Response

Dear Editor-in-Chief,

We thank Dr. Gee and colleagues for their interest in our work (1). We agree that thermoregulatory ability varies among para-athletes, especially given the large heterogeneity in type and severity of impairments. Therefore, we used a personalized exercise protocol to achieve a similar relative workload across participants. As a result, the absolute workload was substantially lower in elite para-athletes (peak power output, 102 [86–143] W) than in elite able-bodied athletes (225 [182–264] W, $P < 0.001$), leading to a lesser increase in body core temperature (ΔT_c, 1.3 ± 0.6 *vs.* 2.2 ± 0.7°C, $P < 0.001$). Based on these observations, we questioned the common belief that para-athletes are at higher risk for exertional heat illness (EHI) than able-bodied athletes.

A high T_c (>40°C) is known to predispose athletes to EHI, and therefore para-athletes with altered thermoregulatory function, such as individuals with tetraplegia, may be more susceptible to EHI. On the other hand, studies in well-trained able-bodied athletes have shown that high T_c values are common, well tolerated (i.e., no health complaints), and not strongly associated with performance loss (2–4). Data on EHI in para-athletes remain scarce, but the available studies suggest that para-athletes are not predisposed to an elevated EHI risk *per se* (5–7). During the Tokyo 2020 Paralympic and Olympic Games, only 0.4% of para-athletes and 0.7% of able-bodied athletes reported to medical services with (exertional) hyperthermia or heat illness (7,8). In most cases, the illness did not affect subsequent training or competition availability, suggesting that illnesses were mild. These data indicate that both elite able-bodied and para-athletes can safely compete in hot-humid conditions.

The low EHI incidence in Paralympic and Olympic athletes may be partly attributed to the preventative countermeasures taken by the organization, as well as heat mitigation strategies used by the athletes. Indeed, we previously demonstrated that many Paralympic athletes used heat acclimation and cooling strategies in preparation for Tokyo 2020 (6). Hence, to facilitate safe training and competition in the heat, heat mitigation strategies should be adopted by all athletes at risk for hyperthermia, whereas individualization is key to optimize heat preparedness.

To conclude, the risk for EHI during exercise in the heat should not be underestimated, and we recommend every athlete to adopt heat mitigation strategies in their training and competition regimen. Individual EHI risk factors, including thermoregulatory impairments such as tetraplegia, should be considered when developing and implementing these countermeasures. While studies have shown no differences in EHI risk between para-athletes and able-bodied athletes, these findings may be limited to well-trained athletes. Future studies on recreational para-athletes with distinct impairment types (e.g., those with amputation, cerebral palsy) exercising under heat stress with different exercise modes, intensities, and environmental conditions are therefore warranted.

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