# Correspondence

## NIH policy: mandate goes too far

The planned mandate of the US National Institutes of Health (NIH) to include both sexes in effectively all preclinical studies could undermine its own objective by wasting resources, slowing down research or even provoking a backlash (see J. A. Clayton and F. S. Collins *Nature* **509,** 282–283; 2014). Instead of a blanket mandate, the NIH should be promoting research into the sex differences that are important to science and in disease.

Duplicating studies to "compare and contrast experimental findings in male and female animals and cells" is rarely practical, affordable, prudent, scientifically warranted or ethically justifiable. Researchers use both sexes because this roughly halves the costs of breeding and maintenance. Sometimes one sex is excluded if results are likely to differ between sexes, and possibly for well-known reasons — for instance, male rats run faster than female rats through a maze. If there is no justification for studying both sexes, then it should not be done.

Clayton and Collins suggest that statistical variability will not be increased by using equal numbers of male and female cells or animals in studies, but this is questionable and undermines the premise for the NIH's argument. If the sexes were not different, there would be no need to use both. Variances are additive, so using both sexes halves sample size while increasing variance, making it less likely that an observed difference not due to sex can be detected at a statistically significant level. Thus, an increased number of samples would be needed to reach firm conclusions.

Understanding gender differences in disease is a goal in itself, but this will not be attained as a by-product of mandating its intrusion into every hypothesis under investigation.

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## NIH policy: status quo is also costly

Researchers have raised concerns about the cost of requiring applicants for US National Institutes of Health (NIH) grants to use male and female animals or cells in preclinical research (see J. A. Clayton and F. S. Collins *Nature* **509,** 282–283; 2014). But they should also consider the costs of not taking sex into account: these include failed clinical trials, misdiagnosis and inappropriate therapies for women, and omission of fundamental biological principles.

Many researchers are still unfamiliar with the distinction between sex and gender. Gender combines self- and societal perceptions of a person's sex, so applies only to humans. Sex is the biological result of interplay between sex chromosomes and gonadal hormones.

The impact of sex is dynamic, changing throughout lifespan and in response to injury and disease. Ruling out the influence of sex on a particular endpoint will sometimes be as difficult as identifying it. Sex must be evaluated in the context of other variables, such as age, experience, genetics and environment.

Age-appropriate medicine is a well-accepted idea that is reflected in the formation of NIH centres studying ageing and child health. The factor of sex deserves an equally integrative approach.

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## Sharing your data is easier than you think

Geoffrey Goodhill questions some of the practicalities of open data-sharing policies (*Nature* **509,** 33; 2014), but I believe that his concerns are largely unfounded.

Storing large volumes of raw data is costly, but many items destined for sharing are highly processed and relatively small. The mouse-brain connectome, for example, is available as a 3-megabyte file derived from many gigabytes of raw data (S. W. Oh *et al. Nature* **508,** 207–214; 2014). Neither is there a shortage of repositories: many institutional databases are freely available and well supported (such as zenodo.org, maintained by CERN, Europe's particle-physics lab in Geneva, Switzerland). More repositories will come online as researchers learn how to share data more effectively.

Contrary to Goodhill's suggestion, sharing computer code does not necessarily demand much time investment (see, for example, D. C. Ince *et al. Nature* **482,** 485–488; 2012). Code is a valuable part of a paper, so everyone benefits if its authors assume from the start that it will be shared or reused. Also, people releasing code are under no obligation to maintain it.

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## Justifying embryo research in Europe

It was a relief last month when the European Commission decided not to modify legislation on research involving the destruction of human embryos in response to a petition by the One of Us pro-life group. Even so, it is time to put a stop to this 'democracy carousel' (see *Nature* **508,** 287; 2014).

Such citizen campaigns against embryo destruction disregard the births of more than 5 million babies as a result of advances in reproductive medicine. Moreover, selective abortion following an adverse genetic diagnosis can often be avoided, owing to advances in screening embryos before implantation. And embryonic stem-cell research is opening up regenerative medicine, which may eventually provide therapies for conditions such as pancreatic failure and age-related macular degeneration.

Central to the debate is the ethical status of the human embryo between fertilization and implantation. Many believe that, although a zygote has the potential to develop into a person, it is not yet a person. On this basis, destruction of donated embryos for medical research can be justified provided the work is subject to strict regulation and supervision. Indeed, a recent (unpublished) study shows that donation of spare embryos is widely supported by couples undergoing *in vitro* fertilization in Europe.

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## Still too many red–green figures

People with red–green colour blindness cannot interpret figures in research papers that use these colours. We call for all journals to provide alternative versions of figures that are more accessible to such individuals.

We searched *Nature* papers published in January–April 2014 that contained at least one image requiring colour discrimination: roughly three-quarters used a red–green combination. Some journals now recommend that authors recolour their figures — green and magenta, say (see, for example, B. Wong *Nature Methods* **8,** 441; 2011).

It would be preferable if journals could include a weblink to a colour-accessible version of red–green figures, and do so retroactively for archived figures. These would also be useful for making slideshows and posters.

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