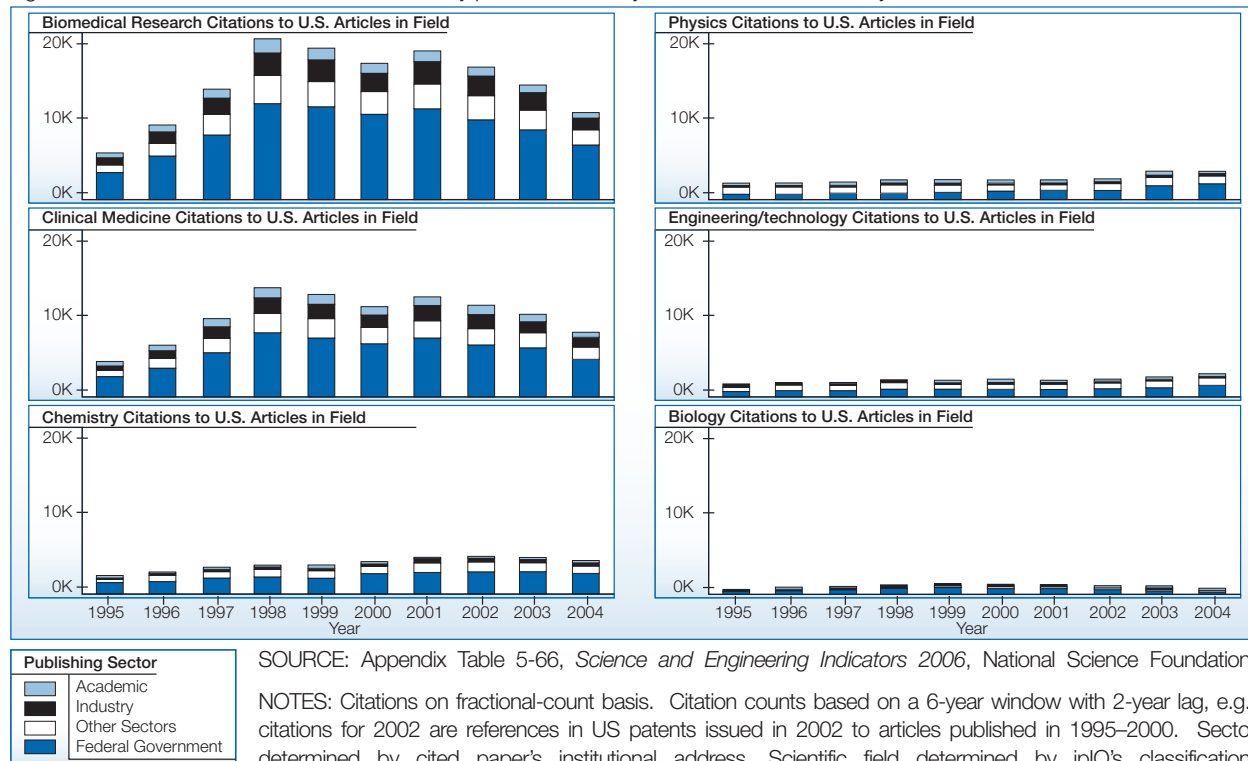


**U.S. patent citations to science and engineering articles rose rapidly through the late 1990s, with the largest increases seen in citations to academic articles in the biomedical and clinical medicine fields.**

Figure 12. Number of citations to U.S. articles by patents issued by the U.S. Patent Office, by field and sector of article: 1995 - 2004



**Why is this indicator important?**

- The citation of S&E literature in U.S. patents indicates the extent to which academic research across S&E fields fosters innovation across sectors.

**Key Observations**

- Academic-authored articles in biomedical research and clinical medicine accounted for 41% of the increase in total citations across all fields between 1995 and 2004.
  - Growth in citations to both biomedical and clinical medicine research occurred primarily in the late 1990s, and citations to research in both fields declined between 2001 and 2004.
- Citations to industry-authored papers, the second largest source, declined from 25% in 1995 to 21% in 2004.

**Related Discussion**

- Patents referencing S&E articles nearly tripled between 1990 and 2001, increasing from approximately 6,000 in 1990 to over 20,000 in 2003 (*SEI 2006* Table 5-26).
- The average number of citations per patent increased from 0.33 per patent in 1990 to 1.56 in 2003 (*SEI 2006* Appendix Table 5-65).
- The bulk of U.S. patents citing scientific literature were issued to U.S. inventors, who accounted for 65% of these patents in 2003, a share disproportionately higher than the 51% of all U.S. patents issued to U.S. inventors (*SEI 2006* Table 5-26).
- The counts in the above chart do not control for patents that cite the same S&E article(s) and may overestimate the degree of “transfer” from scholarly output to potential commercial application.