

**The effects of acute respiratory illness on exercise and sports performance outcomes in athletes – a systematic review by a subgroup of the IOC consensus group on “Acute respiratory illness in the athlete”**

**Supplementary Table S3: Detailed results of the acute (short term) effects of acute respiratory infection on exercise and sports performance outcomes**

Study	Illness classification	Diagnostic method	Study design / flow / testing	Timing of measurements in relation to ARinf	Exercise / sports performance parameter [outcome variables]	Results
Anastasio et al. 2021 (Anastasio, T et al. 2021)	Confirmed general (upper/lower)	Physician diagnosis including pathology confirmed (PCR or culture) for pathogen	<ul style="list-style-type: none"> <li>Elite cross-country skiers with previous SARS-CoV-2 infection</li> <li>CPET and pulmonary function testing before resuming seasonal training</li> <li>Retrospectively selected and compared to a detrained, similar control group</li> </ul>	<ul style="list-style-type: none"> <li>4-6 weeks after SARS-CoV-2 positive test</li> </ul>	<ul style="list-style-type: none"> <li><b>Cardiorespiratory endurance:</b> <ul style="list-style-type: none"> <li>Resting HR (bpm), SBP (mmHg)</li> <li>Maximal exercise test [VO<sub>2</sub>, VE (L.min<sup>-1</sup>), VO<sub>2</sub>/kg, HRR, HR (bpm), VO<sub>2</sub>/kg/HR, BR, blood lactate (mmol/L)]</li> <li>Time to exhaustion (mins)</li> </ul> </li> <li><b>Pulmonary function</b> (at rest)                             <ul style="list-style-type: none"> <li>FVC (l), FVC (%), FEV1 (l), FEV1 (%), FEV1/FVC, PEF (l), PEF (%), MVV (l), MVV (%)</li> </ul> </li> </ul>	<p><b>CARDIORESPIRATORY ENDURANCE</b></p> <p><u>Rest:</u></p> <ul style="list-style-type: none"> <li>SBP (mmHg) = ARinf 123 ± 9; CON 119 ± 8 (p=0.18)</li> <li>HR (bpm) = ARinf 67 ± 10; CON 72 ± 11 (p=0.21)</li> </ul> <p><u>Aerobic threshold:</u></p> <ul style="list-style-type: none"> <li>Time (mins) = ARinf 04:48 (03:34-07:25); CON 06:28 (04:53-10:37) (p&lt;0.05)</li> <li>VE = ARinf 50 (42-58); CON 61 (57-80) (p=0.01)</li> <li>VO<sub>2</sub>/kg = ARinf 28.6 (25.1-34.4); CON 38.9 (33.4-44.3) (p&lt;0.01)</li> <li>HR = ARinf 136 (127-143); CON 150 (142-163) (p&lt;0.01)</li> <li>HRR = ARinf 0.26 (0.23-0.29); CON 0.22 (0.19-0.24) (p&lt;0.05)</li> <li>VO<sub>2</sub>/kg/HR = ARinf 0.16 (0.13-0.19); CON 0.19 (0.17-0.23) (p=0.01)</li> <li>BR = ARinf 0.71 (0.59-0.76); CON 0.57 (0.50-0.63) (p&lt;0.05)</li> </ul> <p><u>Anaerobic threshold:</u></p> <ul style="list-style-type: none"> <li>Time (mins) = ARinf 13:17 (11:45-16:50); CON 15:49 (13:05-17:04) (p=0.29)</li> <li>VE = ARinf 88 (83-106); CON 95 (86-107) (p=0.31)</li> <li>VO<sub>2</sub>/kg = ARinf 28.6 (25.1-34.4); CON 38.9 (33.4-44.3) (p&lt;0.01)</li> <li>HR = ARinf 170 (161-180); CON 184 (177-189) (p=0.01)</li> <li>HRR = ARinf 0.06 (0.05-0.09); CON 0.06 (0.05-0.08) (p=0.26)</li> <li>VO<sub>2</sub>/kg/HR = ARinf 0.25 (0.23-0.28); CON 0.26 (0.24-0.30) (p=0.57)</li> <li>BR = ARinf 0.43 (0.34-0.48); CON 0.57 (0.50-0.63) (p&lt;0.05)</li> </ul> <p><u>Maximal effort:</u></p> <ul style="list-style-type: none"> <li>Time (mins) = ARinf 18:41 (17:14-21:21); CON 21:07 (18:01-3:31) (p=0.18)</li> <li>VE = ARinf 141 (113-161); CON 138 (119-164) (p=0.84)</li> <li>VO<sub>2</sub>/kg = ARinf 56.9 (48.5-64.3); CON 60.0 (53.7-66.5) (p=0.29)</li> <li>HR = ARinf 184 (175-195); CON 196 (188-202) (p&lt;0.05)</li> <li>VO<sub>2</sub>/kg/HR = ARinf 0.30 (0.27-0.33); CON 0.32 (0.28-0.35) (p=0.34)</li> <li>BR = ARinf 0.12 (0.10-0.18); CON 0.12 (0.09-0.14) (p=0.29)</li> <li>Blood lactate (mmol/L): ARinf 11.2(9.4-12.2); CON 10.3 (8.5-11.6) (p=0.26)</li> </ul> <p><b>PULMONARY FUNCTION (at rest)</b></p> <ul style="list-style-type: none"> <li>FVC (l) = ARinf 5.2 (4.4-5.7); CON 4.9 (4.2-5.5) (p=0.32)</li> <li>FVC (%) = ARinf 104 (101-113); CON 105 (102-112) (p=0.76)</li> <li>FEV1 (l) = ARinf 4.3 (3.9-5.0); CON 4.2 (3.6-4.8) (p=0.23)</li> <li>FEV1 (%) = ARinf 110 (107-119); CON 109 (104-118) (p=0.47)</li> </ul>

