Repeated recall, extinction and reconsolidation in behaviorally conditioned immunosuppression

Introduction

Behavioral (classical Pavlovian) conditioning can be utilized to alter immune system functions. Behaviorally conditioned immunosuppression using the immunosuppressive drug cyclosporine A (CsA) has been documented in rodents and humans, highlighting the bidirectional communication between the central nervous system and the peripheral immune system. Potential applications of such learned immunosuppression in clinical situations can be linked to the placebo response which involves conditioning components as well as expectation-induced mechanisms. It is unclear however, whether and to what extent the learned immune response can be repeatedly recalled over time and finally whether condition immune suppression can be controlled by extinction and reconsolidation procedures.

Overview

Repeated recall of behaviorally conditioned immunosuppression

Extinction & Reconsolidation of behaviorally conditioned immunosuppression

Conclusions

After pairing CsA as an unconditioned stimulus (US) with a novel taste as a conditioned stimulus (CS) at acquisition, sole presentation of the CS at evocation caused a significant inhibition of interleukin-2 (IL-2) and interferon-γ (IFN-γ) production by splenic T-cells in rats. More importantly however, an immunosuppressive effect of comparable magnitude was retrievable during a second, unreinforced evocation separated from the first evocation by an interval of 6 days. Furthermore, six CS re-exposures on consecutive days led to an extinction of conditioned immunosuppression that could be reinstalled by a reconsolidation procedure, applying contingent sub-therapeutic CsA injections together with the CS at evocation. Together these data demonstrate that conditioned immunosuppression can be repeatedly recalled and modulated by extinction and reconsolidation processes, thus implying new therapeutic approaches via conditioning procedures for the treatment of diseases where a suppression of the immune system is required.

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