Resume
In the present work, the chromosomal analysis from the peripheral blood lymphocytes of patients afflicted with various types of birth defects, Down's syndrome multiple congenital malformations, neural tube defects, sexual disorders (ambiguous genitalia) and certain types of cancers (leukemia and solid tumours) were made. Attempts were also made to enumerate the frequency of the chromosome aberrations caused under the stages of chemotherapeutic drugs.

Whole blood cultures were made in order to identify numerical and structural aberrations of different chromosomes. Both conventional staining and C-banding technique were used. The findings of the study are outlined below:

Cytogenetic study of Down's syndrome

All the 25 children with Down's syndrome showed a modal number of 47 chromosomes (trisomy 21). However, 7 of them were mosaic (38%). The family history revealed that most of the patients were born to mothers below the age of 30. Satellite associations among acrocentric chromosomes of D- and G-groups were seen in three cases of Down's syndrome as well as in the metaphase cells of their mothers. Translocations of G/G and G/D groups of chromosomes was noticed in the metaphase cells of the
father of case 1. It is apparent from the data that:

1. The Down's syndrome children may be born to mothers of the age of < 30.
2. The genome of Down's syndrome patients is more fragile.

Multiple Congenital Malformations

In the present series, of 25 cases of congenitally malformed individuals, the disorder was found to be associated with chromosomal aberrations such as aneuploidy as well as structural abnormalities. Almost all the cases studied, had some kind of chromosomal aberrations. Six of them with major congenital malformations revealed CCRs i.e. structural anomalies, gaps, breaks, translocations and fragments etc. These children could not survive for more than two months.

The mothers of some of the patients had undergone chemotherapy and radiotherapy during pregnancies. History of repeated spontaneous abortions was seen in two cases. The karyotype analysis of the parents of two cases revealed chromosomal aberrations which might have been genetically transferred to the offspring.

Chromosomal instability is almost invariably...
associated with mental deficiency and malformed features. In the present series, the range of chromosomal instability varied from patient to patient. Major multiple congenitally malformed patients had increased chromosome aberrations.

Cytogenetic Study of Neural Tube Defects

Among 9 cases studied, three showed mosaicism with trisomy 18. Trisomy 13 was also seen in case 4, which co-existed with other congenital malformations. In fact the chromosomal instability in patients with defective closure of the neural tubes, such as, hydrocephalus, meningomyelocele, meningocele and encephalomeningo(myelo)cele have been found with trisomy of chromosome 18. Neural tube defects are multifactorial. But some of these cases occur due to teratogenic influence.

Sexual Chromosomal Disorders

The present series included individuals with sexual disorders such as, Klinefelter's and Turner's syndromes, hypogonadism, hypospadias, male and female pseudohermaphroditism and cryptorchidism or undescended testes. Sexual chromosomal abnormalities were detected in all the 10 cases of ambiguous external genitalia. Chromosomal constitution of XO/XXY/XYY and deleted Y
Chromosomes were specific in these cases. Five cases (1, 3, 5, 6 and 10) had hypospadias. Case 7 with XO constitution had all the characteristic features of Turner’s syndrome. A patient with XXY and XYY had a masculine phenotype with elevated urinary gonadism (Case 1). A deletion of long arm of Y-chromosome (case 5) could be implicated for the abnormality of sexual organs. The chromosome analysis of the parents (Case 9) revealed that the father had large Y-chromosome and deletion of chromosome 4 which might has transmitted to his sexually defective offspring.

Cytogenetic Study of Cancer Patients

It has been shown that individuals exposed to physical or chemical mutagens/carcinogens have some aberrant cell with chromosome rearrangements. Four cases were under the chemotherapeutic treatment with mitomycin-C (1, 3 and 15) and myleran (Case 2). Chromosomal aberrations appearing in cancer cells included all types of numerical and structural alterations. As many as 12 patients with myeloproliferative disorders (acute as well as chronic leukemia) were cytogenetically analysed in the present series. No new marker could be associated with the diagnosis but it has been seen that the incidence of chromosome aberrations, viz. gaps, breaks and sister
Chromatid exchanges were much higher than untreated ones. Radiotherapeutic treatment of case 16 did not indicate much significance in chromosomal aberrations.

Several numerical and structural abnormalities were seen in cases with acute leukemia (Fig. 10, 39, 40, 41, 42 and 43). Acute myeloid leukemia (Case 5) with eosinophilia revealed complex rearrangements in his chromosomes (Fig. 10).

Chromosomes were prepared from lymphocyte cultures of 9 cases of solid tumours. These were characterized according to their origin in the body tissues. The modal diploid chromosome numbers were found in all these cases. Cases 7 and 8 with squamous cell carcinoma of tongue and larynx showed many structural aberrations like gaps and breaks which could possibly, be due to chemotherapeutic treatment received by the patients.

The chromosomal studies of the case with neuroblastoma revealed 50% of the metaphase cells with double minutes (Fig. 26, 27 and 28). Abnormalities of chromosome 1 and 15 in two cases of Wilms tumour (case 11 and 12) were seen respectively. Both the cases revealed polymorphism of heterochromatin 1 and 16 chromosomes. There was no significant chromosomal aberration in a case with hepatoblastoma in the present
The present studies on the chromosomes of the children with birth defects and cancer indicate certain specific points.

1. The frequency of chromosome aberration in congenitally malformed children and cancer patients is quite high as compared to control. The raised incidence of breaks and gaps in children with birth defects is highly significant statistically speaking (See Table II-A of congenital malformation chapter) indicating that the genome of such patients is fragile and more targettable to the action of X-ray irradiation and foreign substances such as, drugs. So the therapy of children with such disorders must be very cautious.

2. The incidence of polymorphism of heterochromatin of chromosomes 1 and 9 is much more frequent in these diseases. It is followed by that of chromosome 16. But the exact significance of this observation need further explanation.

3. The etiological studies point out, that the factors other than maternal age of significance in the causation of the disorders may include the modern life style. It is proposed that such studies should now include the use of RFLPs, so that the exact alteration in the so called normal complement with abnormal phenotype can be worked out.