Amplitude of brain low- frequency fluctuation Changes after sleep deprivation in healthy adolescent subjects:An fMRI study

【Abstract】***Objective:***To explore the regional brain activities in healthy adolescent subjects after sleep deprivation (SD) using amplitude of low- frequency fluctuation (ALFF) method.***Methods:*** Total of 16 healthy adolescent subjects (8 males，8 females; aged 13 －20 years) were recruited in the community and the campus through the internet and posters. Each of the 16 healthy adolescent subject underwent the attention network test and magnetic resonance imaging (MRI) session twice: once was after rested wakefulness (RW condition) ，and the other was after SD condition. Amplitude of low frequency fluctuation (ALFF) method was used to assess the local brain features. The mean ALFF signal values of the different brain areas were performed to investigate theirrelationships with the accuracy rate，reaction time and lapse rate in the attention network test，and were analyzed with a receiver operating characteristic (ROC) curve to investigate their sensitivities and specificities to distinguish the SD condition from the RW condition. ***Results:***Subjects showed a lower response accuracy rate ［(83 ±12) % vs. (97 ±4) %，P ＜ 0. 05］，a longer response time ［(832 ±134) ms vs. (715 ±97) ms，P ＜0. 05］ and a higher lapse rate ［(15 ±11) % vs. (2. 4 ±7. 3) %，P ＜0. 05］ under SD condition than under RW condition. They showed higher ALFF area in the right cuneus (BA 17，BA 18) ，and lower ALFF areas in the right lentiform nucleus，right claustrum，left dorsolateral prefrontal cortex (BA 46) and left inferior parietal cortex (BA 39) under SD condition than under RW condition. Under SD condition，the mean ALFF signal value of the right claustrum showed a significant positive correlation with the accuracy rate (r =0. 69，P ＜0. 05) ，and a negative correlation with the lapse rate (r = －0. 71，P ＜0. 05). The mean ALFF signal value of the dorsolateral prefrontal cortex showed a significant positive correlation with the reaction time (r =0. 68，P ＜0. 05). The values of area under the curve of the right cuneus，right lentiform nucleus，right claustrum，left dorsolateral prefrontal cortex and left inferior parietal cortice were 0. 9，0. 8，0. 9，0. 8 and 0. 9，respectively. These different ALFF areas also showed high degree of sensitivities and specificities. ***Conclusion:***Sleep deprivation leads to the dysfunction in the default mode network anticorrelated "task- positive" network，and advanced cognitive function brain areas，and the functional compensation in the visual network.

大脑低频波动幅度变化睡眠剥夺后青少年健康方面：fMRI研究

【摘 要】目的: 探讨健康青少年在 24 h 睡眠剥夺 (SD) 状态下大脑局部脑区自发活动水平的变化特征。

方法: 通过网络及海报宣传在社区及校园招募睡眠质量良好的 16 名健康青少年 (男性 8 例，女性 8 例; 13 ～20 岁) 均分别在正常静息觉醒 (RW) 状态及 24 h SD 状态下接受注意网络测试 (ANT) 及静息态功能磁共振成像扫描。利用静息态低频振幅 (ALFF) 方法分析脑功能活动的特点。对 ALFF 值差异脑区进行 ROC 曲线分析，同时分析其与 ANT 中的准确率、反应时间及漏做率之间的相关性。结果: 与 RW 状态相比，SD 状态下 ANT 结果的准确率较低 ［(83 ±12)% vs. (97 ±4)%，P ＜0. 05］，漏做率较高［(15±11)% vs. (2 ±7)%，P ＜0. 05］，反应时间较长 ［ (832 ±134) ms vs. (715 ±97) ms，P ＜0. 05］。相对于 RW 状态，SD 状态显示 ALFF 增加脑区主要位于右侧楔叶 (BA 17，BA 18)，ALFF 减低脑区主要位于右侧豆状核、右侧屏状体、左侧背外侧前额叶 (BA 46) 及左侧顶下小叶 (BA 39)。在 SD 状态，右侧屏状核与正确率呈正相关 (r =0. 69，P ＜0. 05)，与漏做率呈负相关 (r = － 0. 71，P ＜ 0. 05); 左侧背外侧前额叶与反应时间呈正相关 (r =0. 68，P ＜0. 05)。ALFF 差异脑区右侧楔叶、右侧豆状核、右侧屏状体、左侧背外侧前额叶及左侧顶下小叶的峰下面积 (AUC) 分别为 0. 9、0. 8、0. 9、0. 8、0. 9，相应的敏感度及特异度均较高。

结论: 24 h 睡眠剥夺引起青少年的功能性神经网络 － 默认网络、任务正激活网络及高级认知功能相关脑区的功能异常，以及视觉网络的功能代偿。

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年轻近视会抵消“老花”吗？

众所周知，人老了都会得老花眼。不过有人说，年轻时近视，到老了就不会老花了。这是真的吗？

人眼为了看清不同距离的物体，需要不停地调节焦距，而眼睛调节焦距是通过调节眼球内晶状体的凸度来完成的。年轻时，晶状体有着良好的弹性，可以看清不同距离的物体。随着年龄增长，晶状体密度增加，弹性逐渐下降，调节的范围越变越小，因此就不能看清近处的物体。眼睛自身的调焦能力下降是正常的衰老退化现象，老花眼会随之出现，每个人都无法避免。

近视者照样会老花，只是镜片度数不同而已。没有近视的老人得了老花眼，看远不用戴眼镜，看近才需要。而原有近视眼的人得了老花眼，看远仍要用近视眼镜，看近时就不一定了，因为近视眼和老花眼能够抵消“看近”的这一部分。而患上老花眼是板上钉钉的事实。

不少老人眼花了不到医院检查，而是直接配眼镜甚至购买现成眼镜，这样做危害很大。长时间配戴不合适的眼镜会造成眼部不适还会头晕脑涨、睡不好觉。与此同时，一些眼科疾病也会在“适应老花镜”的过程中延误诊治。老年人配眼镜必须先经过眼科医生检查，排除老年性眼病，之后准确验光，结合验光结果验配合适度数的老花眼镜。建议老花眼中老年人群每3-5年到医院复查，若发现视力下降及眼部不适，应及时就诊。