

Canadian Olympic and Paralympic Sport Institute Network

Return to Health and Performance following COVID-19 Infection

2020

A Guideline endorsed by the Canadian Sport Institute (CSI) Chief Medical Officers (CMOs), Canadian Olympic Committee (COC) CMO, Canadian Paralympic Committee (CPC) CMO, and Own the Podium*



SPORT INSTITUTE NETWORK
RÉSEAU DES INSTITUTS DU SPORT



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Return to Health and Performance following COVID-19 Infection

Preamble

This document provides a guideline for National Sport Organizations (NSOs), National Development (i.e., NextGen), and Provincial Sport Organizations (PSOs) teams regarding return to health and performance following severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2, or COVID-19) infection in the Canadian Olympic and Paralympic Sport Institute (COPSI) Network. It is applicable to adult-aged, high-performance athletes who have mild to moderate illness. Management of athletes still symptomatic with severe illness requiring hospital admission is beyond the scope of this guideline. The COPSI Network guideline will be frequently reviewed and updated with any new medical and scientific advances, and/or national health authority regulatory changes, and/or with any learned experiences through implementation.

Healthcare professionals directly involved with high-performance athlete care should remain up-to-date with COVID-19 related information and must adhere to their national / provincial / regional public health authority recommendations to reduce any unnecessary risks and help reduce the spread of COVID-19.

Feasibility, cost considerations and burdening of local health care systems should all be considered for various levels of the recommended investigations for low-risk individuals. Given the unknown potential for adverse and/or long-lasting effects of COVID-19-related complications[†] in high-performance athletes, consideration for further investigation and consultation by a (sports) cardiologist and/or respirologist must be considered before return to training/sport, particularly if the athlete has pre-existing comorbidities that may increase the risk of serious illness such as heart disease (e.g., heart failure, coronary artery disease, cardiomyopathies), high blood pressure, diabetes, chronic lung disease, moderate to severe asthma, chronic kidney disease, sickle cell disease, thalassemia, liver disease, cystic fibrosis, immunocompromised status or impaired recovery of exercise capacity¹². Furthermore, consideration of mental health support for the COVID-19 infected athlete is of critical importance.

Disclaimer

Evidence-based recommendations for return to training and competition after COVID-19 infection are scarce and heterogeneous. Although the present document contains specific information that was considered current as of July 27, 2020, the contributing authors acknowledge that the COVID-19 infection return to activity / training / sport / performance related published evidence is expert opinion or consensus-based for use by healthcare practitioners. Evidence will continue to evolve, and the most current emerging research and/or public health authority regulations may add to or replace these guidelines. Therefore, this document is not intended to replace seeking help from your local public health authority and/or a trained medical professional with expertise in public health, infectious disease, cardiology, internal medicine, virology, neurology, epidemiology, or sport & exercise medicine in the process of adapting and implementing the guidelines.

COVID-19 Positive Circumstances

1. COVID-19 Positive and Asymptomatic (or mild localized symptoms[‡] resolving within 10 days)
2. COVID-19 Positive and Prolonged Course (regional or systemic symptoms[‡] >10 days) or Severe Symptoms (i.e., hospitalization)
3. COVID-19 Positive and Symptoms during Graduated Return to Play Progression²

Recommendations

1. Athletes COVID-19 Positive and Asymptomatic (or mild localized symptoms[‡] resolving within 10 days):

- Self-isolation, rest/recovery with no exercise for a minimum of 10 days if asymptomatic or following symptom onset.
- When asymptomatic, clinical assessment with NSO or CSI physician, including careful history and physical exam
 - Based on clinical assessment and/or other reasons for concern (i.e., pre-existing cardiovascular or other health comorbidities[‡]), consideration may be given for laboratory testing (CRP and high-sensitivity troponin (hsTn) assay), 12-lead electrocardiogram (ECG), particularly if athlete has a baseline comparison, and renal and haematologic measures. For high-performance endurance sport athletes, consideration may be given for obtaining spirometry.
- Athletes whose clinical course was that of no symptoms or only mild localized symptoms[‡], have no clinical evidence of cardiac involvement and no pre-existing history of cardiovascular or other health comorbidities may begin the Graduated Return to Play Protocol (GRTP)² (Appendix A) when symptom-free for 7 days without the use of medication (e.g., Tylenol)
 - If any symptoms occur (including excessive fatigue) while progressing through the GRTP, the athlete must return to the previous stage and progress again after a minimum of 24-hour period of rest in which there are no further symptoms.
- If results suggest **possible** cardiac involvement[‡], it is recommended that this athlete have a 2-Dimensional Echocardiogram and be referred to a (sports) cardiologist for further assessment.
- If spirometry results abnormal, it is recommended that this athlete be referred to a respirologist for further assessment and management.
- Athletes with **confirmed** evidence of cardiac involvement will require further management by a (sports) cardiologist, with an exercise stress test recommended before final clearance to return to exercise.

