

ESSENTIAL READINGS - Chromosomal abnormalities and early development in Down syndrome

Learning Objectives

The genetic mechanisms that lead to the developmental anomalies encountered in Down Syndrome and subsequent cancer and premature aging in postnatal life

Content

The human chromosome complement was established as recently as 1956 as 23 pairs, i.e. 46 chromosomes. This is called the diploid number of chromosomes. Down syndrome was the first disorder in which a chromosome abnormality was discovered by Lejeune and colleagues in 1958. They established that the majority (95%) of Down syndrome subjects had an additional 21 chromosome. More sophisticated cytogenetic techniques reveal that a variety of different chromosomal mechanisms result in Down syndrome although these all share the common abnormality of triplication of chromosome 21 genes.

Cytogenetic Mechanisms Responsible for Down Syndrome

Trisomy 21	95 %
Translocation	2.5%
Mosaicism	2.5%
Other	<1%

What are the Mechanisms which Produce Trisomy 21

During meiosis (the formation of germ cells), the chromosome complement is halved to 23. This is called the haploid number. There are 2 steps, Meiosis I in which the diploid number is halved to 23, and Meiosis II in which the chromosomes are replicated similar to a mitotic step. Non-disjunction, i.e. the non-segregation of paired sister chromosomes to 2 daughter cells, results in a germ cell with 24 chromosomes and a corresponding germ cell with 22 chromosomes.

Molecular Cytogenetic and DNA polymorphism studies demonstrate that the error occurs in maternal meiosis I in 75% and meiosis II in 25% of patients. When the error occurs in paternal meiosis the ratios are reversed meiosis I (25%) and II (75%). Epidemiologic studies show that an increased incidence of trisomy 21 Down syndrome is strongly connected with the maternal age >37 years. Errors occur in meiosis in women at all ages. At 40 years, the incidence of Down syndrome is approximately 1:100 compared with an incidence of 1:1000 in women 29 years.

Translocation

Physical fusion of two chromosomes (or part of chromosomes) is known as translocation. This anomaly may be stably inherited. Fusion between chromosomes which have their centromere at one end (acrocentrics) i.e. chromosomes 13, 14, 15, 21 and 22 are known as Robertsonian translocations. A Robertsonian translocation which does not affect the absolute number (dosage)

Readings In Early Development For Occupa

**California. Southwestern Region Deaf-
Blind Center**

Readings In Early Development For Occupa:

This book delves into Readings In Early Development For Occupa. Readings In Early Development For Occupa is an essential topic that must be grasped by everyone, ranging from students and scholars to the general public. The book will furnish comprehensive and in-depth insights into Readings In Early Development For Occupa, encompassing both the fundamentals and more intricate discussions.

1. The book is structured into several chapters, namely:
 - Chapter 1: Introduction to Readings In Early Development For Occupa
 - Chapter 2: Essential Elements of Readings In Early Development For Occupa
 - Chapter 3: Readings In Early Development For Occupa in Everyday Life
 - Chapter 4: Readings In Early Development For Occupa in Specific Contexts
 - Chapter 5: Conclusion
 2. In chapter 1, the author will provide an overview of Readings In Early Development For Occupa. The first chapter will explore what Readings In Early Development For Occupa is, why Readings In Early Development For Occupa is vital, and how to effectively learn about Readings In Early Development For Occupa.
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 4. In chapter 3, the author will examine the practical applications of Readings In Early Development For Occupa in daily life. The third chapter will showcase real-world examples of how Readings In Early Development For Occupa can be effectively utilized in everyday scenarios.
 5. In chapter 4, this book will scrutinize the relevance of Readings In Early Development For Occupa in specific contexts. This chapter will explore how Readings In Early Development For Occupa is applied in specialized fields, such as education, business, and technology.
 6. In chapter 5, this book will draw a conclusion about Readings In Early Development For Occupa. The final chapter will summarize the key points that have been discussed throughout the book.
- This book is crafted in an easy-to-understand language and is complemented by engaging illustrations. This book is highly recommended for anyone seeking to gain a comprehensive understanding of Readings In Early Development For Occupa.

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