



Citation for published version:

Löllgen, H, Bachl, N, Popadopoulou, T, Holloway, G, Vonbank, K, Jones, N, Bilzon, J, Swart, J & Pitsiladis, Y 2020, 'Recommendations for resumption of regular sports activity after COVID- 19 pandemic', *BMJ Open Sport & Exercise Medicine*.

Publication date:
2020

Document Version
Peer reviewed version

[Link to publication](#)

University of Bath

General rights

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

Take down policy

If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.

BMJ Open Sport & Exercise Medicine

Recommendations for resumption of regular sports activity after COVID-19 pandemic

Journal:	<i>BMJ Open Sport & Exercise Medicine</i>
Manuscript ID	Draft
Article Type:	Editorial
Date Submitted by the Author:	n/a
Complete List of Authors:	<p>Löllgen, Herbert; Med.Dept., Cardiology Bachl, Norbert; University of Vienna, Institute of Sports Science; Austrian Institute of Sports Medicine, Papadopoulou, Theodora; Defence Medical Rehabilitation Centre Headley Court, Lower Limbs- ADMR Hip & Groin; British Association of Sport and Exercise Medicine, Holloway, Graham Jones, Nigel; MCAS Bigard, Xavier Meyer, Joachim Vonbank, Karin Niederseer, David; University Heart Center Zurich, Department of Cardiology Muniz-Pardos, Borja; GENUUD (Growth, Exercise, Nutrition and Development) Research Group Debruyne, Andre Zupet, Petra; Institute for medicine and sport Steinacker, Jürgen Wolfarth, Bernd; Humboldt University and Charité University School of Medicine, Department of Sport Medicine; Charité Universitätsmedizin, Abtlg. Sportmedizin Bilzon, James; University of Bath, Department for Health Ionescu, Anca Dohi, Michiko; Japan Institute of Sports Sciences, Sport Medical center Swart, Jeroen; University of Cape Town, UCT/MRC Research Unit for Exercise Science and Badiyeva, Victoriya ; I M Sechenov First Moscow State Medical University, Sport Medicine; Moscow Scientific and Practical Center of Medical Rehabilitation and Sports Medicine , Sport Medicine Zelenkova, Irina Casasco, Maurizio Geislinger, Michael; University of Salzburg Di Luigi, Luigi; University of Rome Foro Italico, Movement, Human and Health Sciences Webborn, Nick; University of Brighton Singleton, Patrick; World Olympians Association, Miller, Mike Pigozzi, Fabio; University of Rome Foro Italico, SPORTS MEDICINE UNIT Pitsiladis, Yannis; University of Brighton, Collaborating Centre of Sports</p>

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

	Medicine
Keywords:	Athlete, Communicable disease, Sports rehabilitation programs, Physical fitness





I, the Submitting Author has the right to grant and does grant on behalf of all authors of the Work (as defined in the below author licence), an exclusive licence and/or a non-exclusive licence for contributions from authors who are: i) UK Crown employees; ii) where BMJ has agreed a CC-BY licence shall apply, and/or iii) in accordance with the terms applicable for US Federal Government officers or employees acting as part of their official duties; on a worldwide, perpetual, irrevocable, royalty-free basis to BMJ Publishing Group Ltd ("BMJ") its licensees and where the relevant Journal is co-owned by BMJ to the co-owners of the Journal, to publish the Work in this journal and any other BMJ products and to exploit all rights, as set out in our [licence](#).

The Submitting Author accepts and understands that any supply made under these terms is made by BMJ to the Submitting Author unless you are acting as an employee on behalf of your employer or a postgraduate student of an affiliated institution which is paying any applicable article publishing charge ("APC") for Open Access articles. Where the Submitting Author wishes to make the Work available on an Open Access basis (and intends to pay the relevant APC), the terms of reuse of such Open Access shall be governed by a Creative Commons licence – details of these licences and which [Creative Commons](#) licence will apply to this Work are set out in our licence referred to above.

Other than as permitted in any relevant BMJ Author's Self Archiving Policies, I confirm this Work has not been accepted for publication elsewhere, is not being considered for publication elsewhere and does not duplicate material already published. I confirm all authors consent to publication of this Work and authorise the granting of this licence.

