Lezione 15

Il mercato farmaceutico

A cura
Prof. Stefano Capri

I brevetti

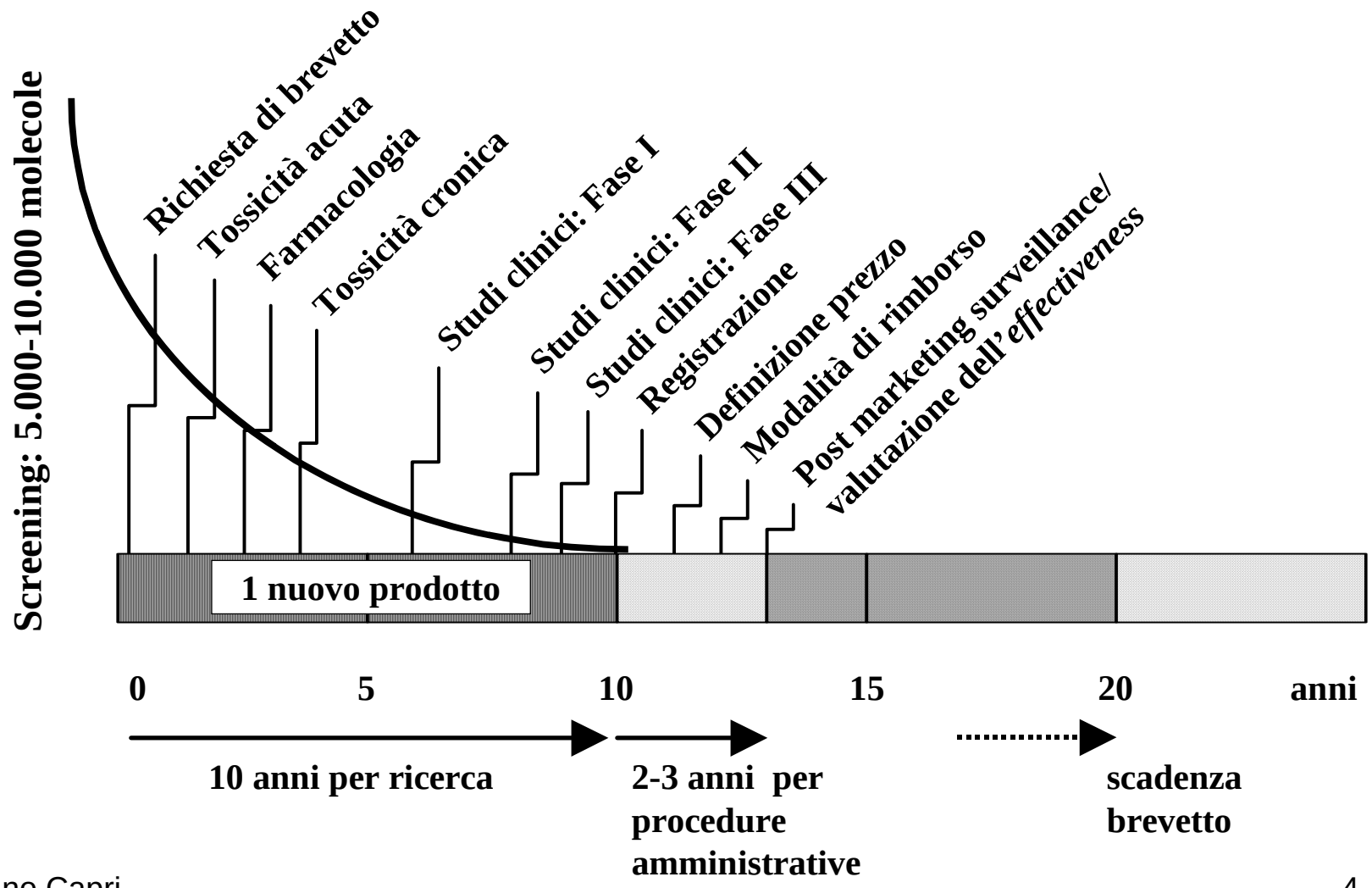
- Il brevetto è particolarmente importante per l'industria farmaceutica sia per le dimensioni delle spese in R&S necessarie a portare un farmaco sul mercato, sia per la facilità con cui i farmaci possono essere copiati.
- Il brevetto è uno dei meccanismi a disposizione dello Stato per favorire l'innovazione.
- Il sistema dei brevetti fornisce scarsi incentivi per la R&S di farmaci i cui benefici potrebbero anche essere ampi per la società, ma di scarso interesse per l'industria produttrice (si veda il caso dei farmaci per le malattie neglette)
- Il brevetto ha scarsa capacità di promuovere la R&S per farmaci il cui mercato previsto sia troppo piccolo (ad esempio i farmaci per le malattie rare).

I brevetti

Vi è un trade-off tra i vantaggi per l'industria e quindi per la R&S e i vantaggi per i consumatori:

- più a lungo rimane l'esclusività concessa dal brevetto, più ampi saranno gli incentivi per investire in R&S, e idealmente si avrebbe il massimo dell'incentivo concedendo uno sfruttamento del brevetto senza scadenza nel tempo, all'infinito
- più a lungo dura la protezione brevettuale, più a lungo i consumatori dovranno attendere l'entrata nel mercato dei concorrenti a prezzo più basso (i farmaci generici).