2. COVID-19 Positive and Prolonged Course (regional or systemic symptoms >10 days[‡]) or Severe Symptoms (i.e., hospitalization)

- Self-isolation, rest/recovery with no exercise while symptoms present.
- When asymptomatic, clinical assessment with NSO or CSI physician, including history, physical exam, laboratory testing (CRP and high-sensitivity troponin (hsTn) assay, CBC, Creatinine), 12-lead ECG, Spirometry, and 2-Dimensional Echocardiogram
 - if results suggest **possible** cardiac involvement[‡], it is recommended that this athlete be referred to a (sports) cardiologist for further assessment and management.
 - if spirometry results **abnormal**, it is recommended that this athlete be referred to a respirologist for further assessment and management.
 - athletes with **no evidence of cardiac or respiratory involvement** may begin the Graduated Return to Play Protocol (GRTP)² (Appendix A) when symptom-free for 7 days without the use of medication (e.g., Tylenol). If any symptoms occur (including excessive fatigue) while progressing through the GRTP, the athlete must return to the previous stage and progress again after a minimum of 24-hour period of rest without symptoms.

3. COVID-19 Positive and Symptoms during Graduated Return To Sport Progression²

- Inability to progress in a symptom-free manner through the Graduated Return to Play protocol² (Appendix A)
 - signs / symptoms may include, but not limited to:
 - elevated AM heart rate,
 - increased shortness of breath with exercise,
 - elevated Rated Perceived Exertion (RPE), and
 - elevated heart rate at sub-maximal exercise intensity.
- Rest / Recovery with no exercise while symptoms present.
- Virtual history / telehealth conference with NSO or CSI physician, laboratory testing (CRP and high-sensitivity troponin (hsTn) assay), 12-lead ECG, 2-dimensional echocardiogram, spirometry, (sports) cardiologist referral, respirologist referral if abnormal spirometry results, and consideration for additional symptom-guided investigations
 - further management decisions should be guided by a (sports) cardiologist, with an exercise stress test recommended before final clearance to return to exercise.

Legend:

[‡] Mild localized symptoms: sore throat, hoarseness, blocked/plugged nose, runny nose, sinus pressure, sneezing, altered/loss of smell or taste¹.

[†] Potential COVID-19-related complications: myocarditis or myocardial damage, neurologic complications (e.g., Guillain-Barre Syndrome, cerebrovascular events, impaired consciousness, muscle injury, etc.), pulmonary fibrosis, acute ischemic stroke, systemic inflammatory response syndrome, microvascular damage.

^f Comorbidities that may increase risk for severe illness from COVID-19: serious heart disease (e.g., heart failure, coronary artery disease, cardiomyopathies), high blood pressure, diabetes, chronic lung disease, moderate to severe asthma, chronic kidney disease, sickle cell disease, thalassemia, liver disease, cystic fibrosis, immunocompromised status or impaired recovery of exercise capacity.

[‡] Red Flags in ECG suggestive of cardiovascular complications: tachycardia at rest, supraventricular or ventricular arrhythmias, ventricular ectopy, high-grade atrioventricular blocks, multiple-lead ST elevations, T-wave inversions, pathological Q waves, left bundle branch blocks, low QRS voltage (suggestive of pericardial effusion or myocardial edema), signs of right ventricular pressure overload¹.

^τ Regional or Systemic Symptoms: dry cough, wet cough (sputum/mucus), difficulty breathing, rapid breathing/shortness of breath, chest pain, headache, conjunctivitis, pyrexia, chills, anosmia/ageusia, myalgia/arthralgia, skin manifestations (erythema, urticaria), gastrointestinal (nausea, vomiting, diarrhea), encephalopathy¹.