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60

1 Recommendations for resumption of regular sports activity after COVID- 2 19 pandemic

3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

Authors: Herbert Löllgen¹, Norbert Bachl^{1,2,3,4}, Theodora Papadopoulou^{1,2,5,6}, Graham Holloway⁵, Karin Vonbank⁷, Nigel Jones^{5,8}, Xavier Bigard^{1,2,9}, David Niederseer¹⁰, Joachim Meyer¹¹, Borja Muniz-Pardos¹², Andre Debruyne^{1,2}, Petra Zupet¹, Juergen M. Steinacker^{1,2,13}, Bernd Wolfarth^{2,14}, James L. J. Bilzon^{2,15}, Anca Ionescu¹, Michiko Dohi^{2,16}, Jeroen Swart^{2,17}, Victoriya Badtieva^{2,18,19}, Irina Zelenkova^{11,18}, Maurizio Casasco^{1,2,20}, Michael Geistlinger^{2,21}, Luigi Di Luigi^{2,22}, Nick Webborn²³, Patrick Singleton²⁴, Mike Miller²⁴, Fabio Pigozzi^{2,25,26}, Yannis P. Pitsiladis^{1,2,27}

12 Corresponding author:

13 Professor Yannis Pitsiladis
14 Collaborating Centre of Sports Medicine, University of Brighton
15 Eastbourne
16 UK
17 Email: y.pitsiladis@brighton.ac.uk

19 Affiliations:

- 20 ¹ European Federation of Sports Medicine Associations (EFSMA), Lausanne, Switzerland
21 ² International Federation of Sports Medicine (FIMS), Lausanne, Switzerland
22 ³ Institute of Sports Science, University of Vienna, Vienna, Austria
23 ⁴ Austrian Institute of Sports Medicine, Vienna, Austria.
24 ⁵ British Association Sport and Exercise Medicine, Doncaster, UK
25 ⁶ Defence Medical Rehabilitation Centre (DMRC), Loughborough, UK
26 ⁷ Department of Pneumology, Pulmonary Function Laboratory, Medicine Clinic (KIMII),
27 University of Vienna, Vienna, Austria
28 ⁸ British Cycling and University of Liverpool, UK
29 ⁹ Union Cycliste Internationale (UCI), Aigle, Switzerland
30 ¹⁰ Heart Centre of the University of Zurich, Zurich, Switzerland
31 ¹¹ Clinic Bogenhausen, Lung Center, Munich, Germany
32 ¹² GENUD (Growth, Exercise, Nutrition and Development) research group, University of
33 Zaragoza, Zaragoza, Spain
34 ¹³ Division of Sports and Rehabilitation Medicine, Ulm University Hospital, Ulm Germany
35 ¹⁴ Department of Sports Medicine, Humboldt University and Charité University School of
36 Medicine, Berlin, Germany
37 ¹⁵ Department for Health, University of Bath, Bath, UK
38 ¹⁶ Sport Medical Center, Japan Institute of Sports Sciences, Tokyo, Japan
39 ¹⁷ UCT Research Unit for Exercise Science and Sports Medicine, Cape Town, South Africa
40 ¹⁸ I.M. Sechenov First Moscow State Medical University (Sechenov University), Ministry of
41 Health of Russia, Moscow, Russian Federation.
42 ¹⁹ Moscow Research and Practical Centre for Medical Rehabilitation, Restorative and Sports
43 Medicine, Moscow Healthcare Department, Moscow, Russian Federation.

- 1
2
3 44 ²⁰ Italian Federation of Sports Medicine (FMSI), Rome, Italy
4 45 ²¹ Unit International Law, Department of Constitutional, International and European Law.
5 University of Salzburg, Salzburg, Austria
6 46
7 47 ²² Unit of Endocrinology, Department of Movement, Human and Health Sciences, University
8 of Rome “Foro Italico”, Rome, Italy
9 48
10 49 ²³ School of Sport and Service Management, University of Brighton, Eastbourne, UK
11 50 ²⁴ World Olympians Association, Lausanne, Switzerland
12 51 ²⁵ University of Rome “Foro Italico”, Rome, Italy
13 52 ²⁶ Villa Stuart Sport Clinic, FIFA Medical Center of Excellence, Rome, Italy
14 53 ²⁷ Collaborating Centre of Sports Medicine, University of Brighton, Eastbourne, UK
15 54
16 55
17 56
18 57
19 58
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

