

Large scale computational analysis of NIH-supported papers reveals a potential explanation for the perception that NIH supports less basic research than in the past.

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Introduction

There is increasing concern in the biomedical research community that NIH support for basic research is wavering. However, the officially reported figures for basic research support do not support this idea. Why is there a disconnect between the community's perception and our reports of research funding?

Methods

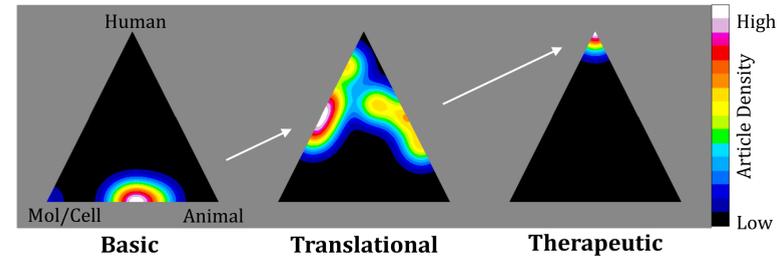
A 2013 study¹ published a new algorithm to automatically classify MedLine-indexed articles as human, animal, or cellular/molecular research (or some combination of these), based on the location of their MeSH terms² within the MeSH tree. We have further developed and refined this algorithm into a prototype tool for NIH use. The position of a paper or set of papers is density-mapped onto a triangle, indicating its place within the spectrum of molecular/cellular, animal, and human studies.

Funding was linked to articles through SPIRES matches; grant dollars from each fiscal year were assigned evenly among all papers acknowledging that grant number and appearing in that year and the subsequent 5 years. To avoid double-counting papers, these were fractionated into the three different MeSH categories according to term frequency (e.g., a paper with 50% 'Human' MeSH terms and 50% 'Animal' MeSH terms would count as half a paper in each category).

¹Weber G (2013) Identifying translational science within the triangle of biomedicine. J Trans Med 11:126

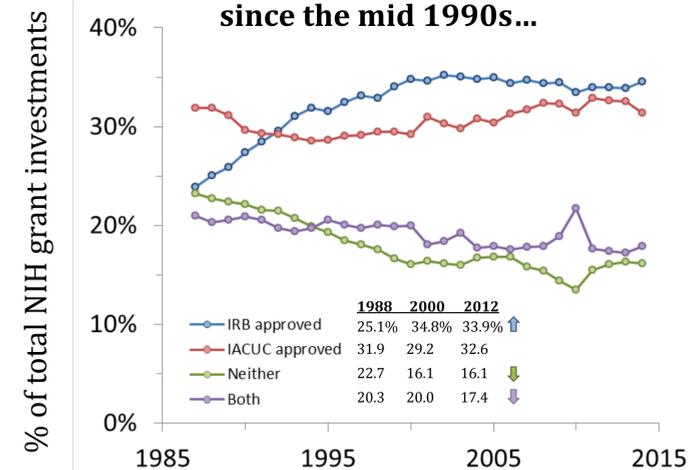
²Medical Subject Headings (MeSH) is the National Library of Medicine's controlled vocabulary thesaurus. It consists of sets of terms naming descriptors in a hierarchical structure that permits searching at various levels of specificity.

Visualizing the Translation of Knowledge

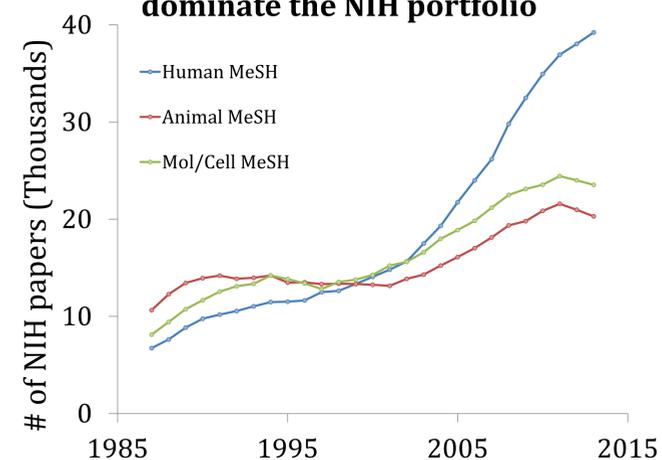


Example of basic research discoveries in cancer immunotherapy (left), leading to translational studies (middle) and finally therapeutic development (right).

