Aberrant Neuronal Development Links to the Over-eating Behaviors in a Rodent Model of Schizophrenia

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Objective:
Schizophrenia is a mental disorder that characterized by abnormal social behavior, psychological hallucinations, and deregulated emotionality. Recent analyses indicated that obesity is twice as prevalent in schizophrenics compared to the general populations which cover more than half of the schizophrenics. Evidence indicated that excessive body weight gain might result from their psychological changes in eating behaviors and prefer to intake foods with higher glucose and saturated fats. However, the neuropsychological mechanisms governing such phenomenon still remain largely unknown.

Methods:
Maternal intravenous injection of 5mg/kg polyI:C (pregnant C57BL6 mice at gestation day 17) was used to established a rodent model that display schizophrenia-like symptoms in their offspring. Numerous behavioral analyses related to the symptoms of schizophrenia and also the eating preference behaviors were tested at 6, 9, and 12 weeks after birth. Meanwhile, a retroviral based labeling approach for monitoring of neuronal maturation process was used to correlate with behavioral changes.

Results:
We found a significant increase in schizophrenia-like behaviors in polyI:C group of mice which recapitulates various core psychological symptoms of schizophrenia in clinic, including hyper-locomotion, social defeat and cognitive impairments. More interestingly, the schizophrenic mice display abnormal preference to high fat diet feeding and increase in body weight gain compared to saline treated groups. Meanwhile, we found aberrant development of neuronal trees and protrusions in schizophrenic brain which correlated to the onset of changes in eating behaviors.

Conclusion:
Our data strongly indicated that aberrant neuronal maturation process is a critical determinant controlling the psychological problems of eating behaviors in schizophrenics. Our results point out directions through pharmacological treatments that adjust these abnormalities should provide potential therapeutic benefits toward bulimia nervosa linked to schizophrenia.