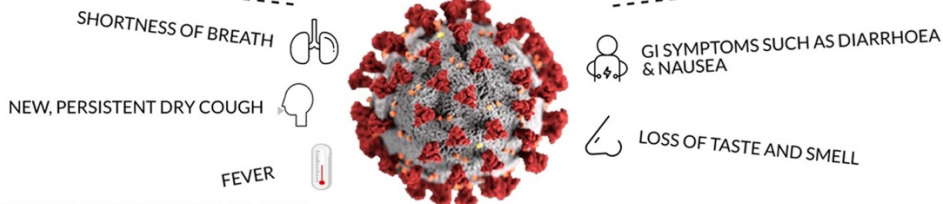
References

1. Verwoert GC, de Vries ST, Bijsterveld N, Willems AR, vd Borgh R, Jongman JK, Kemps HMC, Snoek JA, Rienks R, Jorstad HT. Return to sports after COVID-19: a position paper from the Dutch Sports Cardiology Section of the Netherlands Society of Cardiology. *Neth Heart J* 2020: <https://doi.org/10.1007/s12471-020-01469-z>.
2. Elliott N, Martin R, Heron N, *et al.* Infographic. Graduated return to play guidance following COVID-19 infection. *Br J Sports Med* 2020; Published Online First: 22 June 2020. doi: 10.1136/bjsports-2020-102637.
3. Condliffe R *et al.* British thoracic Society guidance on venous thromboembolic disease in patients with COVID-19 British thoracic Society pulmonary vascular specialist Advisory group 2020.
4. Perico L, Benigni A, Remuzzi G. Should COVID-19 concern nephrologists? why and to what extent? The emerging impasse of angiotensin blockade. *Nephron* 2020;144:213–21.
5. Bhatia RT, Marwaha S, Malhotra A, *et al.* Exercise in the Severe Acute Respiratory Syndrome Coronavirus-2 (SARS-CoV-2) era: A Question and Answer session with the experts Endorsed by the section of Sports Cardiology & Exercise of the European Association of Preventive Cardiology (EAPC). *Eur J Prev Cardiol* 2020; In Press 2020:204748732093059.
6. Baggish A, Drezner JA, Kim J, Martinez M, Prutkin JM. Resurgence of sport in the wake of COVID-19: cardiac considerations in competitive athletes. *Br J Sports Med* 2020;Jun 13 [Epub ahead of print]. Available: <https://blogs.bmj.com/bjasm/2020/04/24>.
7. Hull JH, Loosemore M, Schwellnus M. Respiratory health in athletes: facing the COVID-19 challenge. *Lancet Respir Med* 2020. April 8, 2020 [https://doi.org/10.1016/S2213-2600\(20\)30175-2](https://doi.org/10.1016/S2213-2600(20)30175-2).
8. Clerkin KJ, Fried JA, Raikhelkar J, *et al.* Coronavirus disease 2019 (COVID-19) and cardiovascular disease. *Circulation* 2020; Published online March 21, 2020.doi:10.1161/CIRCULATIONAHA.120.046941.
9. Driggin E, Madhavan MV, Bikdeli B, *et al.* Cardiovascular considerations for patients, health care workers, and health systems during the coronavirus disease 2019 (COVID-19) pandemic. *J Am Coll Cardiol* 2020; Published online March 18, 2020. doi:10.1016/j.jacc.2020.03.031.
10. Phelan D, Kim JH, Chung EH. A Game Plan for the Resumption of Sport and Exercise After Coronavirus Disease 2019 (COVID-19) Infection. *JAMA Cardiol* 2020; Published online May 13, 2020. doi:10.1001/jamacardio.2020.2136.
11. Dores H, Cardim N. Return to play after COVID-19: a sport cardiologist’s view. *Br J Sports Med* 2020; Published Online First: 07 May 2020. doi: 10.1136/bjsports-2020-102482.
12. Centers for Disease Control and Prevention. Last Updated July 17, 2020; Content source: National Center for Immunization and Respiratory Diseases (NCIRD), Division of Viral Diseases. www.cdc.gov.
13. Varatharaj A, Thomas N, Ellul MA, Davies NWS, Pollak TA, Tenorio EL, Sultan M, Easton A, Breen G, Zandi M, Coles JP, Manji H, Salman RA, Menon DK, Nicholson TR, Benjamin LA, Carson A, Smith C, Turner MR, Solomon T, Kneen R, Pett SL, Galea I, Thomas RH, Michael BD. Neurological and neuropsychiatric complications of COVID-19 in 153 patients: a UK-wide surveillance study. *Lancet Psychiatry* 2020; Published online June 25, 2020. [https://doi.org/10.1016/S2215-0366\(20\)30287-X](https://doi.org/10.1016/S2215-0366(20)30287-X).

