Reviewer's report

Title: Vaginal douching and racial/ethnic disparities in phthalates exposures among reproductive-aged women: National Health and Nutrition Examination Survey 2001-2004

Version: 1 Date: 22 December 2014

Reviewer: Laura Vandenberg

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Branch and colleagues have examined associations between the use of feminine hygiene products (tampons, sanitary napkins, and vaginal douches, among others) and exposures to two phthalates. Similar to other studies, they find a greater proportion of black women use vaginal douches, and these women also have higher concentrations to DEP metabolites in their urine. The relationship was dose-dependent, where women that used vaginal douches more than twice per month had the highest MEP concentrations measured.

This is a cross-sectional study, which has inherent limitations. However, the authors are the first (to my knowledge) to examine relationships between use of feminine products and environmental chemical exposures. From the perspective of toxicology, these findings are particularly of interest, since most animal studies use oral exposures, which may not replicate – and are likely not relevant to – human exposures via these personal care products. This study will be of interest to practitioners of environmental health, as well as the OB/GYN community. I do have some suggestions to improve the manuscript, and I would ask the authors to pay particular attention to my comment about toxicokinetics, metabolism, and half-life of these products, and whether these issues could be better addressed with a more limited study design (i.e. the examination of women only during certain phases of the menstrual cycle, if possible.)

SPECIFIC COMMENTS (major compulsory issues):

Introduction, pg 4: The authors briefly describe that exposure to DnBP and DEP is associated with adverse health outcomes, but they provide only a very brief review of the animal literature. This section could use a few more details. Do these studies examine both DnBP and DEP (in a mixture), or do the animal studies examine each chemical separately? Are there any animal studies examining the effects of these chemicals on adult female laboratory animals – which would be the most appropriate comparison group to the adult women examined here?

Introduction, pg 4-pg 5. The authors have a few sentences here about the known associations between race/ethnicity and SES with exposures to DEP and DnBP, but that the reasons underlying these differences in exposure remain poorly understood. The last sentence of this paragraph notes that “mounting evidence points to an important role for environmental factors in shaping racial/ethnic and
socioeconomic disparities in reproductive health outcomes.” Although this is
certainly true, this statement doesn’t directly follow the rest of this paragraph,
which is focusing on exposures, and not outcomes.

Methods & Results: The authors have not discussed or considered any aspect of
toxicokinetics for either of the compounds examined (other than a quick mention
that “phthalates are rapidly metabolized and do not bioaccumulate”. How quickly
are these compounds metabolized – ½ life of hours? With rapid metabolism, one
might expect that only women that had recently used specific feminine products
would have increased levels of exposure. In this way, it is quite striking that the
authors found any association between use of douching products and MEP
concentrations. But, if the authors limited their analyses to only those women
menstruating at the time of urine collection, would they also see associations
between tampon use and phthalate exposures? Or, if they controlled for time
since a douching product was used, is the relationship with MEP concentrations
stronger? I do not know if the NHANES data was collected in this manner (i.e.
date of last use, or menstrual phase) but it does seem relevant here.

Discussion, pg 13: The authors note that “preservatives such as parabens and
antimicrobial agents such as triclosan may also be present in intravaginal
products” and I think it is worth noting that these specific chemicals have also
been shown to have endocrine disrupting properties.

Minor essential revisions:

Introduction, pg 4: Edit, “Because phthalates are not chemically bound to
products, product use can lead to phthalate (singular) exposure through dermal
absorption, inhalation AND (not or) ingestion.”

Level of interest: An article of importance in its field

Quality of written English: Acceptable

Statistical review: No, the manuscript does not need to be seen by a statistician.

Declaration of competing interests:

I have no competing interests.

I will disclose that I have previously published a study with Dr. Woodruff. I do not
believe that this has influenced my current review.