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Studies on Genetic Environment Influences on the Development of Childhood Psychiatric Disorders: A Review

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ABSTRACT

This research article review the key types of genetic research design, methodology involved and emerging and established finding in relation to child and childhood psychiatric disorders, and finally genetic factors seems especially important for autism and attention deficit hyperactivity disorder. (Thapar and McGuffin, 2008)[1] Twin and adoption study design are now being used to examine gene environment interplay, the effects of environment risk factors co-morbidity phenotype definition and development change Liu et al (2006)[11] The ways in which specific gene variant excert risk effects at cellular and biological system are proving to highly competitive (Moffitt et al, 2005).[2] Finally, molecular genetic studies also high light the importance of gene environment interply, which seems to be especially important in depression and wide anti social behavior. Liu. et al)[11], owen et al 2005)[12] , Moffitt, et al, (2005)[2]

Keywords: Adolescent psychiatry; Child psychiatric; Family studies; Gene environment interaction; Gene environment; Genetics; Molecular genetics; Twin studies.

INTRODUCTION

There have been enormous Advantances in genetic research ever the past few decades, informing about the actinology development and course of psychiatric disorder in childhood and adolescence (Thapar et al (2008)[1] First there are traditional genetic epidemiology design in which the genetic contribution to disorder is inferred, second molecular genetic studies of child psychiatric disorder are being used to identify specific susceptibility genes in the laboratory, test how they work at molecular and clinical level and examine their phenotypic effects. (Thapur et al, 2007)[3], capsi, et al (2008)[9], Liu et al 2006)[11]

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METHODOLOGY

Child Hood Survey and Family Studies

Family studies involve investigating whether there are increased rate of given disorder in relative of affected probands compared with rate in a control

group. (silberg et al 1999)[4] All child psychiatric disorder shows familial transmission and this can arise through the both genetic influence and also environmental factors that impact on all family members (Zammit 2006)[9] This type of environment is known as shared environment. The familial risk estimate vary considerably for different disorders, with odds ratio of around 2 to 4 for child and adolescence depression, 5 for attention deficit hyperactivity disorder (ADHD) and over 50 for Autism, As a family studies cannot distinguish genetic and shared environmental factors are more influence twin and adoption design are needed separate these effects Liu et al 2006) 11.0 Wen et al 2012)[12], Davis et al, 2005)[13], Zammit et al (2006)[9], Thapar et al (2008)[1]

ADOPTION STUDIES

Adoption studies involve examiming the degree of simiarity beween genetically related individual compared with individual who are realated by virtue of adaptation, genetic contributions to disorder is inferred when individual are more similar to their biological ralatives. This type of study design also useful for testing the contribution of environmental factors including the family context. There are three types of adoption design.

1. Examining the biological offsprings of parents with a disorder. Such studies will increase the rate of schizophrenia in adopted away offspring s of mother's. (Thapar et al, 2008)[1]
2. Examining the rate of dis order in adopative and biological affected adoptee, such a studies show genetic contribution to A D D and anti social behavior. (Silberg et al 1999)[4], Thapar, (2008)[1], Moffitt, (2005).[2]
3. Cross fostering where children at high genetic risk Adoption into the families at low environmental risk and those at high genetic and high level of environmental risk result shows that, anti social and greater contribution in anti social behavior. Thapar (2008)[1]

RESULTS AND DISCUSSION

Gene-Environment and Interplay

Gene can also influence traits and disorders indirectly by working together with environment al factors. Such affect may be subsumed with in heritability estimate in traditional twin studies. LIU et al 2006)[11]

Gene - Environment Interaction

Theis phenomenon is where genetic susceptibility has only risk 2'3 Genetic susceptibility can be inferred as a twin or adoption study design indexed by a specific variant in a gene.

- Life event and adolescence depression - risk factors are increasd genetic risk of depression.
- Physical maltreatment and conduct problem - risk effects are increase in those at genetic risk.[5]

MOLECULAR GENETIC STUDIES; A VIEW

Molecular genetic studies also show the contribution of gene environment interaction, findings, activity of enzymes monoamine oxidase (MAOA) and catechol-o-methyltraanrerase (CO MT)

- MAOA gene variant linked to anti social behavior in the presence of childhood mal treatment
- SHTT (S Erotonin Transporter) genes variant linked to depression in the presence of sdverse life event, as a result finding replicated
- COMT gene variant linked to schizophrenia in the presence of heavy cannabis use in adolescence. Liu et al 2006)[11]

ROLE OF GENE ENVIRONMENT CORRELATION ANALYSIS

Many important environment al risk factors for child psychiatric disorder, such as family conflict and life event, gene makeup, environmental correlation risk factors co-occur in a non random fashion, gives rise to several important issues are as follows