						<ul style="list-style-type: none"> <li>• FEV1/FVC = ARinf 87 (85-94); CON 89 (86-95) (p=0.44)</li> <li>• PEF (l) = ARinf 8.9 (7.6-9.8); CON 9 (7.8-9.8) (p=0.29)</li> <li>• PEF (%) = ARinf 101 (94-112); CON 105 (97-113) (p=0.67)</li> <li>• MVV (l) = ARinf 170 (126-185); CON 150 (139-182) (p=0.86)</li> <li>• MVV (%) = ARinf 130 (85-148); CON 118 (91-142) (p=0.92)</li> </ul>
<b>Costello et al. 2021</b> (Costello, Climie et al. 2021)	Confirmed general (upper/lower)	Physician diagnosis including pathology confirmed (PCR or culture) for pathogen	<ul style="list-style-type: none"> <li>• Professional basketball players who tested positive for SARS-CoV-2 were compared to teammates who tested negative</li> <li>• Assessment included CPET on return to training</li> </ul>	<ul style="list-style-type: none"> <li>• 10-21 days after SARS-CoV-2 positive test</li> </ul>	<ul style="list-style-type: none"> <li>• <u>Cardiorespiratory endurance:</u> <ul style="list-style-type: none"> <li>○ Resting HR (bpm)</li> <li>○ Maximal exercise test [peak exercise HR (bpm), peak RER, peak VO<sub>2</sub> (L/min), peak VO<sub>2</sub> (mL/kg/min), VE/VCO<sub>2</sub>]</li> </ul> </li> </ul>	<p><b>CARDIORESPIRATORY ENDURANCE</b></p> <ul style="list-style-type: none"> <li>• Resting HR (beats/min) = ARinf 56 ± 9; CON 54 ± 11 (p=0.69)</li> <li>• Peak exercise HR (beats/min) = ARinf 185 ± 9; CON 187 ± 15 (p=0.83)</li> <li>• Peak RER = ARinf 1.3 ± 0.9; CON 1.3 ± 0.4 (p=0.18)</li> <li>• Peak VO<sub>2</sub> (L/min) = ARinf 3.60 ± 0.71; CON 3.91 ± 0.92 (p=0.42)</li> <li>• Peak VO<sub>2</sub> (mL/kg/min) = ARinf 41.5 ± 5.0; CON 47.2 ± 10.6 (p=0.18)</li> <li>• VE/VCO<sub>2</sub> = ARinf 22.6 ± 2.9; CON 22.1 ± 3.2 (p=0.72)</li> </ul>
<b>Csulak et al. 2021</b> (Csuaiak, Petrov et al. 2021)	Confirmed general (upper/lower)	Physician diagnosis including pathology confirmed (PCR or culture) for pathogen	<ul style="list-style-type: none"> <li>• Hungarian Swimmers preparing for the Olympics were prospectively assessed on their return to training post-SARS-CoV-2 infection</li> <li>• ARinf group CPET results compared to their own baseline measurements pre-SARS-CoV-2 infection and to non-infected controls</li> </ul>	<ul style="list-style-type: none"> <li>• 10-14 days after SARS-CoV-2 positive test</li> </ul>	<ul style="list-style-type: none"> <li>• <u>Cardiorespiratory endurance</u> <ul style="list-style-type: none"> <li>○ Resting HR (bpm)</li> <li>○ Maximal exercise test [peak HR (bpm), HR recovery (1/min), RER, VO<sub>2</sub>max (l/min), VO<sub>2</sub>max (l/min/kg), VE (l/min), VE/VCO<sub>2</sub>, peak lactate (mmol/L), O<sub>2</sub> pulse (ml/bpm)]</li> <li>○ Time to exhaustion (mins)</li> <li>○ Max load (watts)</li> </ul> </li> </ul>	<p><b>CARDIORESPIRATORY ENDURANCE:</b></p> <p><u>Resting HR (bpm):</u></p> <ul style="list-style-type: none"> <li>• ARinf 2019 vs 2021 = pre 69.0 ± 15; post 72.4 ± 17 (p=0.61)</li> <li>• Post-SARS-CoV-2 = ARinf 72.4 ± 17; CON 62.0 ± 11 (p=0.024)</li> </ul> <p><u>Peak HR (bpm):</u></p> <ul style="list-style-type: none"> <li>• ARinf 2019 vs 2021 = pre 191.2 ± 9.1; post 188.0 ± 11 (p=0.44)</li> <li>• Post-SARS-CoV-2 = ARinf 188.0 ± 11; CON 190.5 ± 11.5 (p=0.53)</li> </ul> <p><u>HR recovery (1/min):</u></p> <ul style="list-style-type: none"> <li>• ARinf 2019 vs 2021 = pre 33.1 ± 13.9; post 23.5 (19.7–31.2) (p=0.32)</li> <li>• Post-SARS-CoV-2 = ARinf 23.5 (19.7–31.2); CON 22.0 (20.0–32.0) (p=0.78)</li> </ul> <p><u>RER:</u></p> <ul style="list-style-type: none"> <li>• ARinf 2019 vs 2021 = pre 1.15 ± 0.07; post 23.5 1.17 ± 0.07 (p=0.38)</li> <li>• Post-SARS-CoV-2 = ARinf 1.17 ± 0.07; CON 