La durata effettiva del brevetto



Termine della protezione brevettuale e vendite

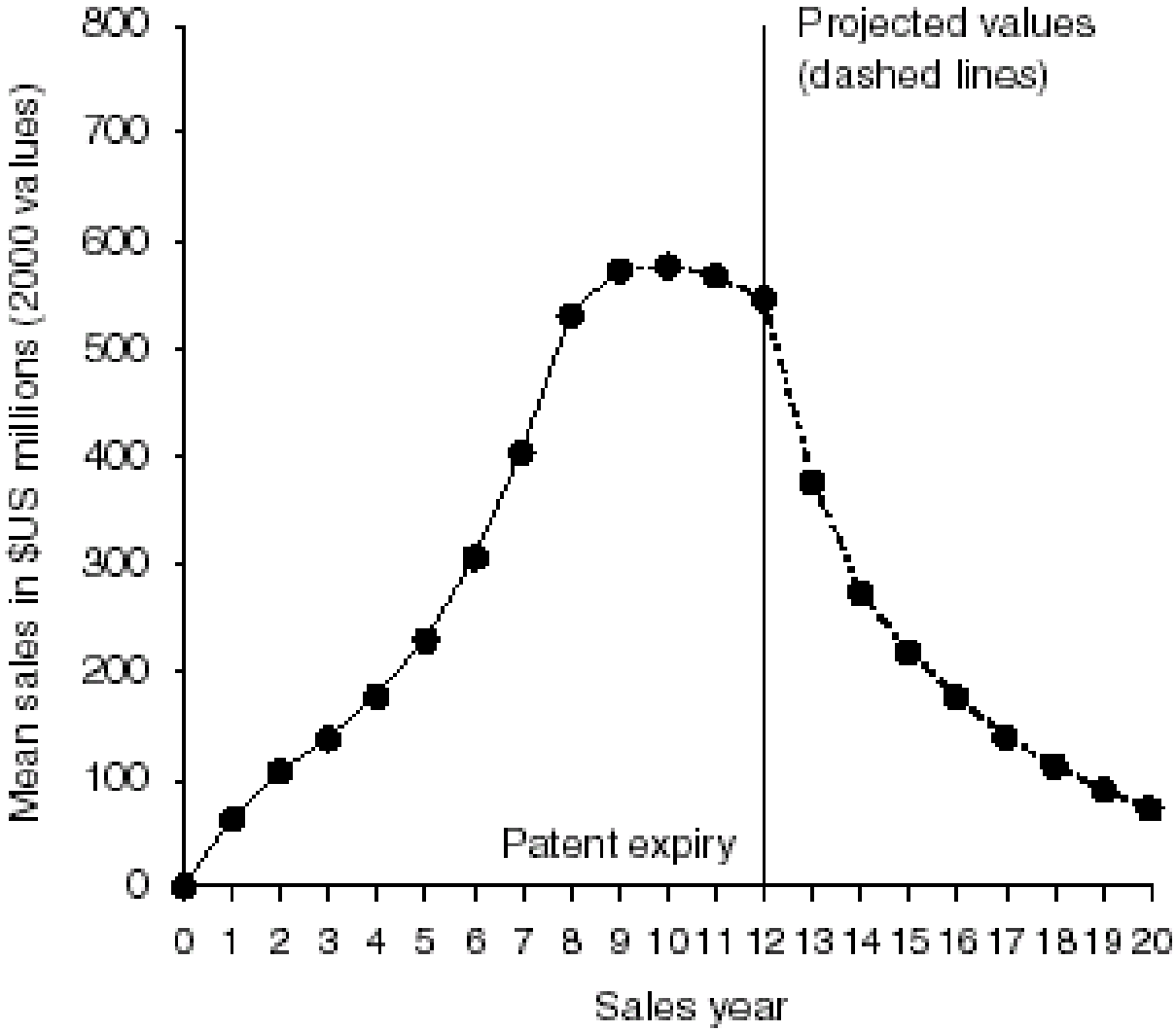
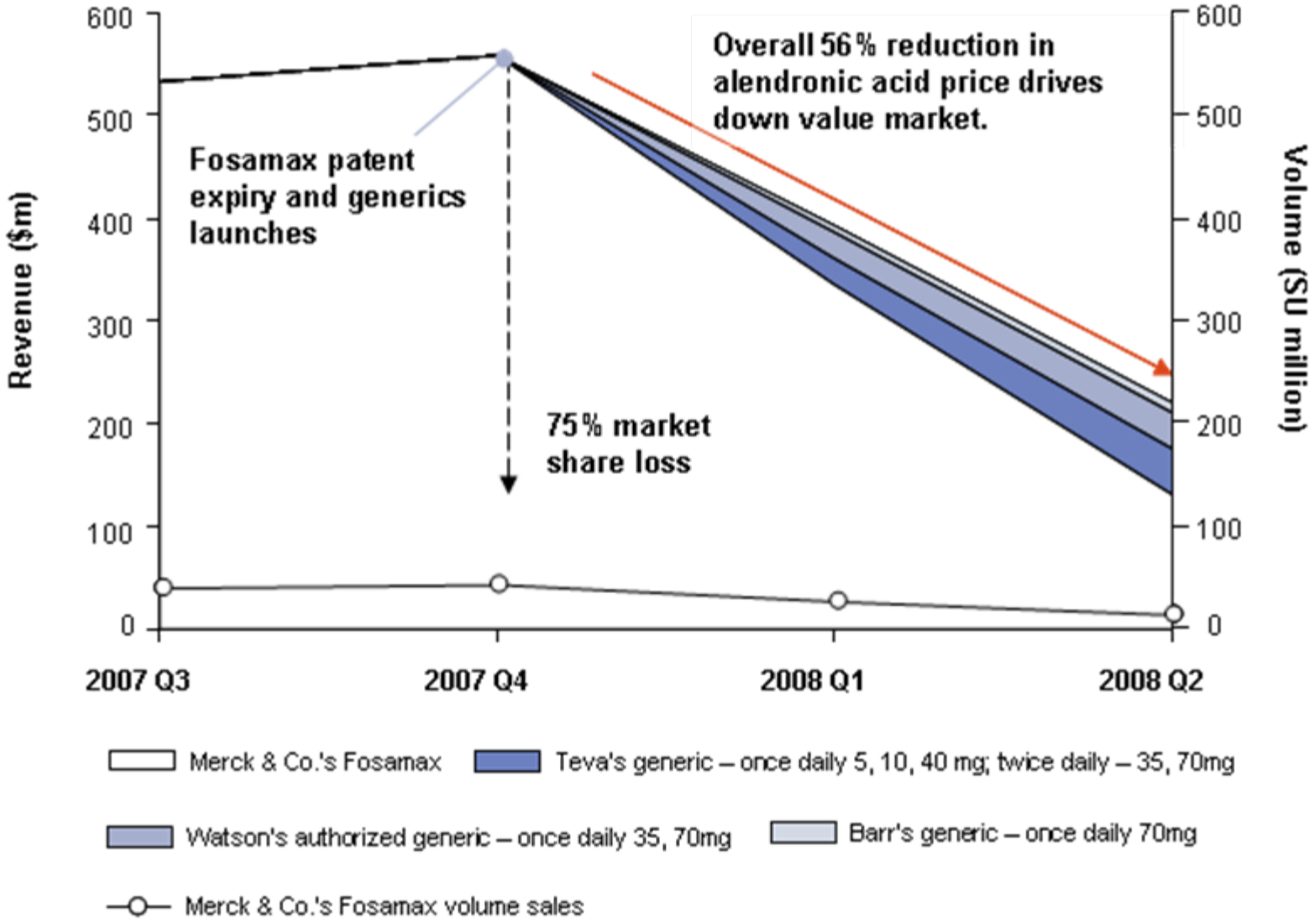
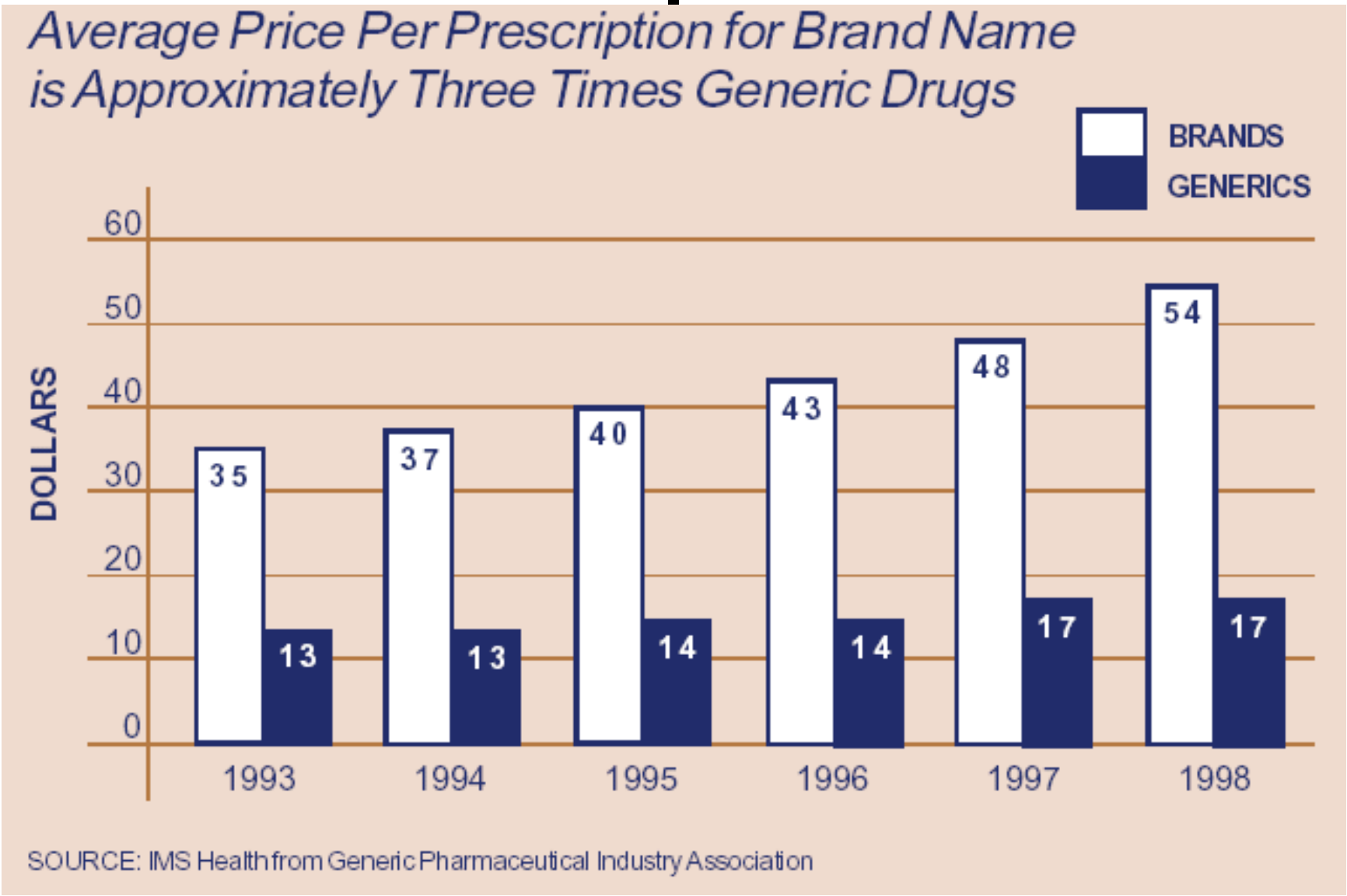


