Consideration of relevant biological variables

For applications due on or after January 24, 2016:

- **Biological variables**, such as sex, age, weight, and underlying health conditions, are often critical factors affecting health or disease. In particular, sex is a biological variable that is frequently ignored in animal study designs and analyses, leading to an incomplete understanding of potential sex-based differences in basic biological function, disease processes and treatment response.

- NIH expects that sex as a biological variable will be factored into research designs, analyses, and reporting in vertebrate animal and human studies. Strong justification from the scientific literature, preliminary data or other relevant considerations must be provided for applications proposing to study only one sex.

- NIH will not require any specific research design or method for accomplishing this goal. Rather, the existing state of knowledge in a particular scientific area and the specific research question under study will both affect how an investigator considers sex and other basic biological variables.

- These changes to ensure the consideration of basic biological variables like sex do not imply the necessary doubling of research animals in every experiment, contrary to what some in the research community have assumed. However investigators aiming to differentiate sex effects—that is, to look explicitly for sex differences—may require larger numbers of animals, or equal numbers of animals of both sexes, for adequate power to detect statistically significant effects. Typically, these types of projects grow from preliminary data that provide hints of sex-based influences that generate a testable hypothesis in larger sample sizes.

Please also refer to: [Consideration of Sex as a Biological Variable in NIH-funded Research](#)