Results: Significant differences from a null model of both with- and without-interaction models were found in (2), (4), (5), (7), (8), (9), and (11). However, no significant differences were found in (1), (3), (6), and (10). The AICs of all without-interaction models in the 7 items showing significant differences were smaller than those in the with-interaction model, showing that the model excluding an interaction between age and sex better fitted the data. Velocity curves of both sexes were parallel and were not crossed or separated from each other in this age range.
Conclusions: The lack of significance in (1), (3), (6), and (10) means that they have the same velocity irrespective of age and sex. Because these 4 items have a common feature in that they assess jumping performance, it is considered that jumping performance develops at a constant rate in young children of both sexes. The parallel-shaped velocity curves in 7 items indicate that no remarkable come-from-behind phenomenon occurred between boys and girls in this age range.

9:45 AM—The Age-Performance Relationship: Toward New Models

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Objective: Here we aim to (1) demonstrate that a biphasic pattern of growth and decline is probably widespread among biological phenomena, and (2) adjust a range of models to estimate the characteristics of the biphasic pattern (peak value, age of death).
Study Design: Cross-sectional.
Subjects: Human, greyhound, mice.
Intervention: Performance data were gathered for human (200-, 400-, and 800-m races, n = 5065, 5013, and 5080, respectively), greyhound (480-m competitions, n = 47 991), and mice (distance run on wheels during 24 hours, n = 14241).
Outcome Measures: Several models were fit adjusted to the data: the model of Moore[1], a revised version of this model including interaction between the 2 processes and 2 other models with either a convex or concave tail.
Results: A U-inversed biphasic pattern is found in both the athletic (human Olympians and elite greyhound) and nonathletic (mice) mammals. The 3 new models describe the dynamics of performance with aging with greater accuracy compared with the initial model, based on classical goodness of fit indicators (R^2, rmse, AIC, BIC). However, the model with convex modelling of the declining process does not perform well.
Conclusions: Models producing long-tailed curves (ie, $\lim_{t\to\infty} P(t) = 0$) provide poor estimates of performance lifespan in the studied species. It suggests that performance development with lifespan among individuals is finite (ie, reaches a plateau). We also assume that a U-inversed biphasic pattern may be found in other species, and we now focus on comparing the age of peak performance in different Olympic disciplines and different types of efforts in order to optimize the selection of athletes in relation to the distribution of performances at different ages.

The Mechanism and Biomarker of Immunological Responses Associated With Exercise-Induced Oxidative Damage in Plateau Environment

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Objective: To determine the biomarker of immunological responses associated with exercise-induced oxidative stress for preventing the damage of altitude training.
Study Design: Cross-over experiment.
Subjects: Thirty male volunteers from Shanghai in plain region, who are native to Shanghai, aged from 18 to 25, $\dot{V}O_2max$ exceeding 35 mL/min/kg.
Intervention/Observation Technique: Thirty subjects were randomly assigned to altitude training in northwest China (group A) and plain training in Shanghai (group P) with a progressively increasing load cycle ergometer for 8 days. The training sites were exchanged after 60 days' rest.
Outcome Measures: Blood samples were assayed for biomarkers of oxidative stress and immune response after training every day. Cytokine (IL-8, MPO, TNF -a) and lipid peroxidation (MDA and) in blood plasma were measured by ELISA. Single cell gel electrophoresis (SCGE) was used to detect DNA damage of lymphocytes. The activity of NADPH-oxidase in PMNs by monitoring the chemiluminescence. The co-localization between $gp91^{phox}$ and $p47^{phox}$ of the NADPH-oxidase was detected using immunocytochemistry and confocal microscopy.
Results: The TNF –a, IL-8 value in blood were increased accompanied by MDA value with training load just in group A, but MPO and MDA value were increased consistently both in group A and group P. There was no DNA damage of lymphocytes in group P, but a little damage in group A. The activity of NADPH oxidase in groups A increased significantly ($P < 0.01$) compared pretraining after 10 days altitude training but not in group P ($P > 0.05$). The co-localization between $gp91^{phox}$ and $p47^{phox}$ of the NADPH-oxidase emerged in group A after 10 days training. Cross-matching regression analysis showed that there is correlation between the MPO and MDA (r = 0.78); the MPO and the activity of NADPH oxidase (r = 0.83); the DNA damage of lymphocytes and the MDA (r = 0.68); the activity of NADPH oxidase and DNA damage of lymphocytes (r = 0.86).
Conclusion: The MPO can be regarded as a biological marker of immune response, which can indicate the oxidative stress damage for the early warning in the plateau training. TNF -a increased with a progressively increasing load was associated with increased blood oxidative stress that may be activated by the NADPH-oxidase produced by ROS and lead to oxidative damage.
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10:15 AM—Analysis of Swimming Individual Anaerobic Threshold

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Objective: To assess the individual anaerobic threshold (IndAnT) velocity in swimmers and compare it with the velocity corresponding to Maximal Lactate Steady State (MLSS).
Study Design: Comparative study.
Subjects: Fifteen trained male swimmers (21.1 ± 8.23 years old, 1.77 ± 0.04 m of height, 69.8 ± 5.39 kg of body mass).
Intervention/Observation Technique: Swimmers performed an individual intermittent incremental protocol until exhaustion of n × 200 m, with 30-seconds intervals and 0.05-m/s increments between steps, to assess IndAnT. After a 24-hour rest interval, an MLSS test was implemented; swimmers performed at least two 30-minute trials at different velocities with 24 hours of rest in between. The swimming velocity for the first trial was established based on the IndAnT. The velocity increments/declines between 30-minute repetitions were 2.5% of the initial velocity. The MLSS was defined as the highest swimming velocity during which [La-] increased < 1 mmol·L^{-1} during the final 20 minutes of the test. Capillary blood was collected from the earlobe at rest, after each stage and at the end of the experimental protocol for [La-] analysis (Lactate Pro, Arkray, Inc).
Outcome Measures: [La^-] allowed assessing IndAnT through [La^-]/velocity curve in MATLAB2010 environment (MathWorks Inc, Natick, Massachusetts).