Fig. 1. Actual and projected worldwide sales values for a representative sample product.

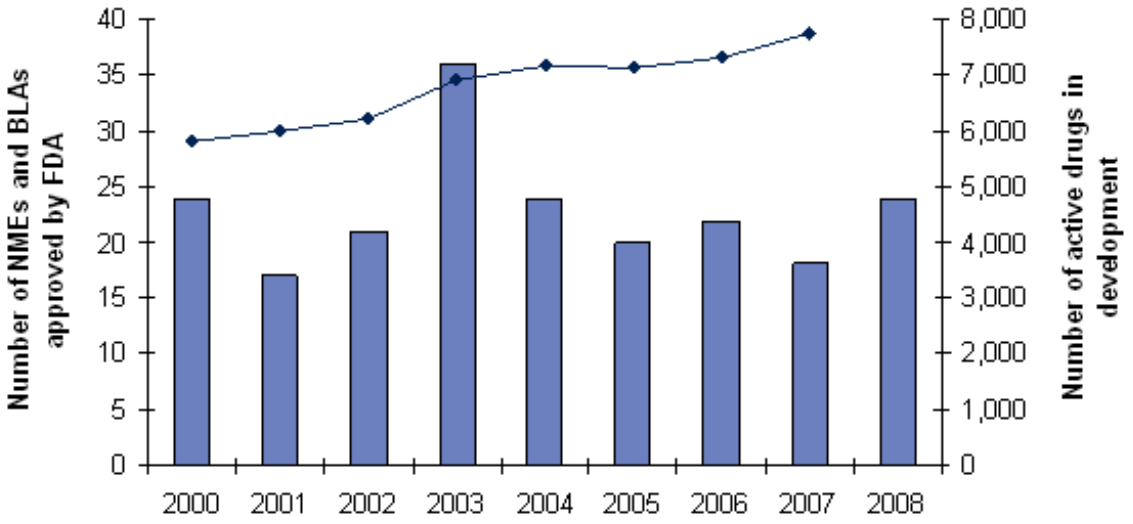
Grabowski e DiMasi Returns on Research and Development for 1990s New Drug Introductions. Pharmacoeconomics 2002; 20 Suppl. 3:11-29.