Appendix A

COVID-19 GRADUATED RETURN TO PLAY FOR PERFORMANCE ATHLETES: GUIDANCE FOR MEDICAL PROFESSIONALS

INDICATORS OF COVID-19 INFECTION



THIS GUIDANCE IS AIMED AT ATHLETES WITH MILD TO MODERATE SYMPTOMS OF COVID-19. ATHLETES SHOULD FOLLOW LOCAL GOVERNMENT GUIDELINES OF COUNTRY OF RESIDENCE FOR MANAGEMENT OF SYMPTOMS INCLUDING ISOLATION AND TESTING PROCESSES. ATHLETES WHO HAVE MORE COMPLICATED INFECTIONS, OR REQUIRED HOSPITAL SUPPORT SHOULD HAVE A MEDICAL ASSESSMENT BEFORE COMMENCING GRTP. ASSESSMENT MAY INCLUDE:

BLOOD TESTING FOR MARKERS OF INFLAMMATION (HS-TROP, BNP, CRP). CONSIDER RENAL & HAEMATOLOGY MONITORING

CARDIAC MONITORING (ECG, ECHO, ETT, CARDIAC MRI)

RESPIRATORY FUNCTION ASSESSMENT (SPIROMETRY)



GRADUATED RETURN TO PLAY PROTOCOL

UNDER MEDICAL SUPERVISION

	STAGE 1 10 DAYS MINIMUM	STAGE 2 2 DAYS MINIMUM	STAGE 3A 1 DAY MINIMUM	STAGE 3B 1 DAY MINIMUM	STAGE 4 2 DAYS MINIMUM	STAGE 5 EARLIEST DAY 17	STAGE 6
ACTIVITY DESCRIPTION	MINIMUM REST PERIOD	LIGHT ACTIVITY	FREQUENCY OF TRAINING INCREASES	DURATION OF TRAINING INCREASES	INTENSITY OF TRAINING INCREASES	RESUME NORMAL TRAINING PROGRESSIONS	RETURN TO COMPETITION IN SPORT SPECIFIC TIMELINES
EXERCISE ALLOWED	WALKING, ACTIVITIES OF DAILY LIVING	WALKING, LIGHT JOGGING, STATIONARY CYCLE, NO RESISTANCE TRAINING	SIMPLE MOVEMENT ACTIVITIES E.G. RUNNING DRILLS	PROGRESSION TO MORE COMPLEX TRAINING ACTIVITIES	NORMAL TRAINING ACTIVITIES	RESUME NORMAL TRAINING PROGRESSIONS	
% HEART RATE MAX		<70%	<80%	<80%	<80%	RESUME NORMAL TRAINING PROGRESSIONS	
DURATION	10 DAYS	<15 MINS	<30 MINS	<45 MINS	<60 MINS	RESUME NORMAL TRAINING PROGRESSIONS	
OBJECTIVE	ALLOW RECOVERY TIME, PROTECT CARDIO-RESPIRATORY SYSTEM	INCREASE HEART RATE	INCREASE LOAD GRADUALLY, MANAGE ANY POST VIRAL FATIGUE SYMPTOMS	EXERCISE, COORDINATION AND SKILLS/TACTICS	RESTORE CONFIDENCE AND ASSESS FUNCTIONAL SKILLS	RESUME NORMAL TRAINING PROGRESSIONS	
MONITORING	SUBJECTIVE SYMPTOMS, RESTING HR, I-PRRS	SUBJECTIVE SYMPTOMS, RESTING HR, I-PRRS, RPE	SUBJECTIVE SYMPTOMS, RESTING HR, I-PRRS, RPE	SUBJECTIVE SYMPTOMS, RESTING HR, I-PRRS, RPE	SUBJECTIVE SYMPTOMS, RESTING HR, I-PRRS, RPE	SUBJECTIVE SYMPTOMS, RESTING HR, I-PRRS, RPE	

ACRONYMS: I-PRRS (INJURY - PSYCHOLOGICAL READINESS TO RETURN TO SPORT); RPE (RATED PERCEIVED EXERTION SCALE)
NOTE: THIS GUIDANCE IS SPECIFIC TO SPORTS WITH AN AEROBIC COMPONENT



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