Appendectomy in Australian Twins

To the Editor:

We read with great interest the recent article by Basta et al. (1990) on the genetics of acute appendicitis. Family studies such as this can overestimate heritability if family environment is a significant covariate of disease, unless some measure of this is included in the analysis. We felt it might be useful to present appendectomy data from the Australian NH&MRC Twin Registry (ATR), as the classical twin study allows one to estimate the effects of shared environment.

In 1980, all 5,967 pairs of twins over the age of 18 years registered with the ATR (a population-based volunteer registry) were surveyed by mailed questionnaire for a past history of a number of diseases and operations. A total of 3,808 complete pairs returned the questionnaire, a 65% pairwise response rate. In one item, twins were asked to indicate whether they had previously undergone appendectomy and at what age the procedure was performed. Zygosity of twins was determined by response to two questionnaire items (Kasriel and Eaves 1976) and, in ambiguous cases, by the examination of photographs sent in by the twins.

Approximately 21% of all respondents had undergone appendectomy (see table 1), excluding 96 cases where the procedure was performed in the same year as a cholecystectomy or hysterectomy (procedures during which a prophylactic appendectomy is often performed). Females were more likely to report appendectomy than were males, a finding noted in other studies (Phlanz 1978). Mean age at time of operation was 19.5 years for females and 20.0 years for males (difference not significant). The rate of reported childhood appendectomy (i.e., before 18 years of age) increased monotonically from 9% of those born 1955–68 to 15% of those born 1925–34, falling off in earlier-born cohorts.

Overall, MZ female twin pairs were significantly more concordant than were DZ female twins, but MZ and DZ same-sex male pairs showed no such difference in concordance (see table 2). We then performed path analysis under the assumptions of the multifactorial threshold model (as applied to twins) implemented using the weighted least squares (WLS) option in LISREL 7.16 (Heath et al. 1989; Joreskog and Sorbom 1989). The path models tested contained an additive genetic component (G), a shared environmental component (C), a unique environmental component (E), and the age of the twins. There was no significant evidence for heterogeneity of causes in the sexes (homogeneity $\chi^2 = 0.05, P = .99$), and a model comprising an additive genetic and shared environmental components fitted the data well (see table 3). Similar results were derived on stratifying the subjects into three age cohorts (data not shown).

There was also a suggestion of higher concordance
for age at appendectomy in MZ twins than in DZ twins; for pairs concordant for appendectomy performed prior to age 18 years, $r_{\text{MZ}} = .52$ (73 pairs, $P = .001$) and $r_{\text{DZ}} = .29$ (65 pairs, $P = .02$; intracorrelation difference $z = 1.8$, $P_{1-tail} = .03$). A formal evaluation of genetic architecture involved here would require use of the methods of Neale et al. (1989).

In conclusion, we present further evidence for the role of heredity in appendicitis and estimate the heritability of this condition to be approximately 27% (95% confidence interval 10%–50%), and the domesticity or cultural transmissibility to be 16% (range 3%–40%). These findings are in broad agreement with those of Basta et al.

David L. Duffy,* Nicholas G. Martin,* and John D. Mathews†

*Genetic Epidemiology Laboratory, Queensland Institute of Medical Research, Brisbane; and †Menzies School of Health Research, Darwin
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