60 **Background**

61 The COVID-19 pandemic and the restrictive measures adopted internationally in order to
62 contain the virus has led to a disruption of organised sport at all levels. During the
63 lockdown period, outdoor exercise was forbidden or partly restricted in some cases without
64 access to sports facilities including gyms or sports centres. As the number of infections and
65 hospitalisations decreased, the strict lockdown was gradually lifted. Team sports have
66 commenced reintroducing their training routines in groups, and the Bundesliga reactivated
67 the professional league behind closed doors on 16th May 2020 despite serious concerns
68 raised by some in the scientific community [1]. Additional sporting competitions such as
69 boxing, Ultimate Fighting Championship and Formula 1 are also scheduled to resume in
70 May-June 2020 [2]. It is worth noting that social distancing is possible in some sports (e.g.,
71 tennis, swimming, athletics and golf) whereas this is not always possible in other cases (e.g.
72 football, rugby, basketball, cycling and boxing), and careful measures of hygiene and
73 control are especially needed for these more at risk sports to regulate the safety of sport
74 resumption and to avoid possible infections. For more thorough information about the risk
75 factors and symptoms to be considered to make the return to sport as safely as possible,
76 consult Carmody et al. [3] and Niess et al. [4]. The present editorial provides practical and
77 medical recommendations on the resumption to sport process.

78

79 **Group identification**

80 During the resumption to sport process, the following groups must be distinguished
81 (individuals below refer to both leisure time and professional athletes or persons starting
82 new with regular physical activities):

- 83 1. Individuals without symptoms and signs.
- 84 2. Individuals with a positive SARS-CoV-2 test without any Covid-19-disease

1
2
3 85 symptoms.

4
5 86 3. Individuals who experienced Covid-19-disease with mild symptoms, only needing
6
7 87 outpatient treatment and quarantine for 14 days.

8
9 88 4. Individuals with moderate symptoms but had inpatient treatment due to an increased
10
11 89 risk derived from pre-existing conditions (e.g., asthma, diabetes).

12
13 90 5. Individuals with severe symptoms, inpatient treatment, including intensive care
14
15 91 without artificial respiration.

16
17 92 6. Individuals with severe symptoms, inpatient treatment in intensive care and on
18
19 93 artificial respiration.

20
21 94

22
23 95 It is imperative that a medical examination is performed in cooperation with a respiratory
24
25 96 physician and/or cardiologist.

26
27 97

28
29 98 **Recommendations for individual groups**

30
31 99

32
33 100 **Group 1:** Before resuming sport without any past medical history evidence, risk
34
35 101 stratification has to be evaluated through questionnaires compiling data related to history,
36
37 102 close contact with people with positive SARS-CoV 2 test, or contact with people of high
38
39 103 risk, or in so called hotspots. The individual has to confirm being free of any symptoms and
40
41 104 this must be documented. Exercise testing is likely to be necessary in some sports due to
42
43 105 the expected detraining after lockdown, and exercise testing must be performed according
44
45 106 to the latest Covid-19-disease / SARS-CoV-2 health and safety regulations.

46
47 107

48
49 108 **Group 2:** Resumption after 14 days quarantine. Examinations ought to include history,
50
51 109 physical examination, 12-channel electrocardiogram (ECG), lung function assessment (if
52
53 60

1
2
3 110 necessary), and both cardiac echo and stress test (if necessary) [5].
4

5 111 **Group 3:** Resumption after a quarantine period of two weeks and strict social distancing
6
7 112 for another two weeks.
8
9

10 113

11
12 114 A medical examination by a sport and exercise medicine physician with history, physical
13
14 115 examination, blood test focused on critical markers (e.g., C-Reactive Protein, high
15
16 116 sensitivity troponin-I, natriuretic peptides) if necessary, and resting ECG (e.g., changes of
17
18 117 Q-wave, ST-stretch, T-wave). Additional lung function assessment and stress test with
19
20 118 ECG, blood gas analysis and spiroergometry are recommended if symptoms have involved
21
22 119 respiratory impairment. Medical surveillance for six months after return to sport if any
23
24 120 symptoms are present but not limiting return to sport.
25
26
27

28 121

29
30 122 **Group 4:** Same procedure as for group 3 but including compulsory ergometry with blood
31
32 123 gas analysis and/or spiroergometry. Chest X-ray examination and depending on the
33
34 124 findings obtained during the inpatient stay, high-resolution computed tomography of the
35
36 125 thorax in the most severe cases always in consultation with a lung specialist. Cardiac
37
38 126 examinations depending on history, symptoms and signs, cardio-magnetic resonance
39
40 127 imaging (MRI) after consultation with a cardiologist.
41
42
43

