

New Statistics on the Cost of New Drug Development and the Trouble with CNS Drugs

The Tufts Center for the Study of Drug Development (CSDD)¹ released new data this month on the current costs to develop and gain approval for a new drug, as well as disappointing analyses regarding timelines and success rates for CNS drugs. In a former, and widely touted, study from 2003, the Tufts Center for the Study of Drug Development estimated the cost per approved new drug to be \$802 million (split evenly between out-of-pocket and capital costs) based on new drugs first tested in humans between 1983 and 1994.¹ A new analysis, performed by DiMasi, Grabowski, and Hansen, based on data for 106 randomly selected drugs (first tested in humans between 1995 and 2007) provided by 10 pharmaceutical companies, led to the staggering finding that the cost to develop and win marketing approval for a new drug has risen to \$2,558 million, or ~\$2.6 billion (\$1,395 million out of pocket cost and time/capital costs of \$1,163 million).^{1,2} If we correct the previous estimate of \$802 million (based on 2000 dollars) into equivalent 2013 dollars, one arrives at \$1,044 million, or a 145% increase over the past decade! Furthermore, costs for postapproval activities (new indications, formulations, dosages, and long-term safety monitoring) increase the cost an additional \$302 million, yielding a cost of over \$2.8 billion/new drug. Major drivers for this increase reside primarily in clinical studies, where longer outcome trials and/or larger number of patients are required.^{1,2} Moreover, due to the pressure of pharmacoeconomics,³ obtaining data with comparator compounds and obtaining health technology assessment information further drives up costs. This is an alarming increase and a cost that few smaller biotechnology and pharmaceutical entities could surmount, as a single, late-stage failure could wipe them out (and has on many occasions).

The past decade has witnessed an alarming rise in the number of exits of big pharma and biotech from CNS drug discovery, despite a serious unmet medical need and the fact that the top selling drug last year was Abilify, an atypical antipsychotic (~\$8 billion in worldwide sales).⁴ Another study by DiMasi from Tufts CSDD⁵ found that CNS drugs not only require longer development time, but also have significantly lower success rates than drugs for other indications. According to the recent Tufts CSDD study,^{1,5} clinical development time for CNS drugs approved in the United States between 1999 and 2013 was 12.8 months, or 18% longer than non-CNS targeted drugs. For non-CNS compounds (1995 to 2007, and followed through 2013) that entered clinical trials, the clinical approval success rate was 13.3%; in contrast, CNS compounds during the same time period garnered a success rate of only 6.2%, less than half of that of non-CNS drugs.^{1,5} While damning, the landscape for CNS drug development actually gets worse. During the time period of 1993–2013, the approval phase for non-CNS drugs was 14.7 months. While for CNS drugs, the approval phase time increased 31% to 19.3 months. Differences also exist for compounds receiving priority review from the United States Food and Drug Administration, where ~50% of non-CNS drugs receive priority review as opposed to a

diminished rate of one in six for CNS drugs.^{1,5} Thus, the exodus from CNS drug discovery across the industry is not unfounded. CNS drug discovery is challenging—both preclinically and clinically. Our field has issues with the validity and translatability of preclinical animal models, challenges in assessing target engagement/biomarkers, and patient selection/stratification (as we now accept that CNS disorders are heterogeneous and personalized medicine approaches will be required, e.g., oncology). Despite these significant hurdles, CNS approvals have held constant since 1980, accounting for ~10% of all United States approvals.^{1,5} With advances in imaging technology and modalities, and a recognized need to identify patients far in advance of clinical trials, there has never been a better time to engage in CNS discovery—to address major unmet medical needs and improve mental health. From the data compiled by Tufts CSDD,^{1,2,5} drug discovery costs across all therapeutic areas are rising to an alarming level, and these costs bring new challenges—as well as opportunities to question the status quo and evaluate new paradigms.

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AUTHOR INFORMATION

Notes

Views expressed in this editorial are those of the author and not necessarily the views of the ACS.

REFERENCES

- (1) For information on the Tufts Center for the Study of Drug Development (CSDD), and related reports, see: <http://csdd.tufts.edu/>.
- (2) DiMasi, J. A., Grabowski, H. G., and Hansen, R. W. Cost to develop and win marketing approval for a new drug is \$2.6 billion. <http://csdd.tufts.edu/>, November 18, 2014.
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