Effects of forced exercise started from different ages on chemiluminescent response and cytokine excretion of alveolar macrophage.

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We prepared three groups (A, B, and C) of rats to evaluate effects of forced exercise started from different ages on lucigenin-dependent chemiluminescence (LgCL) and cytokine excretions of alveolar macrophages (AMs). Training by a treadmill was started from 5, 11, and 17 weeks old (A, B, and C groups, respectively), and was continued for 12 weeks. After 6- or 12-week training, AMs in the broncho-alveolar lavage fluid (BALF) were counted by a Coulter Counter ZM (Coulter Electronic Inc.). AMs were suspended in the Dulbecco's MEM after adjustment of cell numbers to $6 \times 10^5$ cells/mL. AMs were placed in each well of a 96-well black microtiter plate (Greiner Japan Co.) and were cultured for 12 hrs. Supernatants of AMs were collected and stored for the cytokine measurements. LgCL were measured by a parallel luminometer (Alpha-Basic 47, Tokken Inc.) using opsonized zymosan as stimuli. The chemiluminescence was indicated by peak height (PH) and peak time (PT). Concentrations of tumor necrosis factor-alpha (TNFa), interleukin-1-beta (IL-1b), and interferon-gamma (IFNg) were measured by ELISA kits (BioSource Inc.). According to aging, PH of LgCL in the control groups was significantly enhanced. Except for Group B, there was no practical difference in PH between the control and the forced training groups. PH of the 12-week training group of Group B was suppressed significantly. Furthermore, significant increase of TNFa, decrease of IL-1b, and increase of IFNg between the control and the 12-week training groups of Group B were observed. Largest number of cells in BALF was observed at 11 weeks old. These results suggest that forced training started from the 11 weeks old, is thought to be the turning point of lung immunity, affect AM activity, and the chemiluminescent technique is useful to evaluate the changes of AM activity.