Commercial drug development is a high-risk business requiring careful financial analysis.

To survive in today's competitive pharmaceutical marketplace, pharmaceutical company leaders and market investors must make informed decisions on the financial value of drug development programs. A well-formed NPV (Net Present Value) analysis for a new potential drug can guide the overall assessed value of the drug program for licensing negotiations, acquisitions, or estimating future potential revenues. In this study, we illustrate employing data from PharmaKB to estimate the NPV of a drug program.

Estimating the NPV of a commercial drug development program is a complex analysis that involves various factors such as the disease population size, planned drug cost, the current stage of development of the new drug, probability of success, length of clinical trials, and the number of competitive drugs for the disease.

The PharmaKB application and its Market Intelligence Data Sets provide the necessary data to calculate NPV for drug development programs.

Below is illustrated the standard method of calculating Net Present Value for a specific asset. We define **R** and **T** focused on the sale of an approved drug to a population of patients over time (see **Figure 1**). Our NPV estimation assumes there is an equal probability of the patient receiving any of the approved treatments available in the market. Additional PharmaKB data is available for refining such a calculation based on mechanism of action, adverse effects, administration method, and other comparative metrics.

Figure 1

$$NPV = \sum_{t=1 \text{ to } T} \frac{R_t}{(1+i)^t}$$

R_t = net cash flow at time t
i = Discount Rate
T = time of cash flow

$$R = \frac{\text{(Annual Patient Spend) x (US Patient Count)}}{\text{(Marketed Drug Count)}}$$

T = Time to complete clinical trials plus any remaining patent life.

Drug products in development face a unique risk in comparison to other assets for which an NPV might be calculated. In the case of developmental drugs, the product may not successfully pass clinical trials when field tested. We account for this additional risk in our NPV calculation by employing a probability of success to the standard NPV calculation.

PharmaKB has analyzed historical success rates for drugs moving through the clinical trials process and reaching FDA approval. This analysis has been performed for all disease indications (MESH originally yet applicable to ATC and ICD-10 upon request) separately to form a Probability of Success for any developmental drug based on the disease treatment approval sought by the drug sponsoring organization. We employ the Trials Probability of Success to the standard NPV calculation to derive the Trials Risk Adjusted NPV as illustrated in **Figure 2**.

Figure 2

Trials Risk Adjusted NPV = (NPV) x (Trials Probability of Success)

Calculating Trials Risk Adjusted NPV for an HIV Drug.

Table 1 below provides the details for calculating Trials Risk Adjusted NPV of a new developmental drug focused on treating HIV Infections (MeSH ID D015658).

Table 1

Input	Value	Data Source
Annual Patient Spend	$5,000	PharmaKB Market Intelligence Datasets: Curated Financial Data Set derived from US Consumer Survey. Typical drug costs are for HIV Infections.
US Patient Count	1,189,700	PharmaKB API: Curated epidemiological information by disease indication.
Period to Complete Trials	60 +/- 15 Mth	PharmaKB API: Curated clinical trials data. This assumes the drug is beginning Phase 3 trials.
Trials Probability of Success	0.526	
Competitive Drug Count	25	PharmaKB API: Curated drug profile data for all drugs approved for HIV Infection indication.
Patent Protection Period (Years)	20	This calculation assumes a new developmental drug holds a new patent providing 20 years exclusivity. PharmaKB API: Exclusivity patent table provides patent termination dates for all approved drugs.
Discount Rate	0.1	This is user defined. We chose to use the current S&P 500 average cost of capital.

The standard NPV is calculated to be: $1,056,582,084

The Trials Risk Adjusted NPV is calculated to be: $555,762,176

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In order to develop and refine financial and other performance models for commercial drugs, analysts require regularly updated data on all key facets of drug performance ranging from financial to safety.

Collaborative Drug Discovery (CDD), Inc. addresses this need by offering a cost-effective solution for reviewing the commercial status of all US FDA approved drugs. The Pharmaceutical KnowledgeBase is available at (www.pharmakb.com).

PharmaKB provides up-to-date and detailed information about drugs, companies, and disease areas so that commercial organizations can gain a precise picture of where commercial opportunities lie based on impacting factors such as patent and exclusivity termination, competitive product introduction, financial trends, detection of new safety concerns, and many other timely updates.

All content is available through the PharmaKB web application at (www.pharmakb.com) or via the PharmaKB API (details at www.pharmakb.com/pharmakb-api-documentation) and via GitHub.

For information on the PharmaKB content and/or subscription-based access, please contact us at: info@pharmakb.com