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ABSTRACT

Six papers from a 1978 conference on birth defects focus on prevention. G. Stickle ("The Health of America's Babies: How Do We Stack Up?") reviews risk in pregnancy, cites inadequate prenatal care and maternal nutrition, and discusses examples of how the United States is not applying its knowledge of how to improve pregnancy outcome. In "Genetic Counseling for Prenatal Diagnosis--Amniocentesis," E. Lilienthal reviews her procedures for counseling parents prior to and after amniocentesis. "Birth Defects and Venereal Disease" is discussed by T. Thiel. H. Jacobson ("Birth Defects and Nutrition") analyzes the problem of low birthweight babies. C. Brinker ("Birth Defects--Drugs, Alcohol, and Tobacco") discusses approaches to educating adolescents about the effects of addiction on pregnancy. In the final paper, "Dealing with the Birth Defects Problem," F. Desposito summarizes the state of the art in educating children about genetics, nutrition, and birth defects.

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PROCEEDINGS
OF THE

CONFERENCE ON BIRTH DEFECTS
FOR EDUCATORS
(May 4, 1978)

Montclair State College
Upper Montclair, New Jersey

Edited by: Michael S. Davidson, Ed.D.
Mary W. Davidson, M.A.

April 20, 1980

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CONFERENCE ON BIRTH DEFECTS

FOR EDUCATORS

(May 4, 1978)

Presented by: Health Education Service Center
Department of Health Professions
Montclair State College
Upper Montclair, N. J. 07043

Sponsored by: Essex County Chapter
March of Dimes
Montclair, N. J.

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Michael S. Davidson, Ed.D.
Conference Chairman

Welcome Remarks

On behalf of the Department of Health Professions of Montclair State College and the Essex County Chapter of the March of Dimes, I would like to bid you a warm welcome and express our keen appreciation for your coming here today.

We have an interesting and challenging program for you. But before I mention the program, I would like to express my thanks to the Steering Committee who worked so diligently on this conference and especially to the people at the March of Dimes who made it all possible.

Montclair State College today joins the March of Dimes in an attempt to reduce the birth defects problem in New Jersey. We believe that through education in the schools and in the communities, we will be able to reduce the incidence and human costs of birth defects. We therefore throw down the gauntlet of challenge to you to join us in developing and implementing birth defects education in all our educational settings.

The theme of today's conference is prevention. Before the day is through, you will realize that much can be done to prevent some birth defects. And you will also realize that you personally can do something to help. We hope to assist you in developing programs or improving on those you have already initiated. We also hope to be of help to you in the future as we plan and develop additional in-service and other training and educational programs.

You will note on your program that the morning sessions are devoted to hearing from the experts in the field. The afternoon program will include workshops on teaching about birth defects and a showing of several films available free to you from the March of Dimes.

Mr. Gabriel Stickle is Vice-President for Education for the National Foundation-March of Dimes. Mr. Stickle is responsible for coordinating all the educational programs throughout the United States for the National Foundation as it strives to meet its objectives for preventing and treating birth defects. Since joining the Foundation in 1951, Mr. Stickle has participated in the planning and the organization of the Salk vaccine field trials and played an important part in organizing the mass immunization trials which the March of Dimes sponsored throughout the United States. More recently, he has made significant contributions to the planning and administration of new programs aimed at preventing birth defects. He is on the Board of the International Birth Defects Congress and has contributed a number of articles on the size and significance of the birth defects problem.

THE HEALTH OF AMERICA'S BABIES: HOW DO WE STACK UP?

There are many ways to gauge the health status of a people. Longevity, prevalence of disease, disability, capacity to adapt to environmental stress are some of these but the most universally accepted standards are those which measure the survival and quality of life of the very young.

What do these measures tell us about the health of the mothers and babies of our country? They tell us that one out of five newborn babies suffers from some sickness or abnormality during the period of hospitalization following delivery; that one in fourteen weighs as little as five and 1/2 pounds; that fifteen of every thousand die before their first birthday. They tell us that a number of other nations, some with far fewer resources than ours now have a better survival record than this.

How can we explain this situation? Are the statistics for other nations compiled on a different basis than our own? The experts tell us that any such differences are too small to significantly affect the overall standing of the various countries. Perhaps the differences can be explained on racial grounds to some degree but how can one separate race from the social factors associated with it and why is the infant mortality rate in Minnesota or New Hampshire, states that are almost entirely white, significantly higher than the rates in a number of other countries.

It has been said that preceding World War I the high prevalence of T.B. in Massachusetts was shrugged off by at least a few proper Bostonians with a statement, "it's not so bad if you exclude the Irish." Let us acknowledge that at least a few of our fellow citizens still tend to dismiss our most serious health problems in the same racist terms.

Any useful assessment of the problem requires a much more searching examination than a simple comparison of infant mortality even though that may

be a valid starting point. It seems that the most productive approach to take is first to identify the principles which explain these variations in maternal and newborn health; then to consider the adequacy of our current efforts to apply these principles to the control of these variations; and finally to consider how these efforts can be augmented or improved.

What are the principles that underlie maternal and newborn health? First, the outcome of pregnancy is determined by a variety of risk factors some of which are subject to control. The presence of certain medical risks such as a history of fetal loss or a pregnancy complicated by maternal diabetes, toxemia or other disease increases the likelihood of newborn death or damage. We also know that social factors exert their influence so that the unmarried mother, the under-educated mother and the disadvantaged mother tend to produce poorer outcomes. These and many other biological and social determinants are inter-related so that the separate effect of each seldom can be measured with precision.

A second principle is that some of the risks can be identified early in pregnancy and sometimes even before conception so that preventive or ameliorative measures can be undertaken in time to influence the results. For example, treatment of maternal disease protects the health of the fetus. Food supplements and nutrition education for the malnourished mother can add those critical few ounces to birth weight that can spell the difference between life and death, between normal development and retarded physical or mental growth.

Early assessment of genetic risks and effective family counseling can reduce the prevalence of certain inherited abnormalities. A third principle is that many of these risks will continue to go unnoticed and unremedied unless we and our lay and professional allies come to recognize their importance to the health of the individual, the family and the community.

It seems that if we accept these three basic principles we then need to consider whether or not our practices are compatible with them; for in the final analysis our maternal and newborn health policies and programs are nothing more or less than means of intervention to modify or control one or more of the risk factors which affect the outcome of pregnancy. What are these means of intervention and how effectively are we using them?

It has been shown that within limits the birth weight of the newborn tends to vary with the stage of pregnancy in which prenatal medical care is started and with a number of prenatal visits. Generally, the earlier prenatal care begins, the smaller the likelihood of low birth weight. The more often a mother visits the physician's office or clinic, the smaller the likelihood of low birth weight. Babies of women who are at similar social or medical risks are less likely to be born too small or too soon if their mothers receive medical care early in pregnancy.

The concomitants of low birth weight are well known. Seventy percent of all deaths in the first four weeks after delivery occur in babies weighing five and 1/2 pounds or less. Structural or metabolic abnormalities are found three times as frequently in these small infants as in bigger babies. Low birth weight also seems to be associated with impaired intellectual development. The incidence of low birth weight in the U.S. is 16% higher than in Britain; 25% higher than in Japan and 60% higher than in either Finland or Iceland. The American College of Obstetricians and Gynecologists recommend that in an uncomplicated pregnancy the patient should be seen every four weeks during the first 28 weeks, every two weeks until the 36th week and then weekly thereafter.

How does our performance stack up against these standards? Not too well according to a recent report from 37 states and the District of Columbia.

This report shows that only 17% of the mothers began prenatal care in the first trimester and had as many as the recommended number of visits. Less than 4% of their babies weighed as little as 5 1/2 pounds. Fifty percent of the mothers saw a physician in the first trimester but had fewer than the recommended number of visits. Nearly 8% of their babies were underweight. Except for mothers who had an extremely large number of prenatal visits, presumably because of complications, the low weight ratio varied with the number of visits declining continuously from 22% for babies whose mothers had only one or two visits down to 3% for those who had thirteen or fourteen visits.

There is nothing magical about prenatal care. Its most obvious purpose is to identify specific risks to the mother and fetus. Most of these risks can be ascertained at the very first visit so that clinical, nutritional and social measures can be initiated to offset or modify their effects. Of course, there has to be a first visit and the sooner the better. Unfortunately, those with the greatest risks characteristically come under medical care last and they are least likely to continue such care during pregnancy. A recent study in upstate New York showed that four out of five pregnant women who were at none of these risks receive prenatal care in the first trimester as compared with less than half of the women who were at several of the risks studied. There is hardly a city or town across the country in which a significant number of pregnant women fail to obtain early and continuous prenatal care. In many communities free or reduced cost clinics are either absent or barely begin to satisfy the unmet need. In New Jersey fully one-third of all pregnant women fail to see a doctor in the first trimester.

Another means of intervention to improve the outcome of pregnancy is the provision of adequate maternal nutrition. About one-third of the low weights are believed to be due to retarded growth in utero rather than to prematurity.

A variety of laboratory, clinical and epidemiologic studies have implicated maternal undernutrition as a causative factor. Poverty and lack of motivation are probably contributory influences. Inaccurate and outmoded professional advice to the pregnant patient, which stresses limitation of weight gain, routine prohibition and routine use of diuretics, also is believed to contribute to the problem.

Nutrition supplementation for the pregnant woman reinforced with effective counseling has been proposed as a means of improving fetal and newborn health. The precursor of such programs is the Montreal Diet Dispensary under the leadership of Agnes Higgins which has been delivering this combination of food and education to high risk pregnant women since 1962. A recent case control study of over 1,100 women in this program indicated that infants of the supplemented mothers had significantly higher birth weight than the controls. Our own national program of food supplementation for women, infants and children, the WIC program, is now reaching about 1,100,000 women and children. According to a medical evaluation completed last year, women enrolled in the WIC program gained more weight during pregnancy than matched nonparticipating mothers and their babies weighed significantly more at birth.

