

1 Homeostasis, Training, and Performance

Homeostasis refers to the body's ability to maintain a stable internal environment despite external changes. This physiological balance is essential for the proper functioning of bodily systems and overall health. The body employs various mechanisms to achieve and preserve homeostasis, constantly adjusting in response to internal and external stimuli.

It is a composite of numerous interconnected units including systems such as the circulatory, nervous, muscular, and skeletal, along with passive structures like joints and bones. They collectively contribute to the body's operations. It's crucial to understand that each of these systems and structures possesses its own unique Stress-Recovery-Adaptation (SRA) profile, reflecting how it responds to challenges and recovers from them.

The human organism operates using a control loop mechanism, built on feedback systems. These feedback loops involve detecting deviations from a desired set point and activating mechanisms to return the system to this set point. This continuous process ensures the stability and equilibrium of the body's internal conditions.

2 Optimal Training and SRA Modulation

Optimal training aims to elicit alterations in the SRA profiles of the systems and structures involved in an athlete's sport through a variety of interventions that can act as stressors or facilitate the restoration of the homeostasis. The ultimate objective is to reach a new state of homeostasis where performance is elevated. In the context of weightlifting, essential elements influencing this process include the following:

- Volume: The total workload or the number of sets and reps.
- Intensity: How heavy the weights are in relation to one's maximum capability.
- Frequency: How often an athlete trains.
- Nutrition: An adequate nutrients intake is required to insure the recovery and the adaptation.
- Therapies: These can range from physiotherapy to massage, aiding in recovery and injury prevention.

Determining SRA profiles in the context of weightlifting presents unique challenges. Unlike simple hormonal responses, which may be continuously observed, capturing the comprehensive SRA dynamics for weightlifting requires data from extensive longitudinal studies. Such studies would demand consistent, high-frequency data collection from a substantial cohort of athletes, making them logistically challenging.

While creating a comprehensive SRA model remains a complex task, it is feasible to identify specific events that can alter SRA curve profiles. For instance, an event like a knee injury can have predictable effects on the SRA profile of the lower body. The immediate response is a sharp increase in stress levels of the related units, followed by a prolonged recovery phase where the athlete refrains from strenuous activities. The primary objective of this presentation is to pinpoint factors that may influence the likelihood of such events, offering insights into injury prevention and optimised training. Logistic regression is a potent tool designed to assess the odds of a binary outcome—in this scenario, the occurrence or non-occurrence of an injury—by evaluating a collection of predictor variables. It also enables the identification of key factors contributing to injury risk, providing a foundation for targeted interventions and informed decision-making in training contexts.