, or surgery unless healed and not associated with functional deficit that could interfere with the performance of duties.
3. History of heat stroke, temperature intolerance, or environmental injuries associated with significant sequelae that could interfere with performance of duties.
4. History of sensitivity or demonstrated allergy of sufficient severity so as to interfere with the performance of duties.
5. Habitual use of tobacco products.
6. Chronic use of any medication requires AMB review.
7. All malignancies or history of malignancies, except those permitted within the medical standards.
8. Any foreign body or implant, unless considered not to be a hazard during the performance of duties.
9. Any condition or situation that precludes completion of the NASA medical evaluation process.
10. Sarcoidosis, all forms.
11. Decompression Illness (DCI): A. Type II decompression sickness (DCS) or Arterial Gas Embolism (AGE) (involving the central nervous system, spinal cord, pulmonary DCS, or cardiovascular collapse) unless all signs and symptoms resolve with treatment. Such cases require specialist evaluation. B. Type I DCS involving joint pain, the peripheral nervous system, or skin is not disqualifying if adequately treated and completely resolved.
12. Presence or history of systemic exertion intolerance disease or myalgic encephalomyelitis (previously known as chronic fatigue syndrome) and fibromyalgia.
13. Autoimmune disorders, including conditions such as systemic lupus erythematosus and dermatomyositis.
14. Any standard invalidated by new medical information may be appended by the AMB with CHMO approval.

Excerpt from OCMO-STD-100.1A of general medical conditions that may lead to disqualification or require additional testing. Refer to OCHMO-STD-100.1A for additional details.



# Back-Up



## Major Changes Between Revisions

Original → Rev A

- Updated information to be consistent with NASA-STD-3001 Volume 1 Rev B and Volume 2 Rev C.



View the current versions of NASA-STD-3001 Volume 1 & Volume 2 on the [OCHMO Standards website](#)

## Referenced Technical Requirements

### NASA-STD-3001 Volume 1 Revision B

**[V1 3001] Selection and Recertification** Crewmembers shall be medically and psychologically selected and annually recertified following the guidance in OCHMO-STD-100.1A, NASA Astronaut Medical Standards Selection and Annual Recertification.



## Reference List

1. NASA Astronaut Medical Standards Selection and Annual Recertification [OCHMO-STD-100.1A]. *National Aeronautics and Space Administration (NASA) Office of the Chief Health and Medical Officer.* (2021). Retrieved from: <https://www.nasa.gov/organizations/ochmo/aerospace-medical-certification-standard/>
2. Medical Evaluation Documents Volume B (MEDB) Revision 4.2. (2022). *Internal NASA document.*