One difficulty of food supplementation on the conditions of poverty is that the food supplement tends to become an income supplement. That is outlays for food tend to be reduced by the dollar value of the supplement with the savings used for other essential purposes. This means that for the WIC program to succeed, there needs to be built into that program an effective, independent educational component so that program participants come to realize that the only source of fetal nourishment is their own food intake.

Prenatal care and good maternal nutrition are not the only means at our disposal to improve the outcome of pregnancy. A few specific birth defects can now be completely eliminated or largely controlled if we but use the knowledge

and technology already at hand. One of these is Rh hemolytic disease of the fetus and the newborn. As you may know this condition arises out of the genetic incompatibility of the mother and her newborn baby. It results when an Rh negative mother has an Rh positive baby. Every time there is such an incompatibility, there is a risk that some of the fetal blood may get into the maternal circulation and trigger the production of Rh antibodies. If that happens and anyone of the mother's subsequent babies is Rh positive, these antibodies could destroy the babies blood. For many years the principal therapeutic method for this disease was the exchange transfusion of the affected newborn, but since 1968 we have had a simple and fully effective means of prevention. Inoculation of the previously unsensitized Rh negative woman following the birth of each Rh positive baby with a drug commonly known by its trade name Rhogam. There is a somewhat smaller though still highly significant risk of maternal reaction to the Rh factor following miscarriage or induced abortion. Thanks to Rhogam the incidence of Rh hemolytic disease has been reduced by about one-half but some 7,000 babies in the U.S. still are affected each year.

There are two reasons for the persistence of this disease full ten years after licensure of a preventive. One is that some Rh negative women who were already sensitized before the product became available still are having Rh positive babies. Another is that one of five women who should be getting Rhogam are apparently not getting it. Most of these women are being needlessly sensitized following induced abortion. Indeed, it is estimated that one out of every three unsensitized Rh negative women is not given Rhogam following abortion despite the clear indication for its use. It is not certain what can be done to overcome this problem but it seems that the strongest sanction should apply to a situation in which failure to administer a proven preventive could

Gabriel Stickle

compromise a woman's entire reproductive future. Another obstacle to the use of Rhogam probably is its cost which usually ranges from \$50 to \$100 including laboratory work. The federal government does not include Rhogam among the vaccines it distributes to the states.

Congenital Rubella is another preventable birth defect. In this country, the primary emphasis has been on immunization of young boys and girls in the hopes of reducing the exposure of their pregnant mother to the disease. Reported Rubella has declined by two-thirds below the previous average but in the first few years the proportion of cases among adolescents and young adults has been much higher than heretofore. Moreover, an estimated 13,000,000 children, age one to twelve years, are still susceptible to the disease. These developments have focused attention on the need to emphasize selective immunization of non-pregnant adolescent women of child-bearing age as well as the routine immunization of prepubertal children.

One could continue to document other examples of situations in which our knowledge of how to improve pregnancy outcome is not being fully applied, such as control of venereal disease, effective family planning, and avoidance of tobacco, alcohol and other harmful drugs during pregnancy. Screening for unions with risks of serious genetic disease and prenatal diagnosis of birth defects are essential weapons in the struggle to insure a healthy start in life.

One aspect of maternal and newborn health merits our special attention and that is the whole complex of problems related to childbearing by youngsters who are themselves barely out of childhood. Since 1960, virtually every maternal age group in the U.S. has experienced a decline both in absolute number of births and in fertility rate. The sole exception has been the young teenager. The number of mothers age 16 and 17 rose by 12% between 1966 and 1976 while births to mothers 15 and younger climbed by 44% from 30,000 per year

to 44,000. The pregnant adolescent is subject to all the medical and social risks that confront the more mature pregnant woman but the adolescent is especially vulnerable because of a variety of circumstances that are characteristic of her age group. These include physiologic immaturity, economic dependency, poor nutritional status, lack of education and political ineffectiveness. Inadequate medical care often compounds the problem. A recent study in New York showed that 40% of teenagers received prenatal care in the first trimester as compared to 68% of women in their twenties. The results were readily predictable. More than 11% of the newborns of the teenagers weighed 5 1/2 pounds or less as compared with only 7% of women age 20-29. The neonatal mortality showed a similar differential.

Perhaps equally significant is the study of Roberts and Engle based on the examination of a national sample of children age 6 to 11 which found a striking relationship between the children's intelligence scores and the age of their parents. The average IQ was lowest for children whose mothers or fathers were at either extreme of reproductive age and highest for those whose parents were in the middle of reproductive years at the time of their birth.

In the light of these findings and the associated risk of low birth weight among the babies of young mothers, consider that under the welfare regulations of many states, a needy youngster who is pregnant for the first time is not eligible for aid to families with dependent children presumably because her fetus is not regarded as a dependent child. Presumably this is done in the name of economy but what is the eventual cost to society of the resultant sub-normal intellectual development?

To improve the outcome of pregnancy of the adolescent and indeed of all pregnancies, to safeguard and advance the quality of human reproduction in

our country, we require a total reassessment of our national goals and priorities. It would be foolish and irresponsible to pretend that all of the problems of maternal and newborn health can be solved simply by redirecting public and private health dollars to that area even though such a relocation certainly is needed. Our crash programs in heart disease, cancer and stroke should have convinced even their most vocal advocates of the short sightedness of that approach. Health is indivisible. It cannot be departmentalized nor can our health problems be solved in isolation from the social, economic and political medium in which they arise. As a nation, we have entered an era of scarce resources - an era that will force a basic reordering of our priorities. Within the health sphere, we will be pressed increasingly by our expenditures not only in terms of incidence and prevalence of a specific condition, but equally in terms of the impact of these conditions on both the length and the quality of life. If this is so, then our first priority should be to make primary health care available and accessible to all of the underserved at the very start of life.

Dr. Halfdan Mahler, Director General of the World Health Organization, appealed, at the 29th World Health Assembly, for a more equitable distribution of health resources at both the national and international levels. He said that the proper distribution of health resources is as important as their quality and quantity. Acceptance of this premise leads to the goal of first and foremost providing essential health care for all members of society. Social justice would imply that individual care be provided beyond what can be afforded for the population as a whole only when the total population has been provided with a level of care that society considers essential and is able and ready to pay for even to the extent of making sacrifices in other areas. The health of America's mothers and babies should be regarded as falling within the scope of what society considers essential and indeed indispensable.

Ms. Evelyn Lilienthal is a graduate of the Sara Lawrence Human Genetics program and is presently a Genetic Associate at the Medical Genetics Unit of the Westchester County Medical Center in Valhalla, New York. She is also a Genetic Associate at Letchworth Village in Theills, New York and has lectured on genetics to community groups in the New York area.

GENETIC COUNSELING FOR PRENATAL DIAGNOSIS - AMNIOCENTESIS

It is a pleasure to be here today and have the opportunity to participate in this conference on birth defects for educators.

It has been conservatively estimated that some 12 million Americans are affected by one or another of the great variety of hereditary diseases. In 1977 alone, 200,000 babies were born with genetically caused or genetically related abnormalities.

With the advent of so many technical advances, prenatal diagnosis has been made possible. As a result, many families are spared the tragic birth of a child with a possible life-limiting disorder and other families are reassured that the woman will give birth to a normal healthy child within the limitations of what defects can be diagnosed prenatally.

We all have a common responsibility of educating the public. Today, I would like to show you how I counsel families, which is my way of communicating information.

One medical procedure used for prenatal diagnosis is called amniocentesis, which allows doctors to examine the cells of an unborn child to see if it might be afflicted with any variety of serious genetic disorders.

For the purpose of this talk, I will utilize the word "Amnio" in lieu of Amniocentesis.

(Slide 1 - Amniocentesis Diagram) - Procedure of Amnio

Amniocentesis involves the aspiration or removal of a small amount of amniotic fluid, approximately 20-30cc. Amniotic fluid is the liquid or fluid that surrounds the unborn baby and contains sloughed-off cells from the fetus. The optimum time to perform an amniocentesis is between 16 and 17 weeks, because it is felt that at this time there is a sufficient amount of amniotic fluid

for the sample to be easily obtainable; the fetus is small; and there is sufficient time to grow the cells, reach a diagnosis, and terminate the pregnancy, if desired.

(Slide 2 - Indications for doing prenatal diagnosis)

Indications for doing prenatal diagnosis are:

1. Increased risk of chromosomal aberration.

Approximately 1/150-1/200 babies are born with a chromosomal abnormality.

A. The most common indication is -

Advanced maternal age - 35 and over.

B. Either parent is a known carrier of a chromosomal disorder.

This means that a carrier has a chromosomal rearrangement. Sometimes when a couple have multiple miscarriages, the couple is referred by a physician for chromosomal analysis to see if there is any chromosomal rearrangement.

C. Previous pregnancy resulting in a chromosomal aberration or abnormality.

2. Known risk for significant inherited metabolic disorders.

An example would be Tay-Sachs disease.

A. Abnormality must be detectable from cultured amniotic fluid cells.

B. The heterozygous carrier state, meaning that one gene is normal and one gene is affected, must be clearly and easily separated from the homozygous/affected condition. In this case, both genes are affected.

3. Known risk for significant X-linked genetic disorders.

An example of this would be Duchene's Muscular Dystrophy, which is untreatable, fatal and a horrible disease. In X-linked disorders, the mother is the carrier and with each pregnancy there is a 50% risk of having an affected son and no chance of having an affected daughter.

