
The three Rs: A supplementary selection of references

Replacement

Michael Balls

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Reduction

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The theme of the paper on 'Reduction' is that the number of animals used in biomedical research could be substantially reduced by better experimental design. This involves understanding the causes of variation in the experimental material, and ways in which this variation can be controlled. One important way of controlling variation is to use isogenic animals, which are like immortal clones of genetically identical individuals. Although such animals are usually more uniform than genetically heterogeneous outbred stocks, and their use should result in more powerful experiments, this comes at a cost. A single isogenic strain may not be representative of the species as a whole (a fact which is also true for a single genetically heterogeneous stock), so it may be necessary to use more than one strain. This can usually be done without increasing the total number of animals using factorial experimental designs. This theme, as well as other aspects of good experimental design and statistics, is discussed in some of the papers listed below, published after 1994.

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