1.17 ± 0.08 (p=0.94)</li> </ul> <p><u>Treadmill time (min):</u></p> <ul style="list-style-type: none"> <li>• MALE: ARinf 2019 vs 2021 = pre 14.5 ± 1.3; post 15.0 (13.7–15.0) (p=1.0)</li> <li>• FEMALE: ARinf 2019 vs 2021 = pre 14.4 ± 2.0; post 13.5 ± 2.0 (p=0.45)</li> <li>• MALE: Post-SARS-CoV-2 = ARinf 15.0 (13.7–15.0); CON 14.5 ± 2.7 (p=0.40)</li> <li>• FEMALE: Post-SARS-CoV-2 = ARinf 13.5 ± 2.0; CON 12.9 ± 1.6 (p=0.55)</li> </ul> <p><u>Max load (Watt):</u></p> <ul style="list-style-type: none"> <li>• MALE: ARinf 2019 vs 2021 = pre 464.3 ± 25.8; post 458.0 ± 31.0 (p=0.75)</li> <li>• FEMALE: ARinf 2019 vs 2021 = pre 311.4 ± 61.7; post 283.3 ± 41.5 (p=0.37)</li> <li>• MALE: Post-SARS-CoV-2 = ARinf 458.0 ± 31.0; CON 402.9 ± 60.8 (p=0.052)</li> <li>• FEMALE: Post-SARS-CoV-2 = ARinf 283.3 ± 41.5; CON 270.4 ± 41.3 (p=0.59)</li> </ul> <p><u>VO<sub>2</sub> max (l/min):</u></p> <ul style="list-style-type: none"> <li>• MALE: ARinf 2019 vs 2021 = pre 4.7 ± 0.4; post 5.2 ± 0.6 (p=0.14)</li> <li>• FEMALE: ARinf 2019 vs 2021 = pre 3.3 ± 0.5; post 3.2 ± 0.4 (p=0.82)</li> <li>• MALE: Post-SARS-CoV-2 = ARinf 5.2 ± 0.6; CON 4.6 ± 0.7 (p=0.08)</li> <li>• FEMALE: Post-SARS-CoV-2 = ARinf 3.2 ± 0.4; CON 3.1 ± 0.4 (p=0.47)</li> </ul> <p><u>VO<sub>2</sub> max (ml/min/kg):</u></p> <ul style="list-style-type: none"> <li>• MALE: ARinf 2019 vs 2021 = pre 55 ± 3.8; post 56.5 ± 4.9 (p=0.53)</li> <li>• FEMALE: ARinf 2019 vs 2021 = pre 53.1 ± 5.5; post 52.9 ± 4.1 (p=0.97)</li> <li>• MALE: Post-SARS-CoV-2 = ARinf 56.5 ± 4.9; CON 55.5 ± 4.5 (p=0.20)</li> <li>• FEMALE: Post-SARS-CoV-2 = ARinf 52.9 ± 4.1; CON 50.7 ± 2.6 (p=0.76)</li> </ul>

						<p><u>VE (l/min):</u></p> <ul style="list-style-type: none"> <li>MALE: ARinf 2019 vs 2021 = pre 153.0 ± 9.5; post 178.0 ± 16.6 (p=0.03)</li> <li>FEMALE: ARinf 2019 vs 2021 = pre 118.0 ± 10.4; post 111.0 ± 12.4 (p=0.28)</li> <li>MALE: Post-SARS-CoV-2 = ARinf 178.0 ± 16.6; CON 159.0 ± 31.5 (p=0.19)</li> <li>FEMALE: Post-SARS-CoV-2 = ARinf 111.0 ± 12.4; CON 109.0 ± 25.0 (p=0.90)</li> </ul> <p><u>VE/VCO<sub>2</sub>:</u></p> <ul style="list-style-type: none"> <li>MALE: ARinf 2019 vs 2021 = pre 28.5 ± 2.2; post 28.9 ± 3.5 (p=0.86)</li> <li>FEMALE: ARinf 2019 vs 2021 = pre 31.5 ± 2.2; post 30.2 ± 1.6 (p=0.32)</li> <li>MALE: Post-SARS-CoV-2 = ARinf 28.9 ± 3.5; CON 29.4 ± 3.9 (p=0.78)</li> <li>FEMALE: Post-SARS-CoV-2 = ARinf 30.2 ± 1.6; CON 31.0 ± 2.9 (p=0.58)</li> </ul> <p><u>Peak Lactate (mmol/L):</u></p> <ul style="list-style-type: none"> <li>MALE: ARinf 2019 vs 2021 = pre 9.7 ± 4.1; post 9.5 ± 2.1 (p=0.95)</li> <li>FEMALE: ARinf 2019 vs 2021 = pre 8.4 ± 1.9; post 6.6 ± 1.7 (p=0.09)</li> <li>MALE: Post-SARS-CoV-2 = ARinf 9.5 ± 2.1; CON 7.8 ± 3.1 (p=0.23)</li> <li>FEMALE: Post-SARS-CoV-2 = ARinf 6.6 ± 1.7; CON 9.1 ± 2.2 (p=0.04)</li> </ul> <p><u>O<sub>2</sub> pulse (ml/bpm):</u></p> <ul style="list-style-type: none"> <li>MALE: ARinf 2019 vs 2021 = pre 25.6 ± 2.1; post 26.4 ± 2.4 (p=0.58)</li> <li>FEMALE: ARinf 2019 vs 2021 = pre 17.8 ± 2.8; post 18.2 ± 2.7 (p=0.82)</li> <li>MALE: Post-SARS-CoV-2 = ARinf 26.4 ± 2.4; CON 24.0 ± 1.8 (p=0.58)</li> <li>FEMALE: Post-SARS-CoV-2 = ARinf 18.2 ± 2.7; CON 16.2 ± 2.1 (p=0.06)</li> </ul>
<p><b>Fikenzer et al. 2021</b>(Fikenzer, Kogel et al. 2021)</p>	<p>Confirmed general (upper/lower)</p>	<p>Physician diagnosis including pathology confirmed (PCR or culture) for pathogen</p>	<ul style="list-style-type: none"> <li>Elite handball players who tested positive for SARS-CoV-2 were compared to teammates who tested negative</li> <li>Assessment included CPET and pulmonary function on return to training</li> </ul>	<ul style="list-style-type: none"> <li>19 ± 7 days after SARS-CoV-2 positive test</li> </ul>	<ul style="list-style-type: none"> <li><u>Cardiorespiratory endurance</u> <ul style="list-style-type: none"> <li>Rest [HR (beats/min), VO<sub>2</sub> (ml/min), VE (l/min), VTex (l), O<sub>2</sub>-pulse (ml/HR), RER]</li> <li>Maximal exercise test [HRmax (bpm), VO<sub>2</sub>max (ml/min), VEmax (l/min), VTex (l), O<sub>2</sub>-pulse (ml/HR), RER]</li> <li>Max load (watts)</li> </ul> </li> <li><u>Pulmonary function (at rest)</u> <ul style="list-style-type: none"> <li>[FVC (l), FEV<sub>1</sub> (l), PEF (l/s), MEF<sub>25</sub> (l/s)]</li> </ul> </li> </ul>	<p><b>CARDIORESPIRATORY ENDURANCE (ARinf group):</b></p> <p><u>Rest:</u></p> <ul style="list-style-type: none"> <li>HR (beats/min) = pre 70 ± 8.2; post 78 ± 10.2 (p=ns)</li> <li>VO<sub>2</sub> (ml/min) = pre 428 ± 76; post 451 ± 76 (p=ns)</li> <li>VE (l/min) = pre 13 ± 1.5; post 14 ± 2.1 (p=ns)</li> <li>VTex (l) = pre 0.7 ± 0.2; post 0.8 ± 0.2 (p=ns)</li> <li>O<sub>2</sub>-pulse (ml/HR) = pre 6.1 ± 0.7; post 5.8 ± 0.7 (p=ns)</li> <li>RER = pre 0.8 ± 0.1; post 0.9 ± 0.1 (p=0.044)</li> </ul> <p><u>Max:</u></p> <ul style="list-style-type: none"> <li>Max load (watts) = pre 309 ± 33; post 293 ± 37 (p=0.006)</li> <li>HRmax (beats/min) = pre 183 ± 14; post 190 ± 15 (p=0.038)</li> <li>VO<sub>2</sub>max (ml/min) = pre 4082 ± 520; post 3790 ± 513 (p=0.030)</li> <li>VEmax (l/min) = pre 134 ± 15; post 115 ± 17 (p=0.013)</li> <li>VTex (l) = pre 2.9 ± 0.4; post 2.8 ± 0.4 (p=ns)</li> <li>O<sub>2</sub>-pulse (ml/HR) = pre 22.3 ± 2.6; post 19.9 ± 1.7 (p=0.015)</li> <li>RER = pre 1.1 ± 0.1; post 1.1 ± 0.1 (p=ns)</li> </ul> <p><b>PULMONARY FUNCTION (ARinf group):</b></p> <ul style="list-style-type: none"> <li>FVC (l) = pre 6.5 ± 0.7; post 6.5 ± 0.6 (p=ns)</li> <li>FEV<sub>1.0</sub> (l) = pre 5.1 ± 0.5; post 5.1 ± 0.5 (p=ns)</li> <li>PEF (l/s) = pre 11.5 ± 1.5; post 10.7 ± 0.8 (p=ns)</li> <li>MEF<sub>25</sub> (l/s) = pre 2.2 ± 1.0; post 2.1 ± .7 (p=ns)</li> </ul>
<p><b>Komici et al. 2021</b>(Komici, Bianco et al. 2021)</p>	<p>Confirmed general (upper/lower)</p>	<p>Physician diagnosis including pathology confirmed (PCR or culture) for pathogen</p>	<ul style="list-style-type: none"> <li>Competitive athletes with recent SARS-CoV-2 infection underwent CPET and pulmonary function testing</li> <li>ARinf group was compared to a non-infected control group</li> </ul>	<ul style="list-style-type: none"> <li>≤30 days after SARS-CoV-2 positive test</li> </ul>	<ul style="list-style-type: none"> <li><u>Cardiorespiratory endurance</u> <ul style="list-style-type: none"> <li>Rest [HR (bpm), SBP (mmHg), VE (l/min), SpO<sub>2</sub> (%)]</li> <li>Maximal exercise test: [peak HR (bpm), peak SBP (mmHg), peak VO<sub>2</sub> (ml/kg/min), peak VE (l/min), Peak RER, peak SpO<sub>2</sub> (%), peak VCO<sub>2</sub> (l/min), VE/VCO<sub>2</sub> slope,</li> </ul> </li> </ul>	<p><b>CARDIORESPIRATORY ENDURANCE:</b></p> <p><u>Rest:</u></p> <ul style="list-style-type: none"> <li>HR (beats/min) = ARinf 63.5 (55–67); CON 62 (51–78) (p=0.887)</li> <li>SBP (mmHg) = ARinf 120 (105–120); CON 120 (100–130) (p=0.749)</li> <li>VE (l/min) = ARinf 11.95 (9.5–13.5); CON 12.4 (9–14) (p=0.887)</li> <li>SpO<sub>2</sub> (%) = ARinf 98 (98-99); CON 98 (98-100) (p=0.458)</li> </ul> <p><u>Max:</u></p> <ul style="list-style-type: none"> <li>Peak HR (bpm) = ARinf 171 (166–179); CON 162 (155–183) (p=0.423)</li> </ul>

					<p>lowest VE/VCO<sub>2</sub>, 1stVT VO<sub>2</sub> (ml/kg/min), 1stVT% peak VO<sub>2</sub>, peak O<sub>2</sub> pulse (ml/kg/min)]</p> <ul style="list-style-type: none"> <li>• <b>Pulmonary function (at rest)</b> <ul style="list-style-type: none"> <li>○ [FVC (l), FVC (%), FEV<sub>1</sub> (l), FEV<sub>1</sub> (%), FEV<sub>3</sub>/FVC, PEF (%),FEF<sub>25-75</sub> (l), FEF<sub>25-75</sub> (%)]</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Peak SBP (mmHg) = ARinf 177.5 (170–182.5); CON 180 (170–190) (p=0.321)</li> <li>• Peak VO<sub>2</sub> (ml/kg/min) = ARinf 50.1 (47.7–51.6); CON 49 (44.2–52.6) (p=0.618)</li> <li>• Peak VE (l/min) = ARinf 106.8 (100.75–126.05); CON 115.4 (109.8–127.2) (p=0.319)</li> <li>• Peak RER = ARinf 1.1 (1.105–1.14); CON 1.1 (1.08–1.18) (p=0.354)</li> <li>• Peak SpO<sub>2</sub> (%) = ARinf 96 (95–96); CON 96 (95–97) (p=0.710)</li> <li>• Peak VCO<sub>2</sub> (l/min) = ARinf 3.818 (3.5215–4.194); CON 4.018 (3.899–4.396) (p=0.118)</li> <li>• VE/VCO<sub>2</sub> slope = ARinf 27.35 (25.55–29.45); CON 28.1 (26.8–29.3) (p=0.271)</li> <li>• Lowest VE/VCO<sub>2</sub> = ARinf 23.3 (22.45–25.15); CON 25.1 (23.7–26.5) (p=0.155)</li> <li>• 1stVT VO<sub>2</sub> (ml/kg/min) = ARinf 36.45 (34.5–39.7); CON 38.2 (34.5–41.4) (p=0.789)</li> <li>• 1stVT% Peak VO<sub>2</sub> = ARinf 74.07 (71.6–78.6); 79.04 (76.04–80.61) (p=0.082)</li> <li>• Peak O<sub>2</sub> pulse (ml/kg/min) = ARinf 22.55 (20.55–25.1); CON 21.07 (19.5–22) (p=0.141)</li> </ul> <p><b>PULMONARY FUNCTION (at rest):</b></p> <ul style="list-style-type: none"> <li>• FVC (l) = ARinf 5.415 (4.87–5.995); CON 5.46 (5.01–5.72) (p=0.696)</li> <li>• FVC (%) = ARinf 98 (93.5–105.5); CON 103 (100–104) (p=0.188)</li> <li>• FEV<sub>1.0</sub> (l) = ARinf 4.38 (4.05–4.995); CON 4.8 (4.39–5.49) (p=0.078)</li> <li>• FEV<sub>1.0</sub> (%) = ARinf 97.5 (91.5–108); CON 109 (106–116) (p=0.007)</li> <li>• FEV<sub>1.0</sub>/FVC = ARinf 83.55 (77.2–86.9); CON 88.7 (81.2–94.4) (p=0.166)</li> <li>• FEV<sub>1.0</sub>/FVC (%) = ARinf 101 (91–105); CON 107 (98–114) (p=0.075)</li> <li>• FEF<sub>25-75</sub> (l) = ARinf 4.665 (3.78–5.175); CON 4.72 (4.34–5.79) (p=0.384)</li> <li>• FEF<sub>25-75</sub> (%) = ARinf 98 (78.5–108.5); CON 106 (94–130) (p=0.248)</li> <li>• PEF (%) = ARinf 97 (86.5–108.5); CON 97 (92–120) (p=0.302)</li> </ul>
<p><b>Cramer et al. 2020</b>(Cramer, Bielecki et al. 2020)</p>	<p>Confirmed general (upper/lower)</p>	<p>Physician diagnosis including pathology confirmed (PCR or culture) for pathogen</p>	<ul style="list-style-type: none"> <li>• Swiss army recruits assessed post-SARS-CoV-2 infection and compared to pre-infection measurements and non-infected homogenous controls</li> <li>• Assessment included CPET and muscle strength testing</li> </ul>	<ul style="list-style-type: none"> <li>• 45 (31-58 days) after SARS-CoV-2 positive test</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Cardiorespiratory fitness</b> <ul style="list-style-type: none"> <li>○ Maximal exercise test [VO<sub>2</sub> max (ml/ min/kg), change in VO<sub>2</sub> max (ml/ min/kg), fraction of recruits with more than 10% loss in VO<sub>2</sub>, fraction of recruits with a gain of more than 10% in VO<sub>2</sub> max]</li> </ul> </li> <li>• <b>Muscle strength</b> <ul style="list-style-type: none"> <li>○ Upper extremity (seated shot put test) (m)</li> <li>○ Trunk (prone bridge test) (s)</li> </ul> </li> </ul>	<p><b>CARDIORESPIRATORY ENDURANCE:</b></p> <ul style="list-style-type: none"> <li>• <b>VO<sub>2</sub> max at baseline</b> (ml/ min/kg): all = 43.3 (41.8 to 45.1); naïve = 43.5 (42.4 to 45.0); asymptomatic = 42.8 (41.7 to 44.8); convalescents = 43.7 (41.5 to 46.0) (p=NS)</li> <li>• <b>VO<sub>2</sub> max</b> (ml/min/kg): all = 42.6 (40.8 to 44.5); naïve = 42.8 (42.2 to 45.0); asymptomatic = 42.9 (40.9 to 44.2); convalescents = 41.8 (39.9 to 44.6) (p=0.06)</li> <li>• <b>Change in VO<sub>2</sub> max</b> (ml/ min/kg): all = -0.25 (-2.4 to 1.2); naïve = + 0.1 (-1.2 to 1.7); asymptomatic = 0 (-2.0 to 1.3); convalescents = -0.9 (-3.2 to 0.5) (p=0.005)</li> <li>• <b>Fraction of recruits with more than 10% loss in VO<sub>2</sub> max</b> (n, %): all = 10 (7.2%); naïve = 0 (0.0%); asymptomatic = 1 (1.9%); convalescents = 9 (18.8%) (p&lt;0.001)</li> <li>• <b>Fraction of recruits with a gain of more than 10% in VO<sub>2</sub> max</b> (n, %): all = 9 (6.5%); naïve = 5 (13.9%); asymptomatic = 4 (7.6%); convalescents = 0 (0.0%) (p=0.02)</li> </ul> <p><b>MUSCLE STRENGTH:</b></p> <ul style="list-style-type: none"> <li>• <b>Upper extremity (seated shot put test)</b> (m): all = 5.8 (5.0 to 6.3); naïve = 5.8 (5.4 to 6.2); asymptomatic = 5.8 (4.9 to 6.5); convalescents = 6.0 (5.0 to 6.5) (p=NS)</li> </ul>

