The University Of British Columbia

animal welfare program

W.M.Young Centre for Applied Ethics

LOSING GROUND ON THE 3Rs: A Bibliometric Analysis of Changing Patterns in Animal Use

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BACKGROUND

- A primary tenet of animal welfare in research is the 3Rs principle of reduction
- Despite this, Canada and the UK have recently reported an increase in the number of animals used in research
- One reason for this increase is thought to be the creation and use of genetically modified (GM) animals

RESEARCH OBJECTIVES

- Document historic trends in the world-wide use of animals in research
- Identify how the role of research using GM animals contributes to these trends
- Describe changing patterns in GM methods, including species and procedures

METHODS

Bibliometrics is the scientific and quantitative study of published literature.

Bibliometric methods were used to map global trends in animal use including:

- number of studies involving non-GM and GM animals
- number and types of animals used in GM research
- procedures used to genetically modify animals

We sampled 4312 original research articles published in 147 issues of nine scientific journals from 1980-2006 (2 issues/ journal/year). The following journals were selected on the basis of topical nature and impact factor:

- Nature
- Nature Biotechnology
- Nature Cell Biology
- Nature Genetics
- Nature Medicine
- Nature Neuroscience
- Nature Immunology
- Science
- Cell

RESULTS

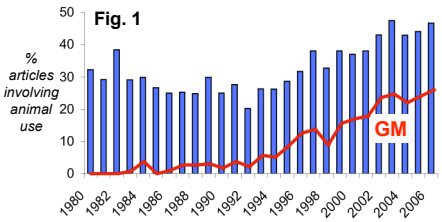

Fig. 1 The percentage of articles that involved the direct use of animals.
The red line shows the proportion of articles involving GM animals.

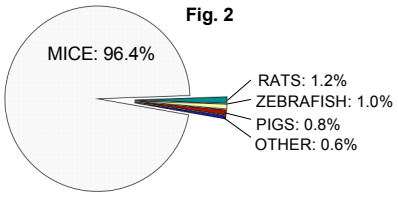

Fig. 2. In the GM articles, mice were the most commonly used species

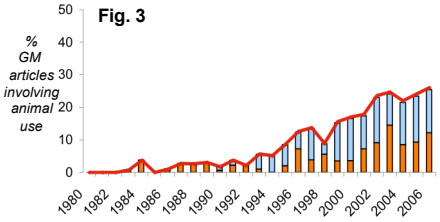

Fig. 3. The relative percentage of GM articles that use random integration (**orange**) and gene targeting (**blue**) procedures

CONCLUSIONS

- The number of publications using animals fell until the early 90s but has since increased
- This increase is driven by increasing use of GM mice
- Random integration remains a popular GM procedure despite being criticised due to inefficiency in animal use and unpredictable effects on animal welfare

These patterns suggest that the genomic research community must accept increasing responsibility for improving laboratory animal welfare, and should consider: **1)** replacement of mice with less sentient organisms, **2)** refinement of current GM procedures to reduce animal numbers and harms.

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