Leprosy in Twins[1]

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Previous field studies in this Institute ([3, 4, 5, 6, 7]) have indicated that leprosy may have an inherited factor in its causation apart from infection by *Mycobacterium leprae*. Taking into account that convincing evidence of genetic influence could best be obtained from a study of the disease in twins, we embarked on such an investigation in 1962. A preliminary paper on the study was published in 1964 ([6]). Several early workers have reported on the occurrence of leprosy in twins. Keil ([2]) reported seven pairs in 1939, Ryrie ([8]) one pair in the same year, and Brown and Stone ([1]) one pair in 1959. Spickett ([9]) wrote about 14 pairs, but did not note the source of his information.

The purpose of this paper is to present a short account of 35 pairs of twins, aged from 7 to 60 years, that we have investigated personally.

DIAGNOSIS OF ZYGOSITY

As in all twin studies, the crucial point is proper determination of zygosity. In determining zygosity in our twin series we have relied upon what is usually known as "similarity diagnosis." Different-sexed twins presented no difficulty. In the case of striking similarity in physical features in like-sexed children, also, there was no problem. In some like-sexed twins, especially aged ones, however, it was not easy to establish the diagnosis. However, essential identity in (1) color, texture, and form of hair, (2) color of eyes and pigment pattern of the iris, (3) shape of nose, lips, chin, and ears, (4) type of teeth, including irregularities, and (5) blood groups (we could do only ABO, Rh and MN groups for want of other appropriate antisera) was considered as

TABLE 1. *Data on zygosity of twins and concordance with respect to leprosy.*

		Number	Per cent
1	Number twin pairs examined	35	
2	Number judged monozygotic (M.Z.)	23	
3	Number judged dizygotic (D.Z.)	12	
4	Number of monozygotic both suffering from leprosy, and concordance rate	19	82.6
5	Number dizygotic both suffering from leprosy, and concordance rate	2	16.7
6	Number dizygotic, one only suffering from leprosy, and discordance rate	10	83.3
7	Number monozygotic, both suffering from leprosy and having same type of disease, and % of all M.Z. both with leprosy	17	89.5
8	Number dizygotic both suffering from leprosy and having same type of disease and % of all D.Z.	0	0.0

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determining the diagnosis of zygosity in our twins. We did not resort to the skin-grafting test, which is the final appeal in difficult cases. A protocol indicating the data used at the time of examination of the twins is given as an appendix to this paper. The results of the study are summarized in Table 1. Our studies are continuing.

SUMMARY

Data from this study (summarized in Table 1) provide *prima facie* evidence that in all likelihood there may be an inherited factor in the causation of leprosy. An extraordinarily high concordance rate (column 4 in table) for the disease in monozygotic twins and an equally high discordance rate (column 6 in table) in dizygotic twins give credence to the view. Furthermore, the striking fact that the type of disease in the affected monozygotic twins was the same to the extent of 89.5 per cent (column 7 in table) lends support to the view that the type of leprosy also may be genetically influenced.

RESUMEN

Los datos obtenidos de este estudio (resumido en Tabla I) constituyen evidencia a primera vista que con toda probabilidad puede existir un factor hereditario en la causa de la lepra. Una tasa extraordinariamente alta de concordancia (columna 4 en la tabla) para la enfermedad en mellizos monozigóticos, y una tasa igualmente alta de discordancia (columna 6 en la tabla) en mellizos dizigóticos dan base a esta manera de pensar. Mas aún el hecho sobresaliente que el tipo de enfermedad en los mellizos enfermos monozigóticos fué el mismo en un 89.5 per ciento (columna 7 en la tabla) hace suponer que el tipo de lepra puede también estar geneticamente influenciado.

RÉSUMÉ

Les données recueillies au cours de cette étude, et qui sont resumées dans la Table 1, fournissent à première vue les arguments pour conclure, en toute probabilité, à l'existence d'un facteur héréditaire dans l'etiologie de la lèpre. Un taux de concordance extraordinairement élevé (voir colonne 4 dans la table) chez les jumeaux monozygotiques et un taux de discordance également élevé chez les jumeaux dizygotiques (colonne 6 dans la table) renforce cette vue. En outre, le fait frappant que, chez les jumeaux monozygotiques atteints de la maladie, le type de lèpre était le même chez 89.5 pour cent d'entre eux (colonne 7 dans la table), fournit un argument en faveur d'une influence génétique sur le type de lèpre également.

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APPENDIX

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Leprosy in Twins

1. Names: Age: Sex: M F
   1) _____
   2) _____
2. Father's name and address:
   _____
   _____
   _____
3. Leprosy in twins:
   a) Both affected Yes/No
   b) Source known? Yes/No
      If yes, relationship and duration of contact:
      _____
   c) Sites involved: _____
      Identical? Yes/No
   d) Age at onset: _____
   e) Were both living together at time of onset? Yes/No
   f) Are they living together now? If not, how long since they were separateted? _____
4. Type of leprosy: _____
   a) Same in both? Yes/No
5. Treatment _____
   If treated, how long since treatment began: _____
6. Other congenital defect or disease: _____
7. Fami'y history:
   a) Number of chi'dren: _____
      Any affected? If so, type: _____
   b) History of leprosy among relatives: _____
8. Traits:
   1. Physical appearance on the whole
      S (Similar)
      D (Dis-similar)
   2. Color, form and texture of hair
      S
      D
   3. Color of eyes
      S
      D
   4. Pigment pattern of iris
      S
      D
   5. Color of skin (apart from tanning)
      S
      D
   6. Shape of nose, lips, chin and ears
      S
      D
   7. Type of teeth (including irregularities)
      S
      D
   8. Type and proportions of hands & fingers
      S
      D
   9. Amount of body-down on face, neck & hands
      S
      D
   10. Time of onset of menstruation
      S
      D
9. Photograph: _____ Appended/No._____
10. Investigations:
    a) Skin smear: _____ Neg./Pos._____
    b) Lepromin test:
       1) _____ Early _____ Late _____
       2) _____ Early _____ Late _____
    c) Blood groups:
       1) _____
       2) _____
    d) Number of ridges on tips of three middle fingers in twin-mates:

	Fingers of left hand		
	2nd	3rd	4th
1) _____			
2) _____			

11. Monozygotic: _____
    Dizygotic: _____
    Undecided: _____

Date of clinical examination: _____

_____
Signature of examiner