						<ul style="list-style-type: none"> <li>• <u>Trunk (prone bridge test) (s)</u>: all = 120 (82 to 180); naive = 130 (115 to 184); asymptomatic = 120 (81 to 168); convalescent = 120 (81 to 149) (p=NS)</li> </ul>
<p><b>Marinkovic et al. 2016</b>(Marinkovic, Minic et al. 2016)</p>	Suspected upper ARinf	Symptom checklist with algorithm/ scoring system	<ul style="list-style-type: none"> <li>• Randomized double-blind placebo-controlled trial in elite athletes</li> <li>• Daily illness log data</li> <li>• Weekly training load data (using the IPAQ short form), influence of illness on training ability, and missed training days recorded throughout 14-week study period</li> </ul>	<ul style="list-style-type: none"> <li>• During ARinf episode</li> </ul>	<ul style="list-style-type: none"> <li>• <u>Training modification</u>: <ul style="list-style-type: none"> <li>○ Illness influence on training ability score (no influence scored as 0 and total disruption of training rated as 7 x number of days of impaired training)</li> <li>○ Total number of days without training</li> <li>○ Self-reported impaired training</li> </ul> </li> </ul>	<p><b>TRAINING MODIFICATION:</b></p> <ul style="list-style-type: none"> <li>• Group training ability score: 28.82 ± 22.58 (mean ± SD)(n=19)</li> <li>• Number of days without training: 1.7 ± 2.3 (mean ± SD)</li> <li>• Longer duration ARinf (10 days control group vs. 7 days intervention group) related to significantly higher proportion of athletes (42% vs. 40%) reporting impaired training (p=0.054)</li> </ul>
<p><b>Van Tonder et al. 2016</b>(Van Tonder, Schwellnus et al. 2016)</p>	Suspected general ARinf	Symptom checklist with algorithm/ scoring system	<ul style="list-style-type: none"> <li>• Prospective study in distance runners</li> <li>• Pre-race acute illness questionnaire completed during the 5-day pre-race period</li> </ul>	<ul style="list-style-type: none"> <li>• &lt;12 days after ARinf episode</li> </ul>	<ul style="list-style-type: none"> <li>• <u>Event participation</u>: <ul style="list-style-type: none"> <li>○ Not starting an event, with pre-race symptoms of an ARinf (DNS rate) (%)</li> <li>○ Not completing an event with pre-race symptoms of an ARinf (DNF rate) (%)</li> <li>○ Risk ratio (RR) of not starting or finishing the race</li> </ul> </li> </ul>	<p><b>EVENT PARTICIPATION:</b></p> <p><u>DNS rate:</u></p> <ul style="list-style-type: none"> <li>• Runners with systemic ARinf symptoms had a significantly higher DNS rate compared to controls (16.7% vs. 6.6%; RR=1.15; p=0.0317)</li> <li>• Runners with localised ARinf symptoms had a higher DNS rate compared to controls (localised symptoms: 7.9% vs. 6.6%)</li> </ul> <p><u>DNF rate:</u></p> <ul style="list-style-type: none"> <li>• Runners with systemic ARinf symptoms had a higher DNF rate compared to controls (1.8% vs. 1.3%)</li> <li>• Runners with localised ARinf symptoms had a higher DNF rate compared to controls (localised symptoms: 1.5% vs. 1.3%)</li> </ul>
<p><b>Cunniffe et al. 2011</b>(Cunniffe, Griffiths et al. 2011)</p>	Suspected upper ARinf	Self-reported symptoms with physician check (no examination)	<ul style="list-style-type: none"> <li>• Prospective longitudinal observational study in elite Rugby Union players</li> <li>• Weekly illness rates and training load monitored over 4 months</li> </ul>	<ul style="list-style-type: none"> <li>• During ARinf episode</li> </ul>	<ul style="list-style-type: none"> <li>• <u>Training modification</u>: <ul style="list-style-type: none"> <li>○ Rating of illness impact on ability to train (above normal, at the same level, below normal or training stopped)</li> <li>○ Training load (IPAQ – MET-hr/week)</li> </ul> </li> </ul>	<p><b>TRAINING MODIFICATION:</b></p> <ul style="list-style-type: none"> <li>• Rugby Union players reported that the presence of an ARinf reduced activity in 14.4% of all ARinf incidences</li> </ul>