4. Previous child with a neural tube defect such as Spina Bifida or Anencephaly. Even if there is no indication other than a chromosomal reason for doing an amniocentesis, nonetheless we will also test for open neural tube defects using some of the amniotic fluid that was obtained because it is cheap, easy and the incidence is 1 in 1000. When looking for neural tube defects, an enzyme called alpha-fetoprotein is elevated or in high concentration in the amniotic fluid as a result of an opening in the baby's spine. Alpha-fetoprotein assays are able to detect approximately 90% of neural tube defects, because an open lesion in the spine allows the alpha-fetoprotein enzyme to leak out into the amniotic fluid. In approximately 10% of the cases, there may be a membrane covering the opening which does not permit this enzyme to leak into the amniotic fluid, so a neural tube defect would not be detected.

(Slide 3 - Relationship of Down Syndrome to maternal age (Graph))

As stated before, the most common reason for doing amniocentesis is advanced maternal age. With increasing maternal age, the risk of having a Down Syndrome baby increases, as the graph shows. There is no data to determine conclusively if the father's age is related to Down Syndrome. All data to date is based on maternal age.

(Slide 4 - Rate estimates for Down Syndrome)

The rate estimates for Down Syndrome which have been modified from Hook are as follows:

<u>Maternal Age</u>	<u>Fractional Rate</u>
in 20's	1/1700-1/1200
30-34	1/900-1/500
At 35	1/400
36-39	1/300-1/150
At 40	1/100
At 45	1/40-1/30

Different places may use slightly different figures.

Statistics are always changing when new or more data is obtained.

This risk of having a Down Syndrome child is age related and not based on the number of children a woman has already had. If one has had a previous child with Down Syndrome, the recurrence risk figure is 1/100. At age 45 the recurrence risk approaches 1/20.

The burden of having a Down Syndrome baby is discussed during the pre-amniocentesis counseling session. Such a child affects families emotionally, psychologically, socially and financially.

Also during this preamniocentesis counseling we obtain information about the family history of the husband and wife. This often includes doing a pedigree. (Slide 4A - Pedigree) A pedigree is a diagram or similar to a family tree where circles are symbols that represent females and squares are symbols that represent males. Some questions that we ask about the couple's health history and the family history include:

1. Are the husband and wife related other than by marriage? The term for this is consanguinity.
2. Other questions inquire about birth defects, mental retardation, diabetes, thyroid, convulsions, bleeding, heart conditions, prolonged and chronic illnesses, hospitalization, early deaths, stillborns and miscarriages.

3. We also want to find out if the couple has been taking any medications, drugs, had exposure to chemicals, had they had any infections, fever, and have they been exposed to X-rays.
4. We also ask about their ethnic background because certain diseases or disorders originated in specific geographical areas and we feel we can inform the couple of this information and it is especially valuable if there is screening and prenatal diagnosis available to detect these diseases. We ask the couple about their occupations to find out if they have jobs that expose them to X-rays or if their work involves contact with chemicals.

After obtaining information about the couple and explaining to them why we do amniocentesis, there is a discussion of how we do amniocentesis.

(Slide 5 - Doctor with ultrasound)

Before the procedure of amniocentesis is done, an examination by ultrasound is carried out to locate the placenta, fetus and fluid. Ultrasound consists of high frequency sound waves that travel through the fluid and when they hit something more dense they show it by a mark that appears on a screen.

(Slide 6 - Ultrasound - Path of a needle)

With ultrasound not only can one locate the placenta and fetus, so that the doctor knows exactly where to put the needle so to avoid hitting the baby, but ultrasound also tells us the gestational age of the fetus, if the woman is really pregnant and if there are twins.

(Slide 7 - Ultrasound - Twins)

This slide shows 2 heads representing twins. In doing amniocentesis when twins are involved, a blue dye is injected into one sac after obtaining amniotic fluid. The second sac is then tapped and if no dye appears in

the fluid, then the doctor knows he has obtained amniotic fluid from the second sac.

(Slide 8 - Ultrasound - Doctor doing Amniocentesis)

A very fine needle is inserted into the amniotic cavity. Cells in this cavity are fetal in origin and therefore, represent fetal chromosomes. Often people want to know the pain and discomfort involved in this procedure. We tell them about a study we did where a questionnaire was sent to women who had an amniocentesis asking specific questions about the counseling and amniocentesis procedures. The majority of the women considered the pain and discomfort associated with the procedure as insignificant and compared it to having blood drawn. Some even said it was less painful than having blood drawn from the arm. Occasionally there is no fluid obtained with the first insertion of the needle and a second insertion may be necessary. Sometimes then anxiety may be felt. We mention this fact to patients during counseling because we want to make them aware that this may happen.

(Slide 9 - Amniocentesis Diagram)

This diagram, which is the same slide that I previously showed, shows that once fluid is obtained, it is sent to the laboratory for biochemical and chromosomal analysis. Cells in the test tube are centrifuged from the fluid and placed in a medium to grow. It takes several weeks to grow. Occasionally the cells show poor growth or no growth at all. In this case, a woman would be called to have a repeat amniocentesis. This is explained to the couple during the preamniocentesis counseling. They are told that if there is lack of or no growth, it does not mean that there is any problem with the fetus.

(Slide 10 - A number of cells)

Cells are then studied under a microscope. This slide shows a number of cells.

(Slide 11 - A magnified cell in metaphase - approximately 1300X)

This is one cell magnified by a microscope approximately 1300 times. Every cell of our body contains 46 chromosomes or 23 pairs of chromosomes. Chromosomes are structures, present in every cell, which determine heredity. They contain genes, which are the units of heredity and invisible by any modern means of examination. Chromosomes, with proper staining and magnification of specially treated cells (usually white blood cells) can be studied and abnormalities in number and structure of the chromosome can be related to clinical abnormalities in the patient. This magnified cell, which is in a specific phase of cell division (metaphase) contains 46 chromosomes.

(Slide 12 - Parts of a Chromosome)

This slide shows the parts of a chromosome; long arm, short arm; centromere (constriction) and satellite.

(Slide 13 - Various position of Centromere)

Chromosomes are identified according to size and where the centromere is located. Each pair of chromosomes is identified by number.

(Slide 14 - Karyotype - Normal Male)

This slide shows the chromosomes from one cell that have been cut out and arranged in pairs. This is called a Karyotype. You will notice that there are 22 matching pairs of chromosomes which are numbered and arranged in descending order according to size, shape and where the construction is located. These 22 pairs are called Autosomes. Each chromosome usually

appears identical to its partner. There are 2 chromosomes which are labeled X and Y. These are the sex chromosomes and they determine the sex of an individual. All normal males have one Y and one X chromosome.

(Slide 15 - Karyotype - Banded normal female)

The normal female has two X chromosomes and No Y chromosome. Chromosome in this karyotype are banded, making use of a new staining technique called Giesma or G-banding. With G-banding one can see if small amounts of a chromosome are deleted, extra or rearranged and it also makes chromosomes more easily identifiable.

Since the sex can be identified with karyotyping, one of the questions we always ask couples is if they want to know the sex of the baby. Both parents must agree on their answer. We find that most couples, approximately 80%, do want to know the sex.

Now I would like to explain what happens to cells in our body. There are two cell division processes in our body, one is mitosis and one is meiosis. The first one that I am going to discuss is mitosis.

(Slide 16 - Mitosis)

Every cell of our body is constantly undergoing cell division and in the process, the original cell divides and produces two daughter cells with the exact composition of 46 chromosomes as the original cell. This process is called Mitosis. For simplicity, only 2 pairs of chromosomes are shown, rather the 23 pairs. The original cell which shows 2 pairs divides in such a way that the daughter cells will also result in 2 pairs of chromosomes.

I said that every cell has 46 chromosomes, however, there is one exception to the rule. The only cells in the body which do not have 46 chromosomes

are the egg cells (ova), the sperm, and the reproductive cells from which they develop. These each have 23 chromosomes. When the sperm and egg fuse at conception or fertilization, they form the beginning of a new individual who will also again have 46 chromosomes in all cells except for the reproductive cells.

Females are born with their lifetime supply of eggs. Therefore, if a woman is 37 years old, her eggs are almost 38 years old.

(Slide 17 - Meiosis)

The type of cell division which result in sperm and egg cells with only 23 single chromosomes which are found in other cells is called meiosis. Also, for simplicity, only 2 pairs of chromosomes are shown in this diagram. The original cells which show 2 pairs of chromosomes divide 2 times in such a way that 4 new offspring cells (eggs and sperm) are formed, each with one chromosome member from each original pair. Each normal, mature reproductive cell (sperm or ovum) contains only one of each pair of autosomes and either an X or Y chromosome.

This process illustrated how the mature reproductive cells (technically called Gametes) are derived from the parent cells in a reproductive process called Meiosis.

(Slide 18 - Non-Disjunction)

Now I would like to give one possible explanation for what has happened in Down Syndrome, which is also referred to as Trisomy 21. Trisomy refers to a condition in which there are 3, rather than 2, of a particular pair of chromosomes. In Mongolism, another term for Down Syndrome, there are 3 chromosomes of pair number 21.

Trisomies are produced by several types of errors in cell division. The most common is the failure of a pair of chromosomes to separate during the production of sperm or egg cells. This lack of separation, known as Meiotic Non-Disjunction, results in one cell containing both members of a particular pair of chromosomes and one containing neither.

Here again for simplicity, only 2 pairs of chromosomes are involved. This diagram shows that up to a certain point, the chromosome separation has been normal. However, then one pair of chromosomes stay together rather than separating which results in one intermediate cell containing too many chromosomes and another containing too few. The end result is 2 cells with an extra chromosome and 2 cells with one less chromosome or 2 cells with 24 chromosomes and 2 cells with 22 chromosomes.