Revenue ($m)
Volume (SU million)
600
500
400
300
200
100
0
Overall 56% reduction in alendronic acid price drives down value market.
Fosamax patent expiry and generics launches
75% market share loss
2007 Q3
2007 Q4
2008 Q1
2008 Q2
Merck & Co.'s Fosamax
Teva's generic – once daily 5, 10, 40 mg; twice daily – 35, 70mg
Watson's authorized generic – once daily 35, 70mg
Barr's generic – once daily 70mg
Merck & Co.'s Fosamax volume sales


Average Price Per Prescription for Brand Name is Approximately Three Times Generic Drugs
BRANDS
GENERICS
DOLLARS
60
50
40
30
20
10
0
35
13
37
13
40
14
43
14
48
17
54
17
1993
1994
1995
1996
1997
1998
SOURCE: IMS Health from Generic Pharmaceutical Industry Association

Current barriers to R&D optimization

The R&D process is failing somewhere between initial innovation and market approval



NME = new molecular entity, BLA = biologic license application

- Despite growing pipelines in recent years, clinical trial success and approval rates have not improved.
- The key factors impacting Pharma's R&D capabilities and output include: increasing cost, duration and number of delays in R&D, poor candidate selection with drugs chosen on their commercial rather than their therapeutic potential, more limited financial resources with lifecycle management and indication expansion strategies prioritized, rather than for the development of novel innovative drugs.

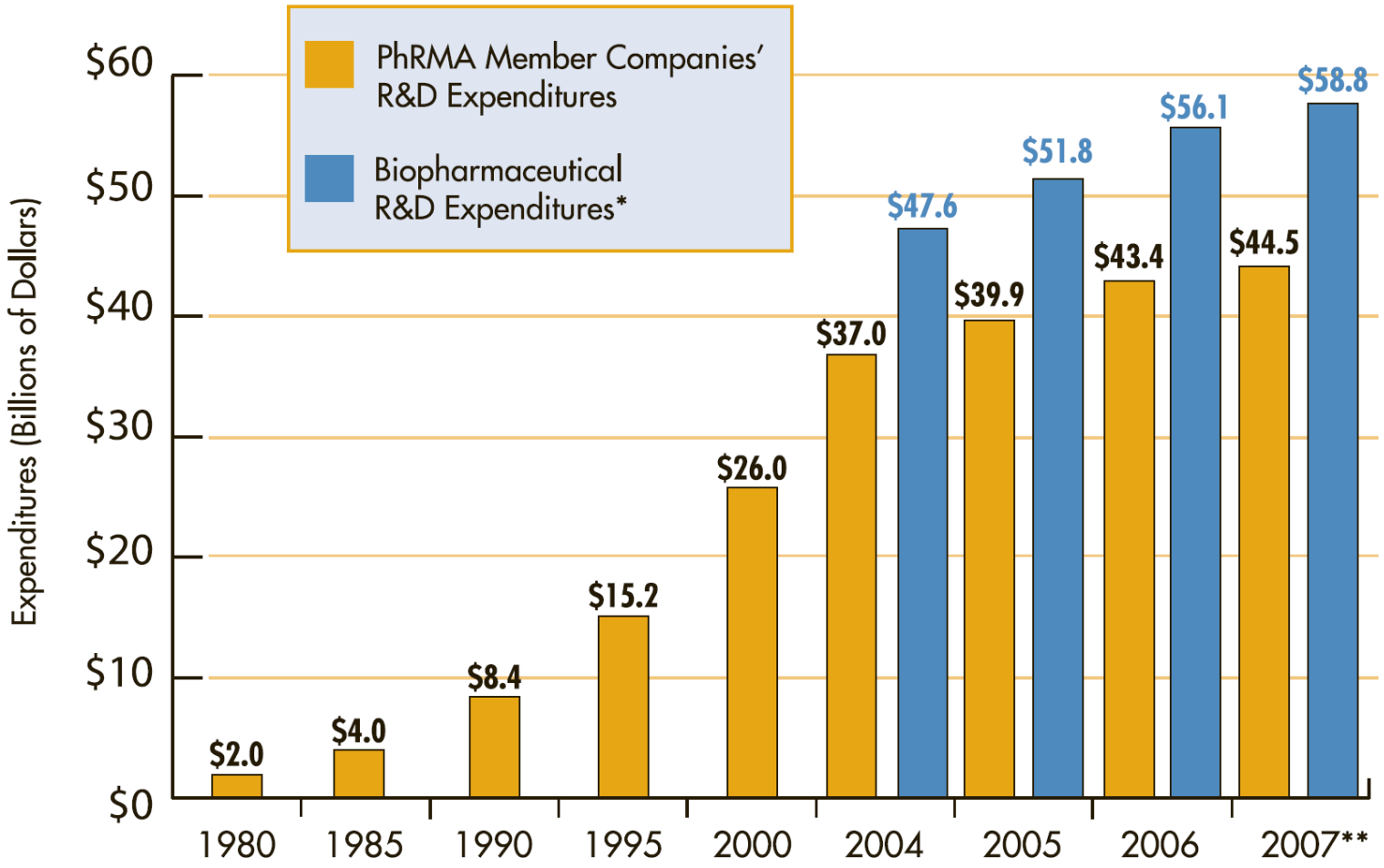
Source: Datamonitor adapted from FDA CDER (www.fda.gov) and Zheng et al. (2006)

Brevetti e innovazione

Dal punto di vista della teoria economica, la R&S è vista come contributo alla crescita:

- L’aumento di spesa in R&S comporta un aumento delle invenzioni.
- L’aumento delle invenzioni ha un effetto positivo sulla crescita della produttività;
- L’aumento della produttività è un elemento importante per la crescita economica.