44 128

45
46 129 **Groups 5 and 6:** A complete pulmonary and cardiological examination is necessary
47
48 130 (“cardiac markers” such as high sensitivity troponin-I or natriuretic peptides) including
49
50 131 resting ECG, lung function, echocardiography (if necessary), stress test with ECG and
51
52 132 blood gas analysis.
53
54

55 133

56
57
58 134 Depending on previous findings in heart rate, computed tomography of the thorax and
59
60

1
2
3 135 cardiac MRI examination in consultation with a respiratory physician and cardiologist,
4
5 136 hospital discharge can take place. A final medical check and sports statement is mandatory.
6
7
8 137

9
10 138 Resumption of sport can occur in uncomplicated cases 10 days after recovery from
11
12 139 infection. In patients with more severe organ involvement, pneumonia, myocarditis or
13
14 140 neurological signs an individualized plan is necessary^{4,5}. Testing for SARS CoV-2 can be
15
16 141 carried out to support a return to play decision but is not essential unless stipulated (e.g.,
17
18 142 National/International Sports Federation, Government).
19
20

21 143

22 144 **Conclusions**

23
24 145 An adequate assessment of the resumption of sporting activity is based on a case-by-case
25
26 146 decision that must consider the individual situation of the athlete including pre-existing
27
28 147 conditions, the type of sport and the risk of infection from other athletes (e.g., increased
29
30 148 risk in contact/team-sports). The recommendation to return to play will be based on the
31
32 149 results of the examination and individual assessment in consultation with the sport and
33
34 150 exercise medicine physician, specialists in pulmonary medicine and sport cardiology (or
35
36 151 extended multidisciplinary team), coaches and training specialists. After a contact ban, an
37
38 152 athlete should be provided with recommendations on sports resumption that are in
39
40 153 accordance with national and regional guidelines. After a longer period of interruption in
41
42 154 sport caused by more severe health issues, increases in training should be gradual and
43
44 155 individualised by monitoring signs and symptoms of the health issue.
45
46
47
48
49
50

51 156

52
53 157 **Funding.** The authors have not declared a specific grant for this research from any funding
54
55 158 agency in the public, commercial or not-for-profit sectors.
56
57

58 159
59
60

1
2
3 160 **Competing interests.** None declared
4

5 161 **Patient consent for publication.** Not required
6
7
8 162

9
10 163 **Provenance and peer review.** Not commissioned; internally peer reviewed
11
12 164

13
14 165 **Acknowledgments:** None
15
16 166

17
18
19 167 **References**
20

- 21 168 1 Corsini A, Bisciotti GN, Eirale C, *et al.* Football cannot restart soon during the
22
23 169 COVID-19 emergency! A critical perspective from the Italian experience and a call
24
25 170 for action. *Br J Sports Med* 2020;:bjssports-2020-102306. doi:10.1136/bjssports-2020-
26
27 171 102306
28
29 172 2 Coronavirus and sports: What happened in April 2020 | Sports| German football and
30
31 173 major international sports news | DW | 01.05.2020.
32
33 174 <https://www.dw.com/en/coronavirus-sports-cancellations/a-52569936> (accessed 8
34
35 175 May 2020).
36
37 176 3 Carmody S, Murray A, Borodina M, *et al.* When can professional sport recommence
38
39 177 safely during the COVID-19 pandemic? Risk assessment and factors to consider. *Br*
40
41 178 *J Sports Med* 2020;May. doi:10.1136/bjssports-2020-102539.
42
43 179 4 Niess AM, Bloch W, Friedmann-Bette B, *et al.* Position Stand: Return to Sport in the
44
45 180 Current Coronavirus Pandemic. *Ger J Sport Med* 2020;71:E1–4.
46
47 181 doi:10.5960/dzsm.2020.437
48
49 182 5 Phelan D, Kim JH, Chung EH. A Game Plan for the Resumption of Sport and
50
51 183 Exercise After Coronavirus Disease 2019 (COVID-19) Infection. *JAMA Cardiol*
52
53 184 Published Online First: 2020. doi:10.1001/JAMACARDIO.2020.2136
54
55
56
57
58
59
60