Funding Basic Research: Continued

Three responses to my editorial of 19 July (p. 291) by Louis Ianniello, Monroe Burke, and Arthur Kornberg (Letters, 16 Aug., p. 857) are about the responsibility of all scientists to help improve and reform our own institutions to respond to the changing dynamics of national and international finances. The letters by Burke and by Kornberg contain the same imperial message: we, scientists, know better how to allocate the nation's resources. These two letters are innocent of specifics and contain little reference to the recent relevant literature. On the end-of-science issue, may I refer the letter writers to *The End of Science* by John Horgan (Abrams, New York, 1996); *Frontiers of Illusion* by Daniel Sarewitz (Temple University Press, Philadelphia, PA, 1996) and *The End of the Future* by Jean Gimpel (Praeger, Westport, CT, 1994).

Arthur Kornberg's superb credentials force us to examine his championing of the possible value of public support for bioscience research. The examples he cites of useful technologies developed are largely outside his field. In most cases the flow was from technologically useful discovery to science, not vice versa. Nor was any bureaucratic funding "process" involved.

On the matter of who should support research, however, times have changed dramatically from the era when only the government could support *relevant* basic research. I cite only one major challenge to such outmododed "golden age of science" axioms: a book by Cambridge University biochemist Terence Kealey, *The Economic Laws of Scientific Research* (St. Martin's, New York, 1995), which provides detailed technical support for the position that most *nontargeted* basic research should be privatized. Over the last 15 years, I have written two books and some two dozen papers with the same approach, giving data and argument and constructive alternatives to the present, unsustainable system. I have yet to find *one* similarly reasoned book or paper replying to these arguments.

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Keratinocytes and the Danger Model

In their report "Neonatal tolerance revisited: Turning on newborn T cells with dendritic cells" (22 Mar., p. 1723), John Paul Ridge *et al.* demonstrate that the neonatal immune system was not uniquely poised for tolerance induction upon encountering antigen, but that neonatal T cells could be primed if antigen was presented by activated professional antigen-presenting cells (APCs) such as dendritic cells (*1*). On the basis of this finding and of previous studies (*2*), they are quoted in a Research News article by Elizabeth Pennisi (22 Mar., p. 1665) on the topic of the danger model, which holds that the immune system does not provide intrinsically for self:nonself discrimination, but rather responds to activated APCs, which are found only at sites of tissue destruction and inflammation. Activated APCs are able to induce T cell responses to antigen, in part through the provision of costimulatory signals to the T cell. The degree to which the regulated provision of costimulatory signals is important in maintaining peripheral tolerance is not known, although Ridge *et al.* and others suggest that the absence of costimulatory signals on "normal, healthy peripheral tissues . . . should continuously induce T cell tolerance . . ." (*1*). This concept is illustrated in the figure in the Research News article (p. 1665), in which skin is portrayed as being unable to deliver signal two. Although