<p><b>Fricker et al. 2005</b>(Fricker, Pyne et al. 2005)</p>	Suspected upper ARinf	Physician diagnosis (by history and clinical examination)	<ul style="list-style-type: none"> <li>• Prospective observational study in distance runners</li> <li>• Daily illness log data</li> <li>• ARinf illness episodes recorded</li> <li>• Maximal exercise test at beginning and end of 4-month period</li> <li>• Submaximal running economy test monthly</li> <li>• Tests during healthy period and following ARinf episodes</li> </ul>	<ul style="list-style-type: none"> <li>• &lt; 10 days after ARinf episode</li> </ul>	<ul style="list-style-type: none"> <li>• <u>Cardiorespiratory endurance</u>: <ul style="list-style-type: none"> <li>• Maximal and submaximal exercise test [VO<sub>2</sub> and VO<sub>2</sub>max (mL.min<sup>-1</sup>.kg<sup>-1</sup>), VE (L.min<sup>-1</sup>), RER, HR (b.min<sup>-1</sup>),blood lactate (mM)]</li> <li>• Time to exhaustion (mins)</li> </ul> </li> </ul>	<p><b>CARDIORESPIRATORY ENDURANCE:</b></p> <p><u>Maximal exercise test:</u> No difference between healthy and ARinf (&lt; 10 days after episode) parameters for:</p> <ul style="list-style-type: none"> <li>• VO<sub>2</sub>max CON (72.6 ± 5.2) and ARinf (69.9 ± 5.7) (p=0.47)</li> <li>• VE CON (167.7 ± 8.5) and ARinf (160.1 ± 6.0) (p=0.14)</li> <li>• RER CON (1.09 ± 0.04) and ARinf (1.11 ± 0.05) (p=0.55)</li> <li>• HR CON (185 ± 7) and ARinf (187 ± 7) (p=0.76)</li> <li>• Lactate CON (12.2 ± 1.1) and ARinf (14.8 ± 4.3) (p=0.22)</li> <li>• No effect in time to exhaustion between CON (5.8 ± 0.8) and ARinf (5.4 ± 1.5) runners (p=0.61)</li> </ul> <p><u>Sub-maximal exercise test:</u> No difference between healthy and ARinf (&lt;10 days after episode) parameters for:</p> <ul style="list-style-type: none"> <li>• VO<sub>2</sub> CON (53.2 ± 4.2) and ARinf (52.8 ± 3.4) (p=0.86)</li> <li>• VE CON (110.7 ± 25.9) and ARinf (107.3 ± 20.0) (p=0.78)</li> <li>• RER CON (0.97 ± 0.05) and ARinf (0.96 ± 0.04) (p=0.69)</li> <li>• HR CON (159 ± 9) and ARinf (156 ± 9) (p=0.57)</li> <li>• Lactate healthy (3.8 ± 3.0) and ARinf (3.3 ± 2.4) (p=0.76)</li> </ul>

<p><b>Weidner et al. 1997</b><sup>(Weidner, Anderson et al. 1997)</sup></p>	<p>Confirmed upper ARinf</p>	<p>Physician diagnosis including pathology confirmed (PCR or culture) for pathogen</p>	<ul style="list-style-type: none"> <li>• Prospective ARinf experimental study in physically active students</li> <li>• Double-dose inoculation with rhinovirus (HRV16)</li> <li>• PFT and GXT to volitional fatigue pre- and post-inoculation</li> </ul>	<ul style="list-style-type: none"> <li>• The day after the second inoculation (peak of illness)</li> </ul>	<ul style="list-style-type: none"> <li>• <u>Cardiorespiratory endurance:</u> <ul style="list-style-type: none"> <li>○ Maximal exercise test [VO<sub>2</sub> and VO<sub>2</sub>max (mL.min<sup>-1</sup>.kg<sup>-1</sup>), VE (L.min<sup>-1</sup>), VT, RPE, RER, HR (b.min<sup>-1</sup>)]</li> </ul> </li> <li>• <u>Pulmonary function</u> (at rest) <ul style="list-style-type: none"> <li>○ [FVC, FEV<sub>1.0</sub>, PEF]</li> </ul> </li> </ul>	<p><b>CARDIORESPIRATORY ENDURANCE:</b></p> <p><u>Maximal exercise test:</u></p> <ul style="list-style-type: none"> <li>• No significant differences between control and ARinf VO<sub>2</sub>max, VE, HR, RER, RPE, VT</li> <li>• Control group had small, yet statistically significant, increases in VO<sub>2</sub> of 1.4 ± 0.7 and 1.6 ± 0.6 mL.kg<sup>-1</sup>.min<sup>-1</sup> at the 2- and 5-min time periods, respectively, ARinf group did not</li> </ul> <p><b>PULMONARY FUNCTION:</b></p> <ul style="list-style-type: none"> <li>• Significant differences in FEV<sub>1.0</sub>/FVC between the severe ARinf group (84.2 ± 2.3%), mild ARinf group (88.9 ± 2.6%) and the control group (92.7 ± 2.2)</li> <li>• No significant differences between control and ARinf FVC, FEV<sub>1.0</sub>, PEF values</li> </ul>
