
Preface

Teratology is the study of chemical-induced birth defects. The work of the regulatory teratologist is to identify teratogenic agents before they can harm the human population.

The working title of this book was “The Teratologist’s Cookbook.” It is essentially a compendium of recipes for all of the methods, techniques, and technologies used in teratology safety testing. The subject of the volume is centered on regulatory safety testing, i.e., the battery of tests to which new chemicals, foods, or drugs must be submitted by law to ensure that they are safe for use, particularly by pregnant women.

Some of the techniques described herein were developed more than 60 years ago (e.g., alizarin staining of the fetal skeleton), others are just gaining acceptance (e.g., micro CT), while some have still to reach infancy (e.g., informatics-based predictive toxicology).

The first chapters describe the various regulatory guidelines in place around the world for the teratology testing for drugs, vaccines, foods, chemicals, and pesticides. Protocols are then presented for each of the technical procedures performed during the course of these regulatory studies. Place is given to innovative technologies, with which we aim to improve the reliability of our experiments and to gleam as much useful information as possible from each animal used. The next chapters present protocols for alternative or *in vitro* tests, with which, one day, we hope to eliminate the need for animal experiments. Innovations and the future perspectives for predictive techniques are presented and discussed. Other chapters give advice on the presentation and interpretation of experimental results, followed by discussions of the extrapolation of these data to the human.

Teratology holds a historic place in the development of regulatory safety testing, since the thalidomide tragedy triggered the appearance of the first safety testing guidelines in the USA in 1966. The final chapter in the volume reminds us of what can go wrong if we are not diligent in our profession. Our animal experiments are not foolproof and have many limitations; this is even more true for the alternative techniques described in this volume. Nonetheless, thanks to our—albeit imperfect—methods, there has been no reoccurrence of any human tragedy on the scale of the thalidomide disaster caused by malformation-inducing substances. Hundreds, or possibly thousands, of teratogenic substances have been discovered over the last 50 years using methods described in this book, allowing actions to be taken to prevent harmful effects on the unborn child. This is of course no excuse for complacency. Hopefully, new discoveries and improvements in our methods will, one day, eliminate the threat of such tragedies. Ideally, this will be achieved without, or with fewer, laboratory animals.

The word “teratology” seems to have fallen from favor in regulatory circles. One reason for this is that the objectives of the so-called teratology studies have been extended to investigate other adverse effects on the course and outcome of gestation, in addition to the potential of the test substance to induce malformations. Therefore, the pregnant animals used in a teratology experiment also serve to detect other adverse effects to which the pregnant female is particularly susceptible or non-teratogenic effects on the developing embryo (e.g., retarded growth). For this reason, the experiments have been renamed “embryo-fetal,” “prenatal toxicity,” or “developmental toxicity” studies in the various guidelines. Likewise, there

is considerable overlap between the study designs used to assess teratogenicity and those used to evaluate other aspects of reproductive toxicity, such as fertility or postnatal development. The guideline chapters explain how the various investigations fit together, while the protocols and methods chapters generally concentrate on prenatal, embryo-fetal, or teratogenicity investigations.

I like to think that this volume will be useful to researchers in the field of teratology for many years to come. Yet, on the other hand, I will be even happier if new scientific understanding of congenital birth defects renders this book obsolete in the very near future.

The fact that this book made it to print is a testament to the perseverance and hard work of the authors. I extend my gratitude to each of them.

Evreux, France

Paul C. Barrow



<http://www.springer.com/978-1-62703-130-1>

Teratogenicity Testing
Methods and Protocols
Barrow, P.C. (Ed.)
2013, XIV, 601 p., Hardcover
ISBN: 978-1-62703-130-1
A product of Humana Press