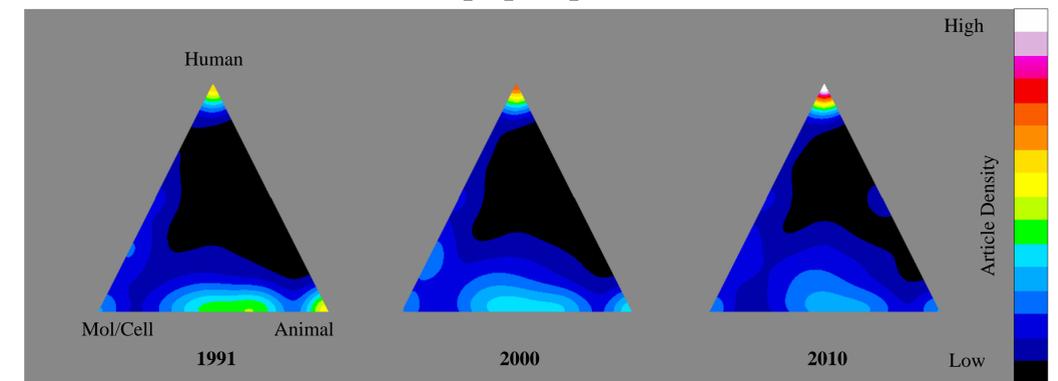
Only a modest increase in human (IRB) grant \$ since the mid 1990s...



...Yet papers with HUMAN MeSH terms now dominate the NIH portfolio

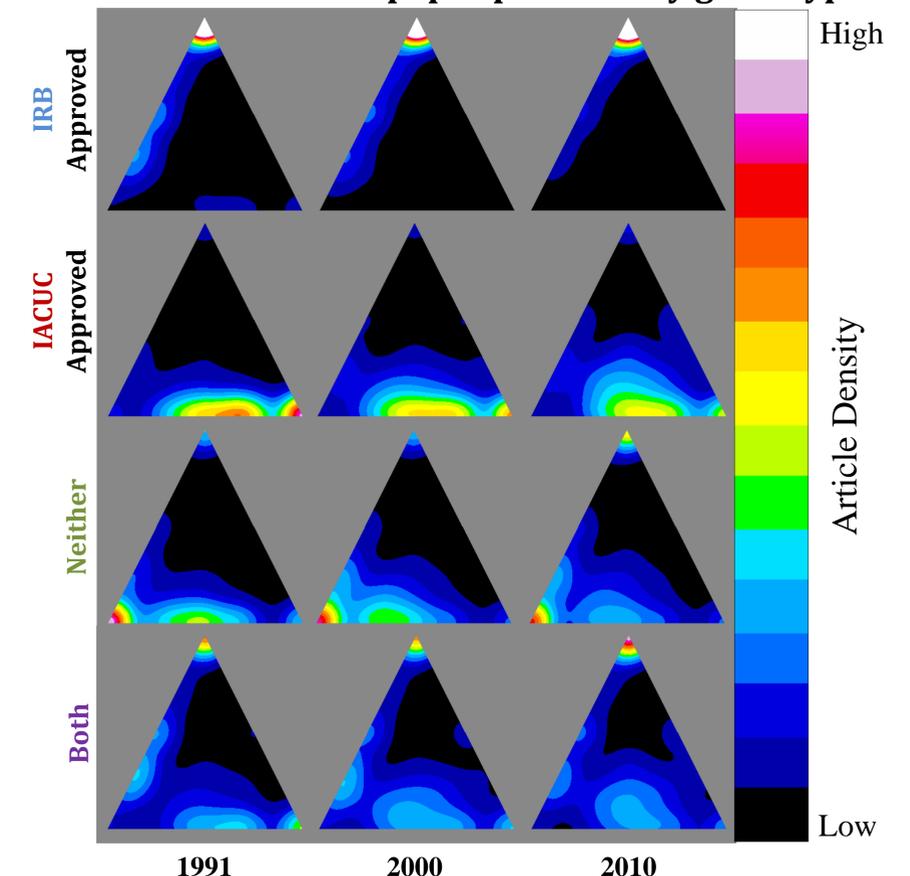


Distribution of the NIH paper portfolio from 1991-2010



Visualization of the types of papers funded by NIH grants in 1991, 2000 and 2010, showing a clear trend toward human-oriented research relative to molecular/cellular and animal research.

Breakdown of the NIH paper portfolio by grant type



The trend toward increasingly human-oriented research can be seen in each grant category from 1991 to 2010.

Conclusion: Perceptions may be driven by the much more visible shift in the literature rather than the modest shifts in grant funding.