FIGURE 1: Biopharmaceutical Companies' Investment in R&D Remains Strong



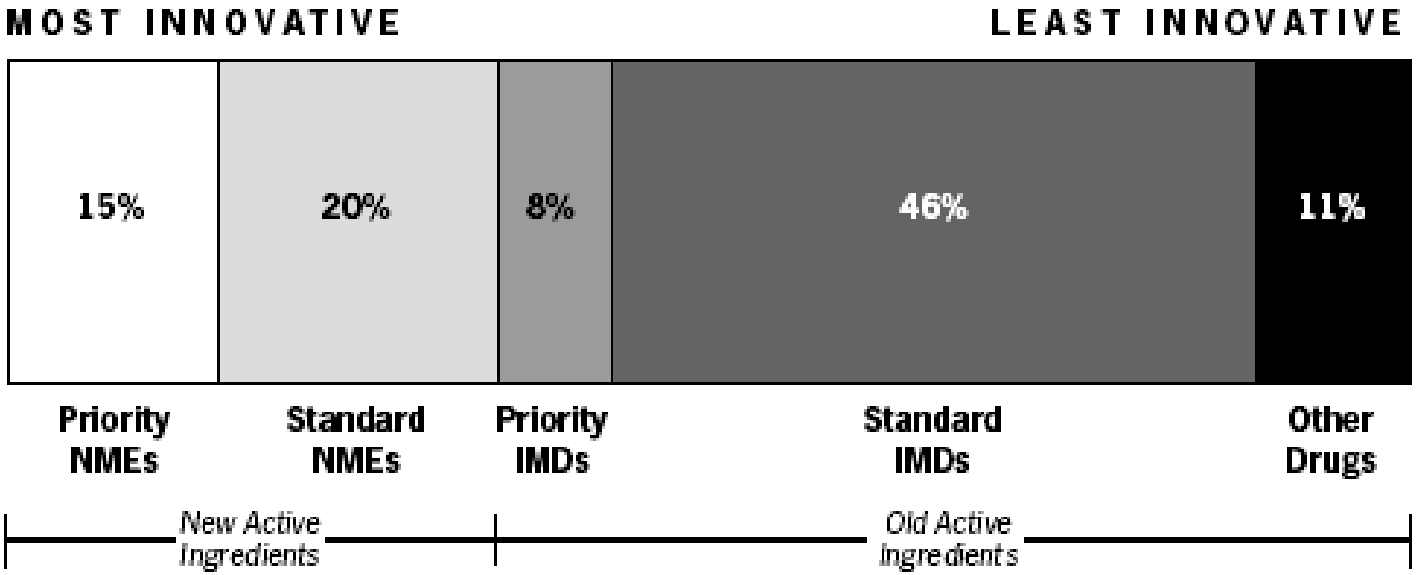
Sources: Burrill & Company, analysis for Pharmaceutical Research and Manufacturers of America, 2008; and Pharmaceutical Research and Manufacturers of America, *PhRMA Annual Member Survey* (Washington, DC: PhRMA, 2008).

*The "Biopharmaceutical R&D" figures include PhRMA research associates and nonmembers; these are not included in "PhRMA Member Companies' R&D Expenditures." PhRMA first reported this data in 2004.

** Estimated.

Only 15% of new drugs approved in 1989–2000 were highly innovative priority NMEs.

Distribution of NDAs, 1989–2000
TOTAL = 1,035 NEW DRUGS



SOURCE: FDA 2001

Classification of FDA Approved Drugs

NEW MOLECULAR ENTITY (NME)

Drug whose active ingredient has never before been approved by the FDA for the U.S. market.

INCREMENTALLY MODIFIED DRUG (IMD)

Medicine that (1) relies on an active ingredient present in a drug already approved for the U.S. market, or a closely related chemical derivative of such an ingredient, and (2) has been modified by the manufacturer.

OTHER DRUG (OTHER)

Drug using an active ingredient that is already available in an identical marketed product.