(Slide 19 - Matings - Non-Disjunction Products with Normal Gametes)

This slide shows the result of mating of gametes or reproductive cells. The top diagram shows the fertilization of 2 normal gametes (egg and sperm) resulting in a normal fertilized egg or Zygote.

The center diagram shows the fertilization of a cell with an extra chromosome uniting with a normal cell, resulting in a new individual which will (47 chromosomes) have an extra chromosome or be trisomic for that chromosome (with 3 of that particular set of chromosomes rather than the usual 2).

The bottom diagram shows the union of a cell which is missing a chromosome with a normal one, resulting in a new individual which will have one less chromosome than it should. The individual will have 45 chromosomes and the condition is called Monosomy.

(Slide 20 - Trisomy 21, Karyotype)

The Karyotype of Trisomy 21 looks like this. It has the extra 21st chromosome. (3 of chromosome No. 21).

(Slide 21 - Down Syndrome Child)

The Down Syndrome child looks like this, with certain characteristics or stigmata. Some of the clinical features are a protruding tongue, folds of skin at the inner corners of the eyes called epicantile folds, poor muscle tone, short stature, round faces and mental retardation.

Amniocentesis eliminates the risk of Down Syndrome and many other chromosomal abnormalities.

Even if there is a normal chromosome constitution and a normal biochemical status of the fetus, there is no guarantee that the couple will have a completely normal healthy baby. The couple still has the same 2% risk as does the general population for having a child with a birth defect and/or mental retardation due to other disorders.

After explaining all about why and how we do amniocentesis, risks are discussed with patients, so they will be able to make an educated and informed decision as to whether they want to proceed with having amniocentesis.

(Slide 22 - Informed Consent Form)

This is an informed consent summarizing the information and risks which we hope the couple now understands as a result of the counseling process which has occurred between the patients and the genetic counselor. It reads as follows:

I hereby request Dr. _____ and associates to make a prenatal determination of the chromosome constitution and/or to arrange for a determination of the biochemical status of the unborn fetus. It has been explained to me and I understand that:

1. The procedure of amniocentesis involves a small risk to both mother and fetus, and I realize that complications could include infection, bleeding or miscarriage.

Infection and bleeding are included because it is routine on consent forms and is theoretical and the risk of this is minimal.

In regard to miscarriage, a collaborative study was done where approximately 1000 (1040) women who had the amniocentesis were compared to 1000 (992) women who did not have amniocentesis.

They were matched according to age, gestation and other factors.

Of the 1000 women who did not have amniocentesis, approximately 3% (3.2%) had miscarriages and of the 1000 women who had amniocentesis, approximately 3% (3.5%) had miscarriages. Therefore, it was felt that there was no statistically significant increased risk to fetal loss or injury.

2. There is a possibility that growing the fetal cells may not be successful. This was discussed before.

3. The chromosome and/or biochemical analysis may not be successful, or technical problems in the laboratory may be a factor.

4. Repeat amniocentesis may be necessary.

This has been discussed.

5. It is possible that the results of the chromosome and/or biochemical analysis may not accurately reflect the status of the fetus.

This means that possibly something entirely new may show up that has never been seen before or that has never been written up in the literature.

6. The findings of a normal chromosome constitution or normal biochemical status of the fetus does not eliminate the possibility that the child may have birth defects and/or mental retardation because of other disorders.

This has already been discussed.

After an amniocentesis is performed, it takes approximately 4 to 5 weeks till the couple receive their results. Results are telephoned to the patients and their referring physician as soon as the laboratory work is completed. Written results are then forwarded to the couple and the doctor.

Of the women who have amniocentesis, approximately 98% are proven to be carrying a normal fetus as far as can be determined by genetic studies. If it weren't for amniocentesis, countless couples who would not otherwise have dared to risk a pregnancy, have had one or more normal healthy children. Many others have avoided the tragic birth of an abnormal baby. And for others, planned abortion was averted when prenatal diagnosis showed that the fetus would not have the expected abnormality.

The ultimate value to the vast majority of couples was felt that amniocentesis is reassurance.

We in the field of genetics feel it is better to have predicted a potential birth defect than to have diagnosed it.

Mrs. Thelma Thiel is Executive Director of the Venereal Disease Service Organization, a registered nurse, a health educator and an invited lecturer at Montclair State College. She is interested in a wide variety of health concerns and has recently been elected to the Board of Trustees of the American Liver Foundation. This appointment was in direct response to the fact that Mrs. Thiel created a foundation in memory of her son who died of an incurable liver ailment. She is a Commissioner on the National Commission on Digestive Diseases that has the task of writing recommendations for Congress regarding such diseases. She recently presented testimony in Washington before a task force on sexually transmitted diseases.

BIRTH DEFECTS AND VENEREAL DISEASE

I have a personal reason for being here today. I lost a son who was diagnosed at two weeks of age as having early cirrhosis of the liver from hepatitis he had apparently acquired during my pregnancy. Not having had a sick day in my pregnancy, there are still many unanswered questions. But, I do know what it is like having a child who is incurably ill and being forced to just sit back and watch him die by inches. It's horrendous, believe me. My purpose in being involved in health areas is really to prevent other people from going through the suffering our family went through.

I don't know if you are aware of it but 98% of the funds that go into V.D. control in New Jersey go into laboratory and epidemiology services. Only about 1-2% of the funds actually go into education. So, in essence, most of our money is going into things after the fact. We take care of people after they get venereal disease but do little to prevent these diseases.

You have been hearing about how teenage pregnancy is increasing at alarming rates. A pregnant girl is easy to see but can you see V.D.? How many teens are sexually active? Over eleven million? Our statistics indicate that about 75% of venereal diseases are found in the 10-25 age group with the most rapid increases occurring in the 10-14 age group. Are we really preparing our children to cope with these problems? You know as parents that when our children were tiny and we were getting ready to send them off to kindergarten, we took them out to the curb and told them to look left and right before crossing the street. But, when it comes to sex and V.D., we say, in essence, "go play in the traffic."

Do our children know the risks involved? Recently, I had a nurse come into the office who told me about a 9 and an 11 year old she found having

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intercourse in a school bathroom. When questioned about the risks of her actions, the girl stated that she couldn't get pregnant because she had not had a period yet; she also said she didn't know anything about V.D. How many of our children do know about V.D.? How many parents really know about V.D.? Parents don't want their children being taught about sex in the schools and of course they think V.D. is synonymous with sex. We have very vocal people at our P.T.A. meetings and Board of Education meetings saying "no, no, no" to sex education while the rest of us sit out there as a silent majority with our hands in our pockets and our mouths shut letting those people control the V.D. epidemic. We have a responsibility as health educators to do something about it.

How can we prevent our children from acquiring diseases such as syphilis, cytomegalovirus and the herpes infections - all of which can cause birth defects - if it is a taboo subject which most parents are uninformed about and which we can't talk about? As Dr. Davidson mentioned earlier, we do lectures here at Montclair State for the health education classes because we want to get this information out to everyone that we possibly can. How could you possibly protect yourself from something if you don't even know how you acquire it? How many people think that you can get V.D. in only one way - via sexual intercourse? We have been doing a survey among Montclair State students and asking them if they classified oral-genital relations as petting or intercourse. Most of them indicated that oral sex is petting and do not realize that they are vulnerable to V.D. through a variety of kinds of sexual contact. You don't really have to get involved in talking about intercourse to teach children about venereal diseases. For instance, how many kindergarten children have impetigo? Is that a sexually transmitted disease? We do tell our children they can get this disease by having direct contact with someone who has the

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sores and that they can transmit it to someone else. It is basic education that these are sores, they have germs in them, and that you can pass them on to someone else by having direct contact with them. That could be classified as V.D. education and yet we don't think about it as that. We have to come up with techniques of teaching children about these basic concepts. And we don't have to put a stigma on it by calling it a venereal disease. I would even like to throw out the term "sexually transmitted diseases." These are just other communicable diseases that are passed from one person to another by making direct contact. As long as we continue to make people feel like they are guilty or that they have done something wrong because they acquired a disease, a lot of people will continue to harbor those diseases by not getting tested and treated. They do not want to be identified as V.D. patients. How are we going to deal with that problem?

Let's talk a little about the herpesvirus? I think most, or a lot of you, have probably had a Herpes infection on your mouth - a cold sore. It is estimated that about 35% of the general population has had a Herpes infection. Of course, we classify them in different ways: Type-I and Type-II. Type-I is usually the one seen on the mouth and shows up anywhere from six months to one year of age in an infant. Type-II, however, is classified as a venereal or sexually transmitted disease because it usually doesn't show up until after the individual becomes sexually active. Recent research, however, (incidentally they have been doing research on herpes at St. Michael's Hospital in Newark) has shown that Type-I can be found on the genitals and Type-II on the mouth. So, with the variety of the kinds of contact that people are having, these viruses are so mixed up that we can't say that one type of herpes is sexually transmitted and the other is not. What we have is just another set of communicable diseases.

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As far as birth defects go, a recent study of 280 cases of Herpes in the newborn showed that 3/4 were caused by Herpes Type-II and about 1/4 were caused by Herpes Type-I and both are just as serious. In the newborn it can create problems with the eyes and can cause blindness. It can infect the internal organs and cause neurological damage. Seventy percent of the babies that acquire Herpes at birth are likely to die. This is a tremendous problem; yet if we continue to hold back this information from people, they are not going to protect themselves. How can you protect yourself from a Herpes infection? The only way is not to have contact with anyone who has it. At this point we have no cure; 35% of the population is affected and the numbers are increasing at alarming rates, and we have no way of stopping it. We have to get the message out for control and the only control measure we have is the message not to have contact with anyone who has the blisters or the open lesions. It should be noted that when those lesions disappear or the sores heal up, one is no longer infectious. That means you can no longer transmit the disease. But, the lesions on the male are external and easily noticed while on the female they may be internal and not particularly painful. How can one tell if the female is infected internally? You really are not going to know and will have to decide the sort of risks you are willing to take.