- Genetic and environmental risk are not distinct or mutually exclusive
- Gene may influence psychiatric dis order by increasing the risk of exposure to environmental adversity
- Environmental risk factors may be associated with disorders but not have true environmental predictor, For example twin studies are a useful epidemiological tools for testing weather environmental risk factors have environmentally mediated effects on

psychopathology. Faraon et al (2001) LIU et al. (2006)[11]

TESTING THE EFFECTS OF ENVIRONMENTAL RISK FACTORS USING GENETIC DESIGN METHOD;

Genetically senstive design that includes genetic pathway become possible to test weather the link between a specific environment risk factor and psychiatric disorder is a tribute yo the true environmental ly mediated risk effect

- Dependent life event and adolescence depression twin studies show the presence of gene environment correlation and environment ally mediated risk factors. Weiss, et al, 2008)[9]
- Negative Parenting and antisocial behavior adoption studies show gene environment correlation, some environmentally mediated risk factors.
- Mal treatment and antisocial behavior-Twin studies shows environmentally mediated risk factor effects.
- Exposure to maternsl smoking in pregnancy and antisocial behavior in offspring a study based on children who were genetically realted and unrelated to women of sibling showed gene environment correlation and no environmentally mediated risk effects. (Capsi et al, 2008)[10] Liu, et al (2006)[11]

MOLECULAR GENETICS

(Gene and Chromosome Structure)

The information unit the gene which encode in this sequence of it's building blocks the nucleotides. The most important unit of information is the gene which encode in the sequence of nucleotides. The rest of the genome consist of noncoding sequence, which were through to be junk "DNA. However there is no evidence that these sequence and thus have regulatory effects on gene expression. All DNA sequence are organinsed in chromosome, each human cell number contains 22 pairs of Autosomes ans a pair of sex chromosome (Weiss et al 2008)[8] XX for Female and XY for female), all chromosome consist of two arms a short arm, (P) and long arm (q). For example gene coding for tyrosine Hydroxylase which is the rate rate limiting enzymes in the synthesis of catecholamine's, for some dis order called single gene disorder. For example the gene coding of tyrosine Hydroxylase which is the rate limiting enzymes in the synthesis of catecholamines is located on chromosome., apart from sex chromosome in male, they have two copies of each genes These two copies are not necessarily exactly the mean and are known collectively called alleles. Liu et al (2006)[11]

PATHOLOGICAL CONDITIONS

Can also result from chromosomal anomalies, including chromosome number example aneuploidy example trisomy 21, down syndrome) More recently there has been much interest In microscopic chrosomal anomalies that are not always Pathogenic and are known as copy number variants (C NVS.) Although CNV are challenging to study at the moment, they could have an important role in psychiatric disorder. Loss of the paternal chromosome cause Prader-Willi Syndrome, maternal chromosome cause Angelman Syndrome, with very different effects 19 for more information about basic genetics of psychiatric disorders. Zammit et al, (2006)[7], Thapar et al, 2008)[1]

Identifying Complex Disorders Susceptibility with Genes

Advance in technology have made mass genotyping of large number of S N Ps for very big sample possible and more economical. Information which is still growing about large number of S N Ps can be found in a public data base called Hapmap. There are three methods for Identifying (jaffee et al, 2005)[5]

Susceptibility genes for psychiatric disorders:

- Whole genome Linkage studies
- Candidates genes association study
- Whole genome association studies

Whole Genome Linkage Studies

In brief fine mapping of linkage result has not been able to identify susceptibility genes probably because linkage studies are you better at picking up region that harbour genes of target effects and not gene of small effects which are very important in psychiatric (weiss et al (2008), Thapur, (2008)[1]

Candidate Gene Association Studies; are base on two different groups one group of affected individual and another group of matched healthy individual (control), There are two group of candidate genes.

(1) Positional genes (2) Functional genes wei

The whole genome association studies for Autism has revealed that change in the number of copies of the genes or locus as a result of chromosomal region 16p 11.2 has been found to be responsibility of 1.5% of cases of autism 2.5, the whole genome association studies under a way for ADHD as well and have been published for bi polar disorder and schizophrenia in adult., Liu et al 2006)[11]

CONCLUSION

Gentics is an important and rapidly moving areas of neuroscience. Modern molecular genetic approaches and traditional design are highlighting that genes and environment work closely together and that genes and environmental work, closely together and that biological underpinning of psychiatric disorder are complex. Child and adolescence psychiatric trainnee need to keep abreast of these finding (Capsi et al, 2002)[7], Thapur (2008).[1]

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