PRIORITY DRUG

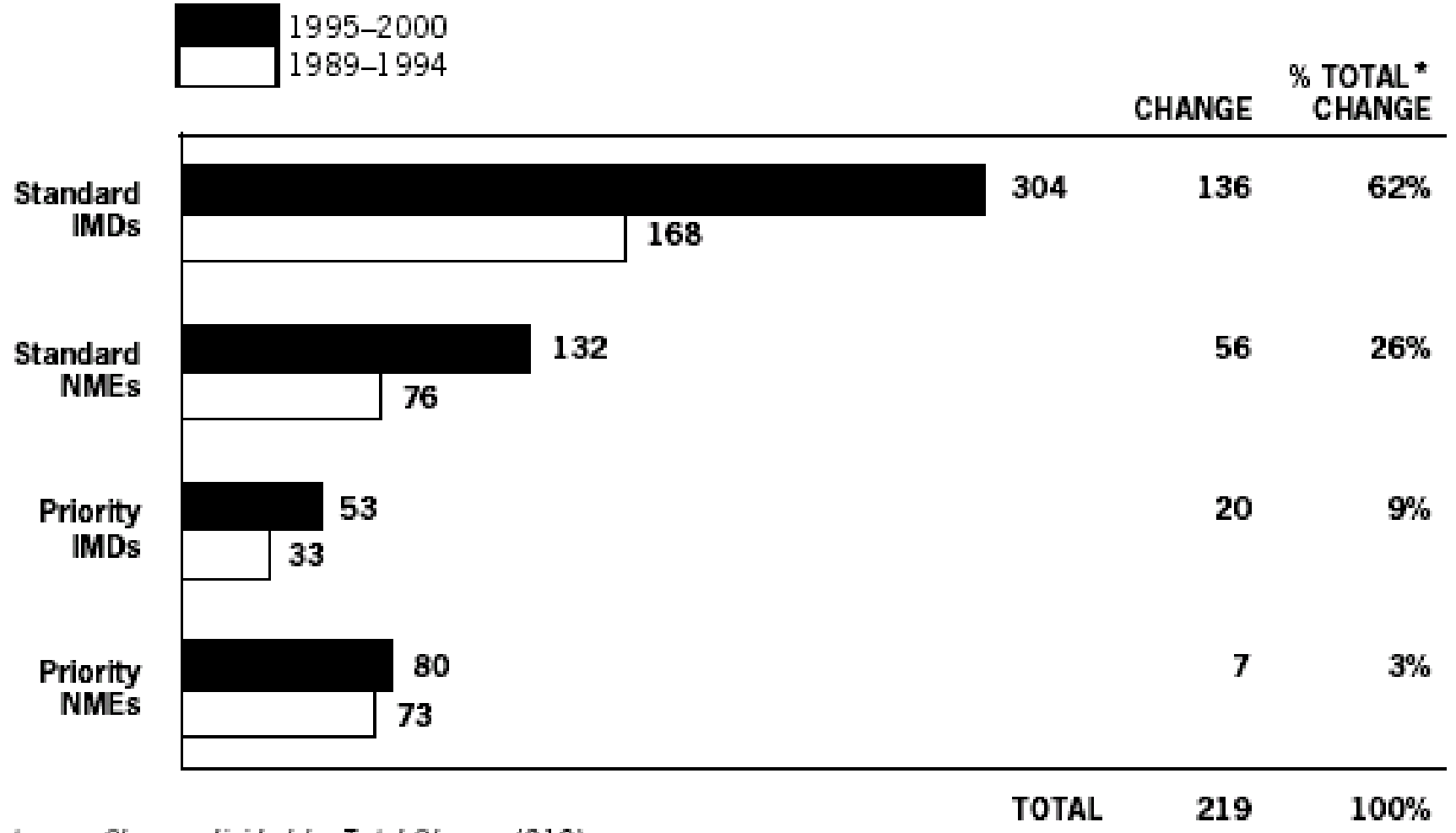
A product qualifying for the FDA's fast "priority review" because it appears to offer clinical improvement over available products and therapies in efficacy, safety, compliance, or use in a new sub-population.

STANDARD DRUG

A product that does not qualify for "priority review" because it does not demonstrate significant improvement over marketed products.

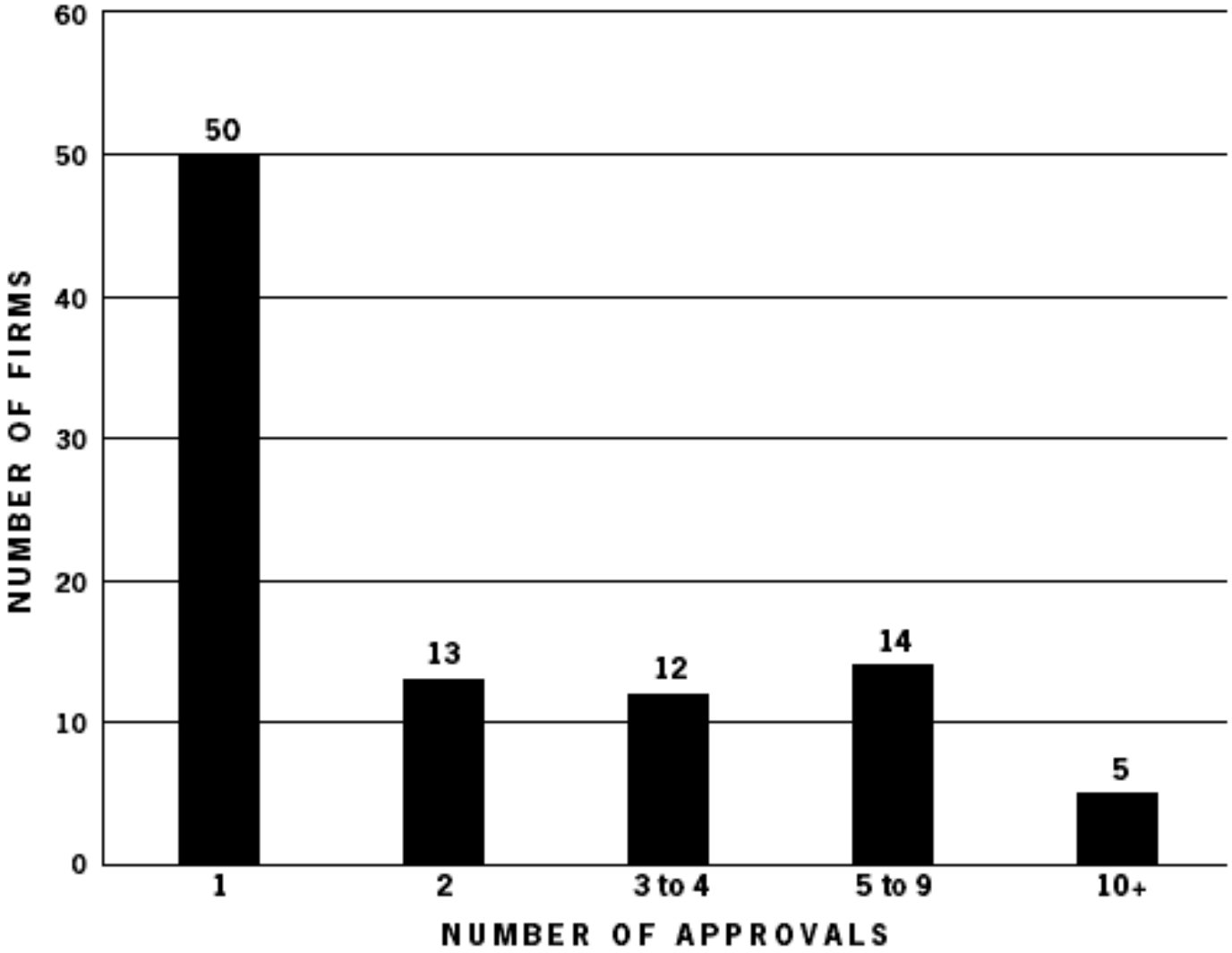
Most of the growth in product introductions has come from standard IMDs.