We have tried to develop techniques of getting this message across to young people. We believe that if we don't give them this information before they become sexually active, it will be after the fact. Are we going to wait until they are sexually involved and acquire an infection before we give them the information. We have got to get V.D. education out to the youngsters at least at the fifth and sixth grade level. What with our problems of introducing sex education at all, we are having tremendous problems

getting V.D. education introduced at that early an age.

I have brought with me a slide presentation called, "Syphilis, The Facts Made Simple," in which we use the technique of not talking about sex. We talk about diseases that are caused by germs and how one transmits them. It has been created with the purpose of making it acceptable for the uptight parent who may be concerned about how one can teach elementary school kids about V.D. without talking about intercourse. (Slide Tape Presentation Shown.) We must make children realize that health care is one's own responsibility. Mothers and fathers may make appointments with doctors and dentists for their children but will mom make an appointment at the V.D. clinic? The individual has to take that responsibility.

Last year in New Jersey we had over 1800 cases of syphilis and only 22 of those were identified as congenital syphilis. In a recent survey of about 600 cases of congenital syphilis, about 135 of those cases were not identified until the baby was about a year old. It is possible that a baby could have a negative blood test for syphilis at the time of birth and then be found to have congenital syphilis at a later time. I did a radio program not too long ago where a woman called in to say that her 30-year-old sister was having three vertebrae fused in her back to correct a deformity. When she had her pre-operative blood tests, they found she had congenital syphilis. She never had a blood test before and it was believed that her condition was probably a result of congenital syphilis. I don't know how many more cases there are out there but again I would like to emphasize the fact that we have to educate our children so they can take care of themselves.

We are putting on a conference this coming Tuesday and will be going through more of the techniques of communicating. Our organization (Venereal Disease Service Organization) does teacher training and physician training

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as well since physicians are part of the problem too. They are not attuned to the sexuality of the individual and we are having problems with their not dealing with the psychological needs of the patient. It is extremely difficult for someone who may be having homosexual contact to identify themselves as homosexual by asking for a rectal examination or a throat culture. If a physician were to ask his patients if he should take a rectal or throat culture, it might be much easier for the patient to answer "yes" and then go on from there.

Physicians do not always report their cases of V.D. When we say we have 1800 cases of syphilis, that means reported cases. How many cases are there out there that go unreported?

With respect to Herpes, we have to get back to the basics of teaching about the germ theory. Recently, I had a woman call me on the hot line about her son who was terribly upset. He had a Herpes infection, heard that it was incurable, and heard that if he had contact with anyone he was going to infect them. He was so upset that he was sitting there with a tooth brush and lysol trying to scrub off the blisters. He did not realize that those organisms were in his system and he wasn't going to be able to wash them off.

We are working all over the states of New Jersey, Connecticut and New York with our slide presentation and have been getting requests for it from other parts of the country as well. Teachers want to teach parents who want to protect their children but they don't know where to begin. We are trying to help with the aid of such organizations as the March of Dimes and the different colleges that we lecture at. We are hoping that we can control the problem but a lot depends on you and how much you are willing to help in your community to improve V.D. education in your schools. Thank you.

Dr. Howard Jacobson is a Professor in the Department of Community Medicine of the College of Medicine and Dentistry, Rutgers Medical School. He has been active on many committees and Boards of Nutrition including two White House Conferences, the Food and Nutrition Board, the National Research Council Committee on Recommended Dietary Allowances and Chairman for the Committee for Maternal Nutrition of the National Research Council. He is currently Chairman of the Committee on Nutrition of the Medical Society of New Jersey and a member of the Advisory Committee of the Women, Infant and Children program (WIC). He was also scientific resource consultant to the March 1978 National Maternal and Infant Malnutrition Conference in Washington and is an Associate Fellow of the American College of Obstetricians and Gynecologists. Dr. Jacobson is the author or co-author of over 50 medical articles and publications.

BIRTH DEFECTS AND NUTRITION

Thank you very much for the introduction, Dr. Davidson. It reminds me of Professor Peterson at the University of Illinois. It was said that when he retired they had a dinner for him at the Drake Hotel in Chicago. Every one came in a tuxedo and at the proper time someone said, "Professor Peterson, you have lived a long and active life and you have seen a lot of things come and go. Would you tell us in resume what the most important event in your career was; what do you think is the greatest contribution medical science has given to man." He got up, said "Aspirin," and sat down. I intend to talk a little longer than that but not much longer.

There is an announcement in the back of the room for the New Jersey Conference on the Quality of Life that is sponsored in part by the March of Dimes, the Medical Society of New Jersey, The College of Medicine and Dentistry and, as the main sponsor, the Junior League. I would like to read to you what it is supposed to do because it fits in with what we are doing here today. The purpose of that conference is to examine those important factors which affect a child from conception through adolescence and to focus on the four principal areas of life's activities: the community, education, the family and health. The Conference combines the support of health education and social disciplines with public, private and voluntary agencies and organizations in an attempt to provide every child with the best quality of life. And I think that is where I come in, to discuss the relation between nutrition and birth defects. Earlier this morning, Mr. Stickle gave a fairly comprehensive overview of the factors that modify a child's start in life. My own background, as you may have gathered, is maternal and child

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health and those marvelous initials mentioned in my introduction. WIC, FNS, USDA are in line with that. There is a Federal program called the Supplemental Food Program for Women, Infants and Children (WIC) sponsored by the Food Nutrition Service (FNS) of the U.S. Department of Agriculture (USDA).

In the program you see that birth defects are listed in two ways, one as genetic and the other as environmentally controlled. Not too long ago some people still said that low birth weight babies were genetic constitutional. Last November I had a letter in response to a paper I wrote from somebody who should know better. He said that it was his understanding that birth weight was determined by factors that were inherent in the mother. Well, if that isn't genetic or constitutional, I don't know what is. Not too long ago in Monmouth County another person who was well known made a presentation to health professionals and talked about the non-effectiveness of nutrition program once pregnancy begins. Because of this, I thought that, although I would be talking mostly about pregnancy and adolescence this morning, I think that I do need to deal first very briefly with the issue of birth weight. Is birth weight something that can be changed? About ten years ago one out of fourteen babies born in this country was of low birth weight. For pregnant adolescents, this turns out to be one in twenty. When you look at infant mortality, by and large, we note that it is a function of birth weight. And maybe that is the place to start.

(First Slide Shown)

Basically, when you talk about the number of babies that die in a country, a state, a county or a census tract, you really are talking mostly about the babies that die in the first week of life. That is 80% of the babies. And,

if you look at something that we have all known for a very long time, you will see that what determines whether a baby lives or dies in that first week is what the baby's weight at birth was. This slide was prepared from data for the whole of the U.S. In 1950 it shows that at all ages of gestation the lighter the baby, the higher the mortality until you get to the point where about 100% die.

For a long time we had the notion that if the baby survived, all was well. You heard from Mr. Stickle this morning that birth weight not only determines survival, it determines how well that baby is going to do. This is particularly true of children born to children. Next Slide. This first became evident to those of us working in the field in the early 1960's. This was the first time we had very clear evidence that a baby's neurological characteristics at age one were not a function of the baby's condition at birth (known as the Apgar Score which is a measure of the baby's activities and ability to deal with life) but of birth weight.

Many of the educators in the room know about the Brookline Early Educational Program (BEEP). That program deals with what they call educational dysfunction in Massachusetts and learning disabilities in New Jersey, I believe. If you have a child with a high enough I.Q. who ought to do well and doesn't, we question what is going on. The Brookline project began to look at the children that did have adequate I.Q.'s and they found that these were the children where there was a preponderance of low birth weight. This was one of the early findings of the BEEP program. So neurological difficulties are a very crude measure. I.Q. is a crude measure. When you get into the more subtle areas like ability to cope and ability to learn to use the neural apparatus to the fullest, you again come back to that baby's weight

at birth. Having said this, let us see why people said this was constitutional. They said it was not prenatal care; it has to do with the mother's height, race or age. It was at that point that I got involved in the studies on adolescence.

What I would like to do with the time I have is to very quickly review what we do know that is convincing about changing birth weight. (Next Slide)

A lot of people have said that since birth weight is a function of a mother's ethnic background, there is no point in trying to add services or spend money or effort since the matter is decided. This would make it a genetic or a constitutional problem. That is not true. The best study on the effect of race on birth weight was done in Japan in the late 1960's. This study showed that for a very homogeneous population for male and female infants, for first and second born children, birth weights went up as times got better from 1945 to 1957 to 1963. So it isn't being Japanese that matters. It is what is going on to that mother at the time. (Next Slide)

This is data we collected from the Island of Kawaihae, Hawaii. The reason we chose this island is that it is a plantation island and all the people get their health care at the same place and deliver their babies in the same hospital. If there are differences in pregnancy outcome, you cannot say that one group had better care than another or anything like that. If you look at the dotted blue line, you will see that, on the average, as mothers get shorter the incidence of low birth weight babies goes up. Very short mothers have about 15% of babies that weigh five and a half lbs. When I say low birth weight, prematurity, or 5½ pounds, I am talking about the same thing. Now, look what happens when the mother is both short and poor. The percent of low birth weight babies is 30%. It isn't being short that matters. Once again, it is who is short. (Next Slide)

Now we come to school kids. This is a study we did in 1966 when the city of San Francisco was trying to figure out what to do about pregnancy in adolescents. The first thing they wanted to know was whether they even wanted to know. They had a program you could not find in the budget even if you tried. The question was whether the hidden budget should be bigger next year and that had to do with how many pregnant kids there were in the schools. Our study indicated there were 600 in a city of 700,000 people. We took a look at the 30 mothers who were 12-14 years old to see if age determined birth weight. If this were so, the very youngest should have the smallest babies. (Next Slide) 4000 grams is something like 8½ to 9 pounds and 3500 grams is 7 lbs. 11 oz. You see that some 12-14 year olds have babies as big as 9 pounds. The average have lighter babies but they can have very large babies. So again age of mother is not a determinant of low birth weight. It simply questions what the circumstances surrounding that young lady were. (Next Slide)

Here are the same 12-14 year old kids. These are the birth weights plotted against the mother's height. If you look at 64 inches, you again see that there is a very large spread in birth weights. We conclude it is not height, it is not race and it is not age that determines birth weight. It is something about the mother that determines it.

