We welcome Holliday and Meltzer’s contribution. We have published several analyses that call into question the part of Firestone et al.’s (2007) hypothesis that deals with the Paleoindians (Buchanan et al., 2008; Collard et al., 2008) but to little effect. Firestone and colleagues continue to present their hypothesis as if it is consistent with the archaeological record (Kennett et al., 2009). Hopefully, now that two senior Paleoindian archaeologists have also criticized their claims about the Paleoindians in print, Firestone and colleagues will realize they can no longer pretend everything is okay.

Regarding the specific points Holliday and Meltzer make, most of them are unproblematic in our view. Indeed, we have made several of them ourselves (Buchanan et al., 2008; Collard et al., 2008). However, Holliday and Meltzer are mistaken about one thing. In the section titled “Population continuity or discontinuity: the radiocarbon record”, they plot the medians and one standard deviation around the medians for a sample of radiocarbon dates, and then look to see whether the dates are consistent with occupation being continuous or discontinuous across the putative extraterrestrial impact event. They argue that this approach provides a better picture of Paleoindian demography than the summed probability distribution approach we have used in our papers on Firestone and colleagues’ hypothesis (Buchanan et al., 2008; Collard et al., 2008). However, this is incorrect. Their approach is not only subject to the same biases as the summed probability distribution approach, it is also less accurate than the summed probability distribution approach. The reason for this is that Holliday and Meltzer’s approach assumes all years within a calibrated date’s range are equally probable when in fact different probabilities are associated with each year within that range. In contrast, the summed probability distribution approach takes into account the differences in probability among years. Thus, contrary to what Holliday and Meltzer contend, their approach can be expected to provide a poorer picture of Paleoindian demography than the summed probability distribution approach. Given that applications of the latter also do not support Firestone and colleagues’ claim that the Paleoindians were decimated at 12.9 calBP (Buchanan et al., 2008; Collard et al., 2008), recognizing Holliday and Meltzer’s error for what it is does not change the basic point that the radiocarbon evidence is inconsistent with Firestone and colleagues’ hypothesis. But as we (hopefully) move into a new phase of the debate, it is important to be clear about the pros and cons of the methods used to test the hypothesis.
Our only other criticism of Holliday and Meltzer’s piece is that they overlook an additional line of evidence—the geographical distribution of radiocarbon-dated site-phases across the putative extraterrestrial impact event. As Holliday and Meltzer explain, Firestone and colleagues argue that the impact occurred above the Great Lakes. A corollary of this part of the hypothesis is that the effects of the impact can be expected to have been more pronounced in the northern half of North America than in the southern half. In our 2008 paper we tested this prediction by assigning dates to blocks defined by latitude and longitude, and evaluating whether their distribution changed before, during, and after the putative impact event (Buchanan et al., 2008). Our results were not consistent with the prediction. We found no evidence that the distribution of dated site-phases changes before, during, and after 12.9 calBP. We concluded at the time that this was another reason to be skeptical about Firestone and colleagues’ hypothesis, and we are still of that opinion. In fact, we consider the lack of a geographic “signature” of the putative impact in the radiocarbon record to be particularly important because it is inconsistent not only with the strong version of Firestone and colleagues’ hypothesis in which the Paleoindians were decimated but also with a weaker version of the hypothesis in which the Paleoindians only experienced a population decline rather than being wiped out. Thus, we think the situation is even more problematic for the Paleoindian part of Firestone and colleagues’ hypothesis than Holliday and Meltzer’s piece suggests.

References Cited

Collard M, Buchanan B, Edinborough (2008) Reply to Anderson et al.; Jones; J. Kennett and West; Bentley; Culleton; and D. Kennett et al.: Further evidence against the extraterrestrial impact hypothesis. *Proc Natl Acad Sci USA* 105: E112-114.