<p><b>Weidner, Anderson et al. 1997</b><sup>(Weidner 1997)</sup></p>	<p>Confirmed upper ARinf</p>	<p>Physician diagnosis including pathology confirmed (PCR or culture) for pathogen</p>	<ul style="list-style-type: none"> <li>• Prospective ARinf experimental study in physically active students</li> <li>• Double-dose inoculation with rhinovirus (HRV16)</li> <li>• Submaximal exercise test within 1-2 days of ARinf onset and 3 weeks later when asymptomatic</li> <li>• Kinematic video recording</li> </ul>	<ul style="list-style-type: none"> <li>• Within 1-2 days of ARinf onset</li> </ul>	<ul style="list-style-type: none"> <li>• <u>Running biomechanics:</u> <ul style="list-style-type: none"> <li>○ Submaximal exercise test with kinematic video recording [stride length (m), stride frequency (hz), and ankle, knee and hip joint angle (deg)]</li> </ul> </li> </ul>	<p><b>RUNNING BIOMECHANICS:</b></p> <p><u>Submaximal exercise test:</u></p> <ul style="list-style-type: none"> <li>• Greater stride length difference in ARinf -0.08 (0.3) compared to control 0.01 (0.02) (p=0.010)</li> <li>• Greater stride frequency difference in ARinf 0.18 (0.06) compared to control -0.03 (0.04) (p=0.005)</li> <li>• Greater ankle joint maximum angle difference in ARinf -5.6 (6.8) compared to control 0.3 (5.2) (p=0.001)</li> <li>• Greater ankle joint minimum angle difference in ARinf -2.1 (10.0) compared to control -0.9 (5.2) (p=0.742)</li> <li>• Lesser knee joint maximum angle difference in ARinf 1.1 (6.3) compared to control -2.8 (6.9) (p=0.036)</li> <li>• Greater knee joint minimum angle difference in ARinf 1.5 (9.7) compared to control 0.6 (4.8) (p=0.373)</li> <li>• Greater hip joint maximum angle difference in ARinf -1.4 (5.6) compared to control 0.6 (4.2) (p=0.280)</li> <li>• Greater hip joint minimum angle difference in ARinf -4.2 (8.9) compared to control -0.3 (4.8) (p=0.261)</li> <li>• Difference in stride length and stride frequency for ARinf group is significant when fever is present (p&lt;0.04)</li> </ul>

\*1stVT VO<sub>2</sub>: first ventilatory threshold; 1stVT% Peak VO<sub>2</sub>: first ventilatory threshold expressed as percentage of peak oxygen uptake; ARinf: infective acute respiratory illness; BR: breathing reserve; CON: control group; CPET: cardiopulmonary exercise testing; DNF: did not finish; DNS: did not start; FEF<sub>25-75</sub>: mean forced expiratory flow between 25% and 75%; FEV<sub>1.0</sub>: forced expiratory volume in the first second; FEV<sub>1.0</sub>/FVC: FEV<sub>1.0</sub> as a percentage of FVC; FVC: forced vital capacity; HR: heart rate; HRR: heart rate reserve; IPAQ: international physical activity questionnaire; MEF<sub>25</sub>: maximal expiratory flow at 25% of the vital capacity; MVV: maximal ventilatory volume; NS: not significant; PCR: polymerase chain reaction; PEF: peak expiratory flow; RER: respiratory exchange ratio; RPE: rating of perceived exertion; SARS-CoV-2: severe acute respiratory syndrome coronavirus 2; SBP: systolic blood pressure; SpO<sub>2</sub>: arterial saturation; VE: expired ventilation; VE/VCO<sub>2</sub>: ventilatory efficiency; VO<sub>2</sub>: oxygen uptake; VO<sub>2</sub>/kg: oxygen uptake normalised to body weight; VO<sub>2</sub>/kg/HR: amount of O<sub>2</sub> extracted per heart beat; VO<sub>2</sub>max: maximum oxygen uptake; VT: ventilatory threshold; VTex: tidal volume.