I have been involved in the study of nutrition because it is one of those things that you can vary for a family. It is one of the things you can do something about and hopefully you can measure it. I will show you some of the problems and what you can do. (Next Slide)

Even though it is difficult to say what it is that leads to low birth weight babies, we do know that things related to diet show the strongest

influence on what kind of a baby a mother is going to have. For a long time pregnant women were told to restrict their weight gain to 10-15 pounds. I have seen adolescents put on a 800-1000 calorie diet during pregnancy. The reason this happened is that if you don't think diet matters, then it doesn't matter what kind of a diet you put a person on. So the first thing you have to be convinced of yourself is that it matters and that is why I have gone through this data. If you look at what healthy pregnant women do left to their own devices, they gain 24 pounds on the average. That is nature's way. (Next Slide)

What we know is that there are three things most likely related to birth weight. The first is a mother's weight gain. If the weight gain in pregnancy is too little, then the chances of having a low birth weight are very high. As the average weight gain goes up, you have less low birth weight babies. The second is a mother's weight. Women who are underweight are more apt to have low birth weight babies. Now you are talking about adolescents. In Children's Hospital two summers ago, there were ten kids treated for Anorexia Nervosa. I thought that Anorexia Nervosa was a problem that had disappeared. Anorexia Nervosa is a disorder where people start off starving in order to improve their body image. It gets to the point where they lose control. When the body weight gets down to 60-70 pounds, then they may very well die. Anyway, adolescent women as a group tend to be either underweight or overweight. The third thing most related to low birth weight is trouble in previous pregnancies. (Next Slide)

I show you this slide simply as another indication of why the weight gain has to be enough and to make a point when we come back to the adolescent. If you add up the components of a pregnancy you can account for about 20½ pounds.

Very often we think about the weight gain as just being the weight of the baby. Actually a whole lot of things change. The fetus, the placenta, the fluid, the uterus, breasts, interstitial fluid and maternal blood are all part and parcel of the normal accoutrements that go with a healthy pregnancy. (Next Slide)

There are two girls I would like to talk about. Note there is a little triangle in the upper left hand side which shows a girl who had an 8 pound baby and a 10 pound weight gain. Now if she has an 8 pound baby and a 10 pound weight gain, the growth must have come at the expense of the rest of her body. Then the question concerns the long term consequences for that growing adolescent. Does anybody keep those kinds of records? My guess is that they don't.

The second girl is one who had a baby weighing about $7\frac{1}{2}$ pounds who gained 65 pounds. What are the long term consequences for her? Who keeps that kind of data systematically? To my knowledge, no one. (Next Slide)

These are the nutritional recommendations for pregnancy. It indicates how much protein these kids need. I would like to show you the problems with that. (Next Slide)

That last slide predicts what a growing adolescent needs as far as protein is concerned. The vertical bars are what we actually found when we studied the kids. It says that a lot of our recommendations are designed to maintain healthy people in a state of good health. How often is the adolescent that you are dealing with healthy? How much do we know about the girl's nutritional status when she is first seen? Very little. So if you simply pass out a diet sheet or assume that her past dietary standard has been excellent, you may be wrong. And then you have problems. (Next Slide)

Now we come down to the part which I think is more immediately related to you. This has to do with the numbers of pregnant school kids today. Many people have hoped that the problem would go away and I think everyone in the room is aware that it has not. Last year I was told that Monmouth County had 40 babies born to girls 12-14 years old. I don't know what it would be here in Essex County but I would bet it would be very high. And not only is there no decrease in the number of babies born to kids 12-14, but these are the kids who don't relinquish their babies. These are also the babies that wind up in the hospital for failure to thrive. These are the babies that Mr. Stickle talked about. If you compare the intellectual performance of the babies born to these young ladies with those born to mothers of 20-24 years, the former do less well. So it is the 12-14 year olds that present the major problems because there are more of them, because there are severe problems to both mother and fetus, and because of the few services available for these kids.

This is the number of pregnant school kids in the City of New York going from 1700 in 1960 to 4600 in 1974. What is interesting is that this was when money was still around--before the crunch came in New York. There were provisions for special education programs for 900 of those 4600 kids and when the budget cuts came to the schools that was the first program that was threatened. The only reason it survived was because the March of Dimes in New York convened people who were concerned and managed to keep that thing afloat. (Next Slide)

This shows the same kind of phenomenon as the national one. The number of babies born to girls under 16 have a mortality rate 2 to 3 times as great as other people, as healthy 20-24 year olds. (Next Slide) The basic reason

that happens is because they have more low birth weight babies. I would like to summarize what happens to these kids in terms of their health. (Next Slide) This shows the increase in the number of very young kids showing up for prenatal care in Parkland Hospital, Dallas, Texas. The next slide shows a study group and a control group. The data from the study group shows that 3/4 of the kids under 15 have less than six prenatal visits during the whole pregnancy. 35% of these kids wind up with high blood pressure during their pregnancy; 20% of these kids have low birth weight babies. Most studies show that even when these kids get married, half of them leave the school system. A study at Penn. State showed that 7% of married boy teenagers drop out of school as compared with 50% of the girls.

Let me close by telling you how I used to ask my father-in-law who was a school principal in central Pennsylvania what the problems were with pregnancy and adolescents. He would always tell me there were not any. I would ask him if any one in his school knew about any problems. Did the nurse know and he would say "No." What he did tell me was that the high school class had 1/3 more boys than girls. And when I asked him where the girls went he would say simply that the families with daughters had moved away. Thank you very much.

Christa M. Brinker currently serves as Regional Program Coordinator for the Mid-Atlantic States for the National Foundation/March of Dimes. Her responsibility is to encourage and facilitate March of Dimes' educational programs, especially as they relate to health and parenthood education. Her background includes the positions of public health nurse for the Baltimore City Health Department, research assistant at Johns Hopkins University's Child Growth and Development Study, consumer specialist for the Pennsylvania Department of Agriculture and radio broadcaster for WHJB in Greensburg, Pennsylvania.

BIRTH DEFECTS--DRUGS, ALCOHOL AND TOBACCO

I have a number of things to share with you today. In addition, as regional program director for the March of Dimes, I want to help you to understand the March of Dimes as a resource agency. It is interesting when your moderator says that your speakers are experts in the field. I do not consider myself an expert in the field of the effects of drugs, alcohol and tobacco on the fetus. I have not specifically worked in the research area of any of the environmental causes, but I do have a knowledge of these problems. I was involved in the national mother-child collaborative project that looked at what causes cerebral palsy and mental retardation. It was the child growth and development project that Dr. Davidson referred to at Johns Hopkins which was one of the 15 university hospitals involved in this major study.

A lot of our approaches to obstetrical and prenatal care are new approaches which came out of that collaborative study on mothers and children. One of the things that, prior to the study in 1958-59, I was involved in, was the early collection of data on how many packs of cigarettes or indeed how many cigarettes women smoked during their pregnancy. We compared that data with the outcome weight of the baby. One thing we found was that as the number of cigarettes the woman smoked increased, the birth weight of the baby decreased. We did not know at first whether this was actually due to the cigarettes or not. Some said perhaps this was due to the nicotine element which, as a vasoconstrictor, could interfere with the circulation of the blood within the mother's body. This, in turn, might cut down the circulatory flow of the blood through the placenta to the baby. This has been demonstrated through studies done on the fetus which show deprivation of the appropriate nutrients due to the cutting off or limitation of, the circulatory rate. However, we suspected a number of other things were influencing the outcome of pregnancy. It seemed

that many of the women who were heavy smokers were also nutritionally deprived so that there was a combination of issues. Much of what I am going to share with you today shows that it isn't just one thing that causes a problem in the outcome of a pregnancy--the causes are multifactorial. We need to look at other causes, both nutritional and genetic, when looking at the problems that result from the use of drugs, alcohol and tobacco. Many of you have recently heard about the studies done on alcoholic mothers who gave birth to severely retarded children which resulted in the discovery of the fetal alcohol syndrome. The March of Dimes has an excellent film called, "Alcohol Crisis for the Unborn" which is available through your local chapters. I will not show the entire film but I want you to see what they categorize as a child with fetal alcohol syndrome so that you can better visualize the physical and mental retardation. Then, I would like to talk with you a little further about the effects of alcohol on pregnancy.

(Film shown)

You have seen five or six minutes of this film. The rest discusses some of the laboratory research being done and looks at several factors--one being genetic--affecting the outcome of a pregnancy. Not every alcoholic mother will have a child with fetal alcohol syndrome. The outcome of pregnancy is multifactorial. In studies done, it has been found that the blood alcohol levels in humans vary because of genetic make-up. You may be able to drink a six pack of beer and never show it while I may have two beers and do show it. Researchers are concerned with the higher blood alcohol levels in genetically different animals. They have found that higher or lower variations of blood alcohol levels determine whether the fetus is going to do poorly or be retarded in any way.

