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GENETIC COUNSELING

Physicians are often consulted by parents about the chance that their children will develop a disease present in a sib or some other relative, by patients fearful of contracting a familial disease, or by adoption agencies which must decide whether children with certain family histories should be placed for adoption. The answers to such questions constitute genetic counseling, even if the genetic basis of the condition is unknown or thought not to be important.

Nearly all of such counseling is, and should be, done by physicians, since human geneticist are few in numbers, academic in interests, unfamiliar with the patient, and usually ignorant of clinical medicine. To supplement the physicians training in medical genetics there are several useful references specifically on counseling and genetic risks. It is important to remember that psychological, economic, and religious factors largely condition the interpretation of a genetic risk and the action that this information may lead to, and the physician must decide for himself whether he wishes to offer advice. It is the policy of the various counseling centers in this country not to give advice, but only information. The following problems are typical.

Example 1. A student consulted the Heredity Clinic at the University of Michigan because his mother was institutionalized with Huntington's chorea. He gave a typical family history of this dominant disease, with 4 other close relatives affected. He wished information as to the probability that he would develop the disease and transmit it to his children. Since the gene usually does not manifest itself clinically until after the age of 30, he was told that the probability was 1 in 2 that he would develop the disease, and if he did, a further 1 in 2 that any child would also be affected. His EEG pattern was normal. There is some evidence that the EEG pattern in this

disease is abnormal long before clinical symptoms begin, but until this is studied further, no prognosis can be made, and the patient must decide whether he wishes to undertake the responsibility of a family with so uncertain a future.

Example 2. The uncle of a child with infantile amaurotic idiocy asks what is the likelihood that his newborn son will develop or transmit the disease. This is a typical recessive condition, with a carrier frequency of 2% or less. Since the probability is 1/2 that the uncle is a carrier, the probability that his son will develop the disease is not more than (1/2) (.02) (1/4) = .0025, and the probability for an affected grandchild not more than half of this, or .00125.

Example 3. A physician wrote to the Department of Medical Genetics at the University of Wisconsin about the following problem. A patient has a child with marked spina bifida, meningomyelocele, and hydrocephalus. The mother believed that spina bifida had also occurred in both her relatives and her husband's, but the exact relationships and the numbers of normal children were not given. The parents want to have more children if there is a reasonable chance that they will be normal. The genetics of spina bifida is quite confused, with a continuous gradation from severe to occult cases, which are often not diagnosed. Several studies agree that the risk of a second child with spina bifida is about 3% for each subsequent child, but the risk is probably greater in some families and less in others. Spina bifida is often accompanied by other abnormalities, but the risk of repetition of severe malformation seems to be no greater in such cases. It is impossible to evaluate the sketchy family history. The final impression is that, if the parents try again, the odds are in favor of a normal child.

Example 4. The patient has a cleft lip and palate, and his parents are first cousins. From three large-scale studies, it appears that the risk of this condition in subsequent children is about 5%, whether or not the parents are related. This would be the most appropriate figure to give the parents, but it is of course possible that this is a rare instance of recessive cleft palate, and the risk is 25%.

Example 5. The patient has bilateral retinoblastoma, and both eyes have been enucleated. He cannot adopt a child, because the adoption agency does not consider a blind person a suitable adoptive parent. Estimates of the proportion of retinoblastomas that are due to a dominant gene range from 100% to 25%, the remainder being nonheritable phenocopies. The patient's chance of producing a child with retinoblastoma is either 50% or 0. Should he have a child?

Example 6. A French Canadian couple had four children, of whom three died in infancy from congenital heart disease. The mother tried unsuccessfully to abort her last children, and is depressed and hostile, especially to her husband. It is unusual to have three cases of congenital heart disease in one sibship, but such instances occur commonly in Marfan's syndrome, a disease due to a dominant gene with variable expression. This was definitely ruled out in the mother, and probably in the father. The attending physician felt that the mother required psychiatric treatment and that serious consequences might result either from repetition of the disease, if she were encouraged by a favorable prognosis to have more children, or from antagonism to the husband, if she were discouraged from having children by the risk of dominant inheritance.

Example 7. An engaged couple, who happened to be first cousins, consulted a physician about the risks involved in consanguineous marriage. On the basis of several studies, they were told that the chances of infant death and congenital malformation were approximately doubled in first cousin marriage, but that the odds were still in favor of normal children. Result: the prospective husband concluded that the risks were too great, while the prospective wife decided that they were not. Was the counseling done correctly?

Example 8. The patient was born with a bilateral cleft lip and palate, which was not repaired until maturity because of parental neglect. The patient's marriage is unsuccessful, and his wife is hostile and agressive. Their first child has a defect like his father's. The couple came to a physician with the conviction that all subsequent children will be affected. They are told on the basis of Danish studies that the risk for subsequent children, given an affected parent and sib, is only about 15%. They are not pleased with this "good news", since they had decided not to have more children anyway, and decide that the physician's advice is unreliable. If you were the physician, how would you have handled this?

References

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