SABV in Biomedicine Checklist

Accounting for SABV in applications for NIH-funded research could be reflected in the ways discussed in the following sections.

1. Consider the influence of sex in study design

Research findings may be influenced by sex and/or gender, as women and men are characterized by both. Factors that contribute to biological sex differences include biological and physiological characteristics encoded in DNA. These effects may include chromosomal or biochemical interactions, hormonal cycles and reproductive stages, and pathways and clinical presentations in health. Consider the role of sex chromosomes and sex hormones.

2. Review available literature for the influence of biological sex

Add search terms, such as sex, male, and female, to literature searches on the research topic of interest.

3. Consider the influence of sex when formulating the research questions

Sex-skewed disease prevalence may suggest underlying sexbased influences on physiological or pathological processes.

4. Incorporate both males and females into studies

Include both females and males in test groups (factorial, randomized block designs, etc.) Stratify randomization of males and females into experimental conditions. Conduct pilot studies, such as adding a steroid hormone treatment to tissue cultures. When little or no sex-specific data are available, observation of measures in both males and females could be appropriate; in contrast, previously observed sex differences may prompt sex-specific hypotheses. Researchers working with animal models should consider whether the female estrous cycle is a relevant factor for the design and analysis. It might be relevant for some research questions and not others. Investigators examining variability among female and male rodents found that females were not more variable than males for any endpoint, that males were substantially more variable for several traits, and concluded that the estrous cycle was not a reason to exclude females.

5. Analyze data and report data disaggregated by sex

Characterize study results for males and females. Examine treatment or toxicity effects for each sex separately. Report sex-based data and any identified sex-based influences. Report when sex differences are or are not detected in analyses. For studies using both sexes, prospectively develop a methodological plan that includes, at a minimum, reporting of data disaggregated by sex (whether significant in effect or not), which may be valuable for future research and meta-analysis. In exploratory or early mechanistic studies, or in research areas where SABV has not previously been considered, an appropriate first step could be to include both sexes, disaggregate data by sex, and discuss appropriate generalizations that can be

drawn from findings. For studies designed to examine sex differences, the experimental design should include consideration of effect size and power calculations to determine the number of samples/ subjects in the study, if applicable.

6. Consider the influence of sex in the interpretation of study results

Were there trends in study results that may be due to an influence of sex? Considering SABV does not mean designing all studies to examine sex differences, for powering all studies to discern a small sex difference. It is not expected that every study will be designed to detect sex differences at some level of statistical power. The science is still developing in many areas, which means there is value in reporting subset analyses. Similar trends identified across multiple studies would inform the design of future definitive sex-differences studies.

7. Articulate strong justification for a single-sex study

Strong justification should be provided for applications proposing to study only one sex. Such justification may include the study of sex-specific conditions or phenomena (e.g., ovarian or prostate cancer), acutely scarce resources (e.g., nonhuman primates), or literature/findings that indicate that SABV is not relevant to research in the area under question. Recognize that the absence of data regarding sex differences in an area of research does not, by itself, constitute strong justification to study only one sex.

8. Appropriately generalize research findings

Acknowledge limited applicability of findings that may arise from the samples, methods, and analyses used, in the research plan as well as in progress reports and publications. Researchers should be mindful that sex-specific in- fluences might change with age or any other biological variable. Hence, sex-specific data in young adult animals, might not generalize to juvenile or aging animals.

Works Cited

For full text, see Cornelison, T. L., & Clayton, J. A. (2017). Considering Sex as a Biological Variable in Biomedical Research. **Gender and the Genome, 1(2),** 89-93. Reproduced by permission of the authors.