One point the film does not bring out is that the alcoholic is generally a nutritionally deprived person. In general, alcoholics do not eat well and they

have difficulty utilizing those nutrients that they do take in. It has to be a combination of things that affect the outcome of a pregnancy; the alcohol consumption, the nutrition and the genetics. The film does point out that we may have degrees of fetal alcohol syndrome. While we may look only at the severely retarded child with an IQ of 40, there may be other babies who have been compromised in utero because of the mother's alcohol consumption during pregnancy. This is a point worthy of considering and certainly the advice of the film is that mothers not consume any alcohol during pregnancy.

Another area that I want to mention deals with the drug issue. We have a new film out called, "Born Hooked." It is 15 minutes long which makes it good for classroom use as there is time after showing for discussion. "Born Hooked" is about the problem of the addicted mother and her baby and deals mostly with heroin addicts.

Some of you may be using the film strip, "Tomorrow Happens Today," which dwells on environmental problems and gets into drugs, alcohol and smoking. It also covers VD, genetic counseling, nutrition and the need for good prenatal care. You may wish to preview it for use with 7th and 8th graders. I feel comfortable using it with that age group but you may not. The film does discuss venereal disease, a touchy issue. It goes into some of the concerns of getting in touch with your sexual contacts and mentions other things that you may have problems with in your school.

The March of Dimes is getting into the presentation of educational programs in a big way. This is a recent step. We are excited about the development of our Department of Education at headquarters. It means that the monies raised by our chapters will be used not only for medical service programs but also for educational service programs; public health education programs in the community and schools, and professional health education programs in the health professions

arena. Programs for pregnant teens on prenatal education and nutritional education can be a service provided by a grant from the March of Dimes. Other materials and programs can also be provided.

I want to bring you up to date quickly on what is happening in our development of materials. We grant funded a program at the Educational Development Center of Newton, Mass., called "Starting a Healthy Family." It was listed for grades 7-12 but we are piloting it in grades 7-8. Some of you as home economic teachers may have already used the EDC child development curriculum, "Exploring Childhood." "Starting a Healthy Family" is a curriculum that deals with all the issues we have discussed in today's program. It is aimed at the student long before we hope they choose to become a parent. Since 95% of us in this country do become parents at some time or other, it is worth considering that we train our young people for this pursuit. To succeed, our young people need examples and the kinds of information we have been discussing today. They need to know the choices they can make in life--even to choose to be non-parents. This is a subject to be looked at and discussed in the classroom.

One subject that we have mentioned today is the adolescent becoming a parent too soon. For this we needed an extra special curriculum and group of materials to use with school-age parents. For this reason, the March of Dimes funded Bank Street College of Education to develop some hard hitting yet visual and vibrant materials written at the level of today's teenager. Teenagers live in a visual world and often are not reading on grade level. So Bank Street, in their own unique way, has come up with a kit of materials for classroom use. It includes a chart showing the gestation of the fetus from conception to term, and lists all the things that are happening within the mother and baby. It points out nutritional concerns and the impact of environment. There are also comic books in the kit; one comic book is called Days of Change and, in a soap

opera theme, deals with the concerns for prenatal care; the other book is called Junk Food Blues and deals with the importance of good nutrition in pregnancy. There are also some posters, flash cards and a student book called Inside Your Head, Inside Your Body. This is a text with a teachers' manual to accompany it. Some people have asked if these materials are for use only with pregnant teens. I think they can be used with all young people because they have the information we need to get across in child development programs, in family life programs and in human sexuality programs.

We are planning in the future to release some TV spots dealing with nutrition and prenatal care which are aimed at the teenager. Some disk jockey scripts are also being planned to be inserted in some of the top pop music shows so that the DJ's can start to get our message through to the teens. If you listen closely to the words of today's music, the messages that are coming across give the young people very mixed feelings about their own sexuality and how they should handle it. These may conflict with some of the things that school, family and church are saying are the ethical and right things to do.

You may wish to look into some of these programs that I'll mention in summary. Those of you who are working with junior high level people should be aware of an excellent video taped program called, "The Middle Road Travel." It is being used in the Houston schools and is good. The March of Dimes has given the Biological Sciences Curriculum Studies Center in Boulder, Colorado, a grant to develop guidelines for genetic education programs within the schools. One of the education systems which has now required that human genetics be part of K-12 education is the State of California. They have a very interesting curriculum called "Genetic Conditions or if You Only Know That." I would recommend that you get an opportunity to look into it. There is another curriculum that we grant funded at the Curriculum Center at Catholic University

which is called, "Curriculum for Health Education: Nutrition." Although it emphasizes nutrition in one module, it gets into a module on community resources, a module on consumer education, and another module on the handicapped child. This module is to help the normal child and teacher in the school room situation more readily accept the handicapped person. Although the curriculum was developed to be used in the parochial schools, many public schools are using it as a part of their health education program. We have used it in some in-service programs including one in Newark.

I would like to close by mentioning a factor which is not on the agenda. That is some environmental hazards we have not already discussed. Recently the National Foundation for the March of Dimes and the National Institute for Occupational Safety and Health sponsored a conference titled, "Women in the Work Place." It was very interesting to look at the exposure that men and women have in their work environment and to consider the effect that this could have on any children they may bear in the future. The program dealt with the pregnant woman, who, many times today opts to stay on the job, and the effects her environment at work may have on the baby. We should be aware that there are hazards. We are all aware of some of the more severe hazards such as asbestos, X-rays, lead and other components that could affect the outcome of pregnancy. As citizens in the community we should all be aware of the hazards in the air we breathe, the water we drink and the food we eat.

I should mention a health education project for those of you here who might be from community agencies or from business and industry. It would be worth thinking about starting some in-plant health education projects particularly as they affect family health. The March of Dimes, with the American Association of Occupational Health Medicine and Occupational Health Nurses,

Christa Brinker

has developed a program called, "All in Your Family." It is an in-plant health education project dealing with all the issues surrounding good maternal and infant health care. Another in-plant program is the Educational Development Center's "Starting a Healthy Family" which I already mentioned. It has parent seminars which run parallel with the classroom curriculum for the students. Thank you very much.

Dr. Franklin Desposito is presently Associate Professor of Pediatrics at the New Jersey College of Medicine, the Director of Pediatrics at St. Michael's Medical Center in Newark and Director of the Genetic Center there. Some of his previous hospital appointments include Physician in Charge of the Pediatric Cytogenetic Laboratory at Queens Hospital and the Physician in Charge of the Division of Human Genetics of the Long Island Jewish Medical Center. He is the author of numerous articles relating to pediatrics.

DEALING WITH THE BIRTH DEFECTS PROBLEM

You had a treat this morning. I have been listening in the back for a while and I think the program has been exciting. It has brought you up to date on a lot of things that have happened very recently. To be exposed to this is the first point in education. I would like to echo at the start, and this perhaps is the continuing theme of what I have to say today, that education of our children, our adolescents, our young adults, starts with you, with all of us. That is the most important thing.

In talking about education and health planning, I am reminded of a story of the physician, the engineer and the health planner who are talking about God's profession. The physician says, "well obviously God was a physician since he created Eve from Adam's rib." The engineer said, "wait a minute, before He did that, out of this vast chaos, He created a universe that works and has an order to it." And the health planner says, "now I've got you, who do you think started the chaos?"

I think that part of the problem we are dealing with has to be looked at in terms of the health care delivery system itself. Education needs to go to the general population and to the physician as well. Much of what you have heard today is relatively new and I will bet that many of you have known older physicians who have less understanding of the new concepts of genetics or some other new things that are happening or are available. They have not been kept up to date.

I would remind you that many of the things you heard about today have all been developed in the last 20 years. For example, when I went to college we were taught that humans had 48 chromosomes. When I finished medical school, we were also taught that humans had 48 chromosomes. It was just a freak

accident in a Paris laboratory that someone inadvertently used some distilled water instead of saline and found in fact that humans have only 46. That was in the mid-1950's (in 1956) and it was really only in the early 1960's that the chromosomal techniques that Ms. Lilienthal told you about were available or the newer technique of looking at chromosomes from the amniotic fluid which receives or contains cells shed from the baby. You can actually look at the chromosomes of that baby. This technique has not really been available to any great degree before the last 7 or 8 years.

In terms of progress, the March of Dimes has changed. It initially focused on poliomyelitis by funding programs and providing information on dealing with this disease. The organization was of course very instrumental in developing vaccines. With the eradication, hopefully, of most cases of polio, their support has now moved on to birth defects. They have become heavily involved in education, which I think is a great direction, and are putting stress on the pregnancy: prenatally, perinatally, postnatally. I hope that the March of Dimes people do not forget the genetic counselors with their scare about some of the abortion problems that have been raised. These are obviously important.

I would like to summarize some of what has been said this morning, tell you a little about what is available in the State of New Jersey and indicate where I see some of the emphasis being placed. Since hypoglycemia, or low blood sugar, is one of the consequences of speaking late in the morning and since that is one of the major problems with the undergrown babies—that they don't have high enough blood sugars and this damages their brains if unrecognized—I will attempt to stop by 12:30.

Again I would like to say I think that in no way can physicians either a) have the time, b) have the interest, many times unfortunately, to provide educational information, such as you have been treated to this morning,

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about genetics, birth defects and malformations, proper nutrition and proper growth of babies to everyone. There is just no way that that can be done. I think that as informed citizens we need to know about these things ourselves. We have to, as part of being adults, as a part of being educators, tell our children about it, tell our classes about it.

Information about genetics, like you have heard this morning, needs to start in the grammar schools. I am not sure at what age it should start but obviously, with various programs, one could build it up in steps. Certainly, it must be available in the junior high and high schools. This information has to be disseminated and you are the ones that are going to be doing it. The burden is going to fall on you to be informed about these things and to present current information to your classes. You have heard about marvelous ways the March of Dimes has been providing education materials and other information and this is where it has to start. Unfortunately, doctors are too busy and may not be as well informed as perhaps they ought to be.

