Epigenetics, Stress and the Brain

Epigenetics
- Andrew Z. Fire and Craig C. Mello won the Nobel prize in Medicine and Physiology in 2006 for their discovery of "RNA interference – gene silencing by double-stranded RNA".
- This work was first published in 1998.

The Epigenome
- [http://learn.genetics.utah.edu/content/epigenetics/inheritance/](http://learn.genetics.utah.edu/content/epigenetics/inheritance/)

Stress

Prenatal Stress & Special Needs Students

Epigenetics & Prenatal Stress
The effects of maternal adversity on foetal growth is mediated by adrenal glucocorticoids (stress hormones) and environmental adversity alters maternal physiology which then programs HPA activity in the offspring.
Stress

There is a large body of research in psychology and psychiatry documenting a relationship between both prenatal stress and life events and emotional and behavior disorders in adolescents and adults.

In adults the magnitude of the event seems to be important.

In adolescents the number of events appears to be important.

Life Events

- Life Events

| Predisposing factors in a population of adolescent suicide completers. |
| Factor | Incidence |
| Chronic medical or psychiatric condition | 31.8% |
| Major loss or life event | 25% |
| Previous psychiatric diagnosis | 22% |
| Drug or alcohol addiction | 19% |
| Social problems | 16% |
| Hospitalizations - medical and/or psychiatric | 10% |
| Relative or friend who died | 10% |
| Chronic physical medical problems | 9.7% |
| Relative who committed suicide | 4.8% |

(McBride, Siegel & Duckworth, 1998).

Life Events

- In 75.6% of the cases there were readily identifiable precipitating factors or stressful life events noted in the month immediately preceding the suicide.

Precipitating factors in a population of adolescent suicide completers.

| Factor | Incidence |
| Family problems (fight with parents) | 32% |
| Relationship problems (fight with girl/boyfriend) | 31% |
| Legal problems (court appearance, charges) | 16% |
| School problems (failed test, upcoming exam) | 12% |
| Money problems | 2% |

Prenatal Stress

Both human and animal studies have found significant relations between prenatal stress and post natal problems in a variety of behavioral domains, such as attention, language, and learning (see reviews by Mulder et al., 2002; Weinstock, 1997).

A prospective longitudinal study of children by Buitelaar et al. (2003) found significant associations between prenatal stress and infants cognitive development.

Prenatal Stress & Autism

Two retrospective studies have reported that mothers of ASD children experienced significantly more stressful life events prenatally - 44.7 vs 25.9 than mothers of healthy children. (Beversdof et al., 2005, Ward, 1990).

Kinney (2008) found ASD prevalence increased significantly with the severity of prenatal storm exposure. Particularly during months 5-6 and 9-10.
Prenatal Stress & Depression

Watson et al. (1999) compared 611 high school seniors who had been prenatally exposed to a severe, magnitude 7.8 earthquake in Tangshan, China in 1976, to 604 matched controls students who were born exactly 1 year after the students in the exposed group. The rate of severe depression was significantly higher in the exposed group (13.3%) than in the control group (5.5%) (p<0.001).

Prenatal Stress & ADHD

A significant association between prenatal stress and increased risk for attention deficit/ hyperactivity disorder (ADHD) was found in two prospective longitudinal studies. Higher levels of both individual ADHD symptoms and a diagnosis of ADHD were associated with more prenatal exposure to stress (p<0.01), with a stronger effect found for males. (Van den Bergh & Marcoen, 2004; Rodriguez & Bohlin, 2005).

Prenatal Stress & EBD

Several studies with children have reported an association between prenatal stress and increased risk of emotional and behavioral problems. (O’Connor et al., 2003).

This association held even after controlling for postnatal maternal anxiety, obstetric complications, and family psychosocial disadvantage. Similar effects were found when the children were 4 and 7 years old, suggesting that the effects of prenatal stress were quite persistent.

Prenatal & Language Development

Prenatal exposure to a high level of objective, storm-caused stress was associated with significantly poorer language test performance at age 2 years. (Laplante et al., 2004)

Neuropathology

In reviewing MRI studies of brain anatomy of patients with AD, Brambilla et al (2003) concluded that the most consistently replicated findings included structural abnormalities of the cerebellum and corpus callosum.

Similarly, Eigsti and Shapiro (2003) concluded that a cerebellar abnormality was the most consistent neuropathological finding in histological studies of post-mortem brain tissue in AD.

Jay Giedd, in twin studies, found that the cerebellum appears to be most vulnerable to environmental influences (2008).
Individuals who are anxious have overactive amygdalas which causes them to notice the negative rather than the positive in situations and events. This can be innate or learned. Individuals with a past history of trauma are more likely to develop PTSD when exposed to another trauma.

References


Interventions
http://www.mindhabits.com
References


References


References

