# Dehydroepiandrosterone sulfate

Existing studies suggest that dehydroepiandrosterone (DHEA) may be important for human brain development and cognition. For example, molecular studies have hinted at the critical role of DHEA in enhancing brain plasticity. Studies of human brain development also support the notion that DHEA is involved in preserving cortical plasticity. Further, some, though not all, studies show that DHEA administration may lead to improvements in working memory in adults. Yet these findings remain limited by an incomplete understanding of the specific neuroanatomical mechanisms through which DHEA may impact the CNS during development. Here we examined associations between DHEA, cortico-hippocampal structural covariance, and working memory (216 participants [female=123], age range 6-22 years old, mean age: 13.6 +/-3.6 years, each followed for a maximum of 3 visits over the course of 4 years). In addition to administering performance-based, spatial working memory tests to these children, we also collected ecological, parent ratings of working memory in everyday situations. We found that increasingly higher DHEA levels were associated with a shift toward positive insular-hippocampal and occipito-hippocampal structural covariance. In turn, DHEA-related insular-hippocampal covariance was associated with lower spatial working memory but higher overall working memory as measured by the ecological parent ratings. Taken together with previous research, these results support the hypothesis that DHEA may optimize cortical functions related to general attentional and working memory processes, but impair the development of bottom-up, hippocampal-to-cortical connections, resulting in impaired encoding of spatial cues [1)].

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The established neuroprotective property of the sex steroid precursor dehydroepiandrosterone-sulfate (DHEAS) has not yet been investigated in the context of aneurysmal subarachnoid hemorrhage (aSAH). The influence of DHEAS on inflammatory response resulting in modulation of interleukin 6 (IL-6) synthesis has been shown. Here, we evaluate DHEAS serum levels after aSAH (day 0-14) and levels of IL-6 related to functional outcome at discharge and at six months.

A complete data set (DHEAS and IL-6 serum levels for days 0, 1, 4, 7, 10 and 14 after aSAH) and outcome assessment at discharge according to modified Rankin Scale score (mRS) was available for 53 patients of the initially screened cohort (n = 109). Outcome assessment six months after aSAH was obtained from 41 patients. Logarithmized levels of DHEAS and IL-6 were related to dichotomized functional outcome either assessed at discharge or at six months. A mixed between-within subjects ANOVA was applied for statistical analysis (SPSS 21.0).

DHEAS and IL-6 levels across time were related to functional outcome. Regarding outcome assessment at discharge and at six months after aSAH, DHEAS levels (transformed to square root for statistical purposes) were considerably higher in patients with favorable outcome (mRS 0-2) ($p = .001$; $p = .020$). Inversely, in patients with favorable outcome either at discharge or six months after aSAH, lower IL-6 levels (logarithmized for statistical purposes) were observed across time (both $p < .001$).

We provide new evidence that DHEAS is associated with protective properties resulting in improvement of functional outcome after aSAH, possibly by influencing the inflammatory response after aSAH shown in the decreasing IL-6 serum levels. But the results for outcome six months after SAH are limited due to a high drop-out rate [2)].

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2)

Höllig A, Thiel M, Stoffel-Wagner B, Coburn M, Clusmann H. Neuroprotective properties of dehydroepiandrosterone-sulfate and its relationship to interleukin 6 after aneurysmal subarachnoid hemorrhage: a prospective cohort study. Crit Care. 2015 May 21;19:231. doi: 10.1186/s13054-015-0954-1. PubMed PMID: 25993987; PubMed Central PMCID: PMC4462180.