NDAs Approved

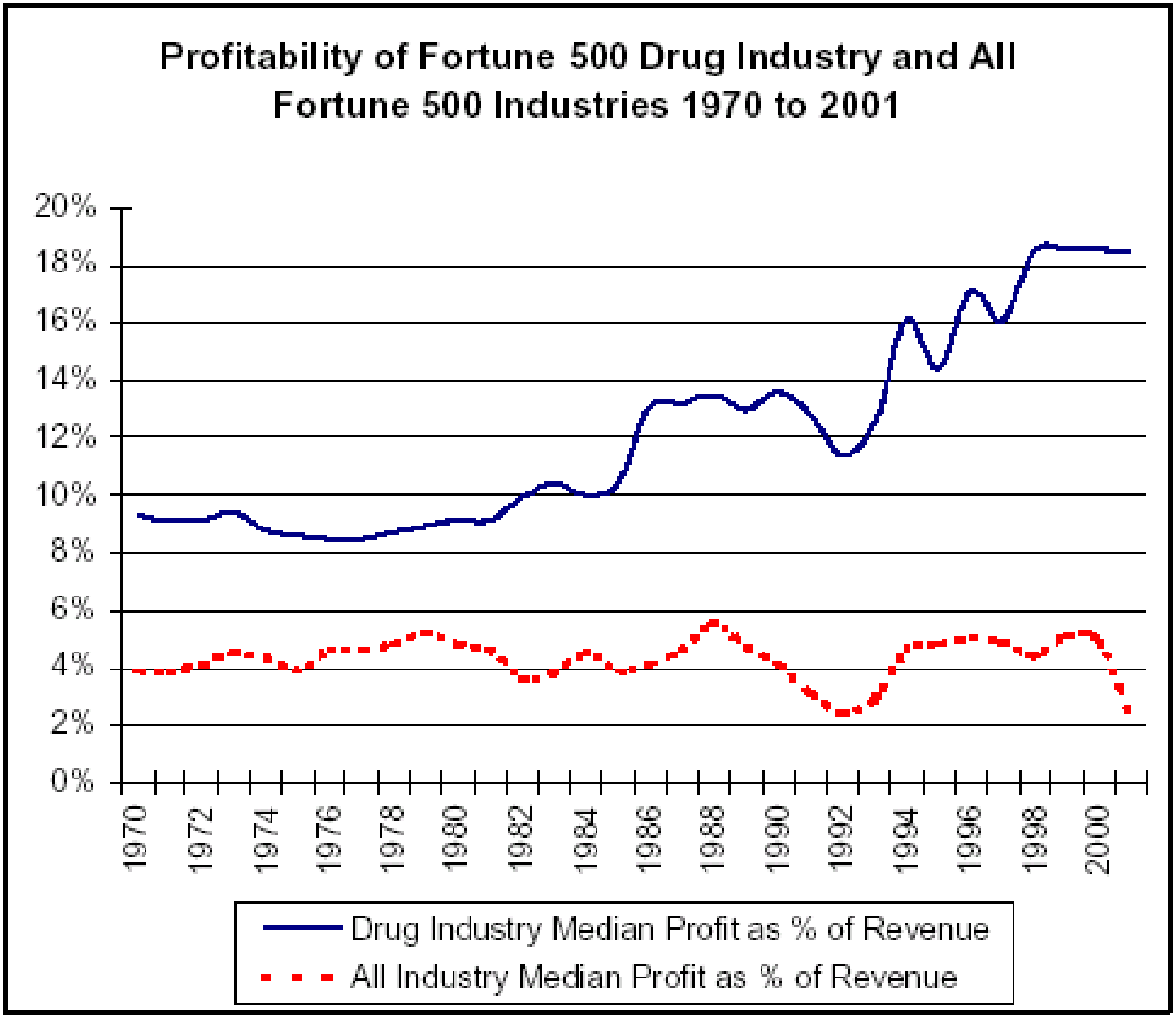


*Category Change divided by Total Change (219)

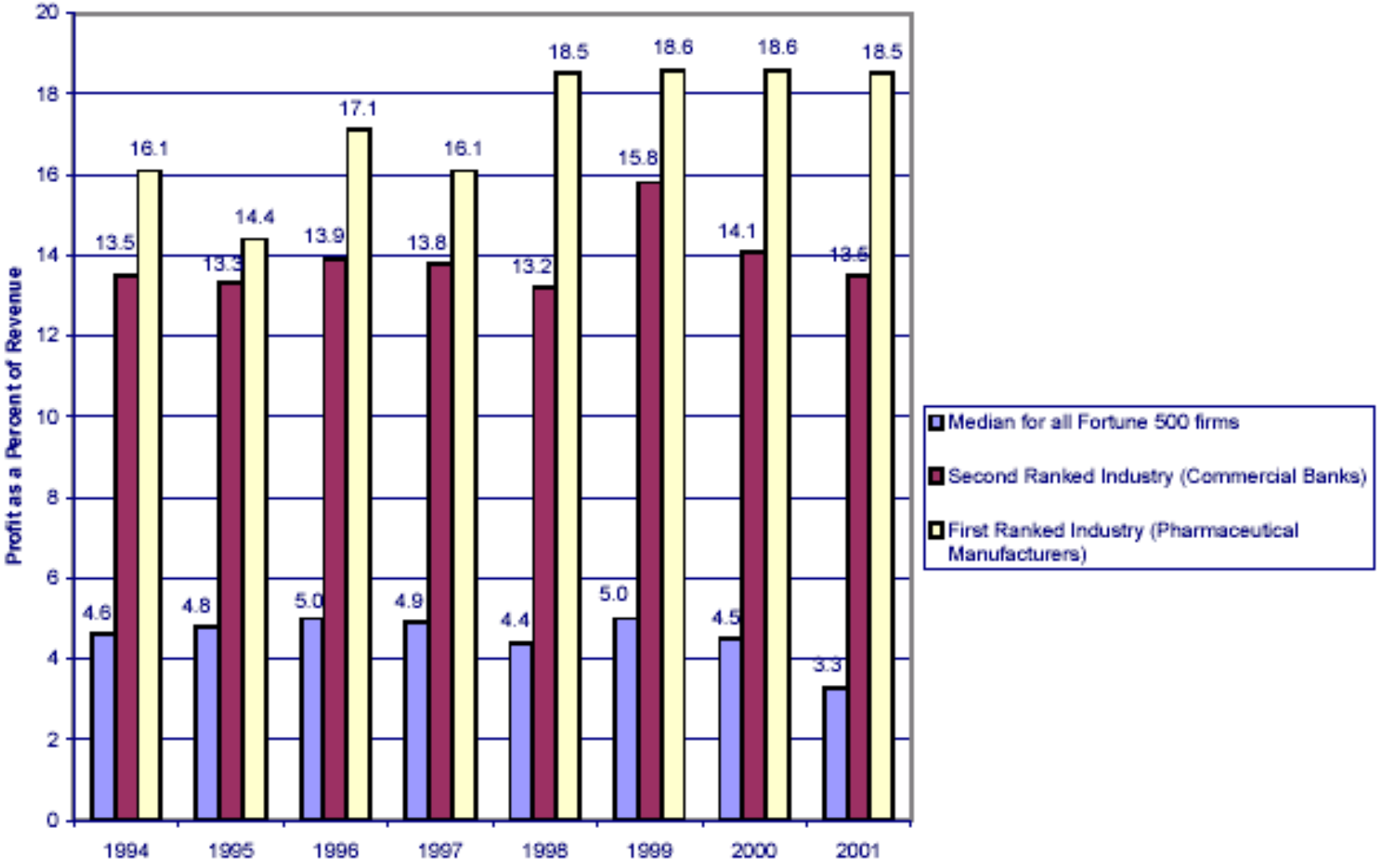
Distribution of Firms by Total Approvals of Drugs with New Active Ingredients, 1990–1999