Let me give you some idea of the scope of the problem. You have heard about nutritional problems, fetal alcohol problems, amniocentesis and chromosomal problems. Just let me give you some idea of the numbers we are talking about. How many babies are born each year? What percentage are affected with these different categories? It does vary from study to study so I will give you approximate numbers. You will, however, get some ball park figure of the magnitude of the problem of congenital malformations and some of their causes.

The overall incidence of a major birth defect in the population is 2%. The possibility of having a child with a birth defect is something that I find most people do not think about before they have children or plan a family. They do not think that there is a risk of having a birth defect attendant upon every pregnancy. Throughout the world that incidence is

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roughly 2, 2.4, 2.5% of the children born - that is 2 in 100 - have a major birth defect like the things you have heard about today. These are problems to those actually born. If you also look at spontaneous miscarriages or spontaneous abortions, obviously the incidence of birth defects is much higher. Spontaneous abortions, in a sense, are nature's way of terminating the fetus that is malformed. Obviously then, there are many more kinds of birth defects, many more kinds of severe birth defects, that do not allow survival through the complete pregnancy. The incidence of spontaneous miscarriages is about 10-12% of pregnancies. Of the number of those that miscarry, roughly 30-40% represent a severe chromosomal abnormality. Some of these are Downs Syndrome but most of them have other kinds of birth defects. These are primarily miscarriages that occur in the first three months of pregnancy. The remainder of the causes for spontaneous miscarriages probably have to do with the environment in which the fetus lives: that is faulty implantation of the fetus on the placental wall, poor blood supply, some abnormality of the placenta itself, or a poor hormonal environment. These kinds of things represent the other 60% of miscarriages.

There seem to be some differences in the types of birth defects that one sees. As you can imagine, the more severe malformations will miscarry. Those less severe, in terms of involving more critical organ systems, may survive to deliver at term. I do have some data just to indicate this to you. For example, there is a birth defect known as myelomeningocele which is an opening at the back of the spine. Many times it is associated with paralysis of the lower extremities, mental retardation, and possibly hydrocephalus. The overall incidence of this birth defect is 1.4 per 1000 births. If you look at spontaneous miscarriages, the incidence of myelomeningocele is 31 per 1000. You can see that there are other kinds of malformations that have higher frequencies.

If we take all the malformations and divide them into three major categories, this is a simplification, it will give you some idea of where the birth defects are. You have genetic, teratogenic (by this I mean environmental—that is drugs, infections before or during pregnancy) and then a third group for which we don't know or understand the causes. About two percent of all children born, 2 per 100, have a major birth defect. 1.3% are due to genetic causes including multifactorial (0.7%) inheritance, Mendelian (0.4%) inheritance which include the classic recessive/dominant, X linked genetically transmitted disorders and, chromosomal abnormalities (0.2%).

The multifactorial inheritance patterns which have combined genetic influences provide the highest incidence. This is where some of the environmental factors and drugs should be looked at since we do not quite understand how they work or whether they affect some families and not others. We should look for and attempt to find those families that are at risk for certain drugs and other families at risk because of the interactions between genetics and environment.

The thing we have heard about and talked about for 100 years or so is the nature/nurture, genetics/environment relationship. There is a true interaction and we are now perhaps beginning to understand a little about this but we still do not know very much about how it works. For example, the kinds of birth defects that usually involve single organs, like cleft lip or palate defect, a congenital heart defect, a club foot defect and the myelomeningocele defect, are thought to represent multifactorial inheritance patterns. They have a relatively low recurrence risk but in any event it may be - and there are some studies which suggest it - that certain drugs and environmental agents may bring out these kinds of birth defects in a genetically predisposed family. This is an area which is very important and is one of the reasons why there is a lot of conflicting information about which drugs one can safely take during

pregnancy. No one really knows. The simple answer is to say "don't take anything" and the same is true with alcohol. It is obviously not clear as to what interaction there is between the genetic factors and environmental factors that are contributing to the fetal alcohol syndrome.

The second category is the teratogenic one. There are lists of: those drugs that have a definite relationship to birth defects; those that are probably related; those that are of questionable relation; those that are probably not related; and those that are negatively related. I think that those you have heard about today are those that have been described as producing birth defects with clear assurance. There are lots of drugs that appear to be questionable - that we are not really sure of yet. One can get a compendium of these that is put out by the March of Dimes Foundation. But obviously, no one can have all the information at hand about all the kinds of things that one is exposed to. Those drugs that constitute a definite relationship are: alcohol, dilantin, thalidomide, the antichemotherapeutic agents, the anti-cancer agents, Warfarin and some other things. These account for a very small percent of birth defects (0.05%); those due to maternal conditions such as diabetes, epilepsy and nutritional factors account for 0.1%. Those related to maternal infections - you have heard about venereal disease today but there are other kinds of intrauterine acquired infections, placentally acquired infections or relatively inapparent infections which don't infect the mother but cross the placenta and affect the developing fetal cells - account for 0.1%. So, we are dealing with 1.3% being genetic, 0.25% being related to teratogens and 0.6% are left in that third unknown cause category.

Let me take a second here to say something about ionizing radiation. This has been looked at very carefully, and you can still be on one side of the fence or the other about it. The data seems to be relatively reassuring that one needs in excess of 50 rads for there to be any teratogenic effect.

That means that unless one is undergoing radiotherapy during pregnancy, routine chest X-rays are probably not harmful. Again, the precaution is to say don't get X-rayed during pregnancy unless there is a specific medical indication for it. On the other hand, if there is a specific medical indication which cannot be put off, then it's better to have the study done because the chance of there being any damage is minimal. I think that is the kind of information that ought to come out of all the things you have heard today.

Before I close, let me do a 90 degree turn and tell you what counseling and laboratory services are available in the State of New Jersey. I cannot stress enough the importance of education, and of an informed people knowing about what is available, where they can get help, what things are dangerous and what are not.

Most of the things that we do in genetic counseling - and that is primarily what I do - is reassurance. That is important. In New Jersey there are two major genetic counseling centers. By the way, in New York almost every medical school has a genetic counseling service of high quality. In New Jersey, one center is at the New Jersey Medical School located in Newark and the other is at Rutgers based at St. Peter's Hospital. At both centers, we have a number of genetic counselors. At the New Jersey Medical School, we have half a dozen technicians. We are able to do most of the biochemical analysis, the amniocentesis and, of course, chromosomal things.

More important than this is the dissemination to physicians and to educators of where this is available. The National Foundation of the March of Dimes has a listing of genetic counseling centers throughout the country and includes the types of services available.

I see that we have now run out of time. Thank you very much.

STEERING COMMITTEE

BETH CRAWLEY
Community Service Representative
Essex County March of Dimes

MICHAEL S. DAVIDSON, Ed.D.
Faculty, Department of Health Professions
Montclair State College

JOAN FICKE, Ed.D.
Faculty, Department of Health Professions
Montclair State College

MARK KAELIN, M.A.
Faculty, Department of Health Professions
Montclair State College

ROGER MC HUGH
Director
Essex County March of Dimes

PHILIP A. MC LAUGHLIN
Vice Chairman
Essex County March of Dimes

MICHAEL D. MC MAHON
Treasurer
Essex County March of Dimes

WALTER L. MITCHELL, M.D.
Medical Advisory Committee Chairman
Essex County March of Dimes

BERNARD RYAN, Ed.D.
Principal
Maplewood Junior High School

Conference on Birth Defects
for
Educators

May 4, 1978

SCHEDULE

- 8:30 a.m. Registration
- 9:00 Welcome and Introduction
- MICHAEL S. DAVIDSON, Ed.D.
 Conference Chairman
 Montclair State College
- 9:05 "The Health of America's Babies: How Do We Stack Up?"
- MR. GABRIEL STICKLE, VICE PRESIDENT FOR EDUCATION
 National Foundation, March of Dimes
- 9:20 "Genetic Counseling for Pre-Natal Diagnosis--Amniocentesis"
- EVELYN LILIENTHAL, M.S., GENETIC COUNSELOR
 Medical Genetics Unit
 Westchester County Medical Center
 Valhalla, N.Y.
- 10:00 "Birth Defects and Venereal Disease"
- THELMA THIEL, R.N., EXECUTIVE DIRECTOR
 Venereal Disease Service Organization
 East Orange, N.J.
- 10:30 "Birth Defects and Nutrition"
- HOWARD JACOBSON, M.D., PROFESSOR OF NUTRITION
 Rutgers Medical School
 Piscataway, N.J.
- 11:00 "Birth Defects--Drugs, Alcohol and Tobacco"
- CHRISTA BRINKER, R.N., REGIONAL PROGRAM COORDINATOR
 March of Dimes
 Greensberg, Pa.
- 11:30 "Dealing With The Birth Defects Problem"
- FRANKLIN DESPOSITO, M.D., DIRECTOR
 Genetics Center
 St. Michael's Medical Center
 Newark, N.J.

12:30 p.m. LUNCH

1:30 WORKSHOPS ON TEACHING ABOUT BIRTH DEFECTS
THREE CONCURRENT SESSIONS
SMALL GROUP DISCUSSIONS

WORKSHOP FACILITATORS

Thelma Thiel, R.N.
Venereal Disease Service Organization

Noreen Boyd
Teacher
Livingston High School

Jean Schroeter
Teacher
Maplewood Junior High School

2:30 WORKSHOP SUMMARIES

3:00 MEDIA SHOWING
March of Dimes Audio-Visual Material

Miss Beth Crawley
Community Service Representative
Essex County March of Dimes

4:00 CONFERENCE ADJOURNMENT