APPENDIX II

COMPUTER PROGRAMS

Several computer programs are available for the computation involved in the different methods described in this book. There are general statistical packages, in the framework of which some analyses can be conducted, special programs written to deal with data from long-term animal experiments, and specific programs developed for special methods. Some of these have already been mentioned in the text. In this appendix, we mention briefly some of the computer programs that can be applied. No claim of completeness is made.

Throughout this monograph, it is apparent that the analysis of long-term animal experiments requires statistical methods that are adapted to the biological particularities of the field. Consequently, large statistical packages such as BMDP, SAS and SPSS, which address general statistical methods, may not suffice for the specific needs of the analysis of a long-term experiment. Nevertheless, the wide range of methods offered by these packages would allow the majority of statistical calculations to be performed. When they are composed appropriately, full analysis of an experiment can be carried out.

Methods for analysing censored survival data are included in all these packages and allow for the estimation and comparison of survival curves, as discussed in Section 5.3, and can also be used to analyse the occurrence of rapidly lethal occult tumours or observable tumours, as outlined in Section 5.6.

Regression methods for survival data, such as Cox's proportional hazards model, as discussed in Section 6.3, are also a common part of these packages. Methods for the analysis of crude proportions (Section 5.4) can be found in the framework of programs for the analysis of frequency or contingency tables, which also provide a tool for performing analyses of nonlethal occult tumours (Section 5.5), including the regression analyses with logistic models (see also Section 6.3). The methods for the analysis of auxiliary data outlined in Chapter 8 are mainly textbook methods. Thus, the larger statistical packages include programs for the parametric analysis of variance, both for univariate (Section 8.3) and multivariate data, and allowing, in the latter case, for the structure of repeated measurements (Section 8.4).

In any case, when using the facilities of larger statistical packages for the analysis of long-term animal experiments, careful consideration must be given to definition of the appropriate variables in order to analyse properly the correct endpoint(s).

Some special computer programs that have been published in the scientific literature are referenced at appropriate places in the text. These are basically programs for the

analysis of contingency tables (Chapter 5) and parametric Weibull models for time-to-tumour data (Section 6.3). In many of the papers that give special methods, as outlined in Chapter 7, special computer programs are said to be available for the specific purpose. In Chapter 3, we referred to some computer systems that have been developed for the routine storage and management of histopathological data.

Following the publication of Peto *et al.* (1980), a computer program was developed for the analysis of occult tumours when contexts of observation are known (Section 5.7). This simple FORTRAN program, named CARTEST, is available free of charge from IARC in Lyon, France. A corresponding APL program has been published by Rosenkranz (1982), and these methods are also part of the system developed by Roe and Lee (1984).

Finally, a program named RISK81, to fit different dose-response models to crude proportions of tumour-bearing animals, as outlined in Section 6.2, is available from D. Krewski at Health and Welfare Canada in Ottawa, Canada.