SOURCE: Drug Information Journal 2000 based on Tufts CSDD Analysis



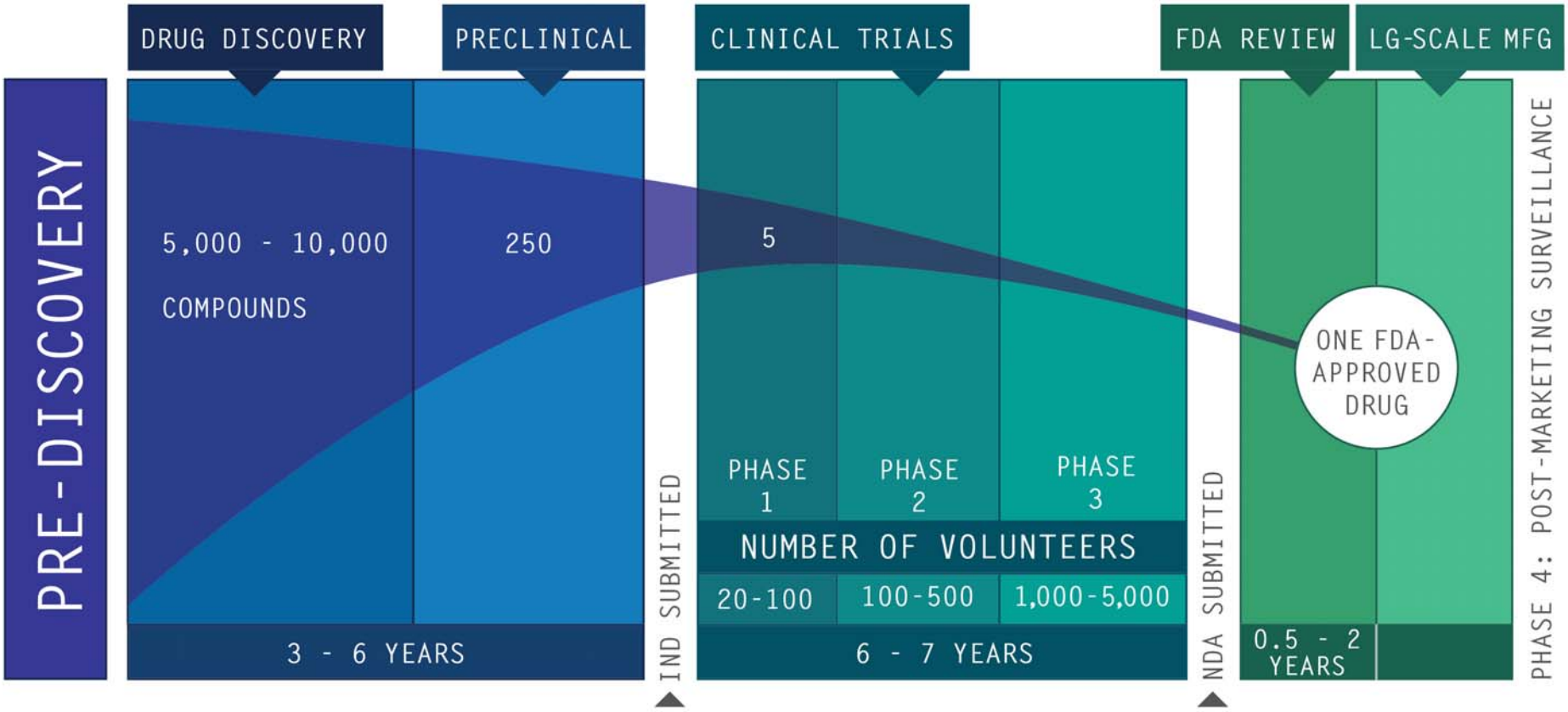
Source: Public Citizen update of Stephen W. Schondelmeyer calculation, *Competition and Pricing Issues in the Pharmaceutical Market*, PRIME Institute, University of Minnesota based on data found in *Fortune* magazine, 1958 to 1999; Public Citizen's analysis of *Fortune* magazine data, 2000-2002.



Source: Williams, C, Treloar, J, *Trends and Indicators in the Changing Health Care Marketplace* , 2002. (Menlo Park, CA: The Henry J. Kaiser Family Foundation, May 2002), p.46.

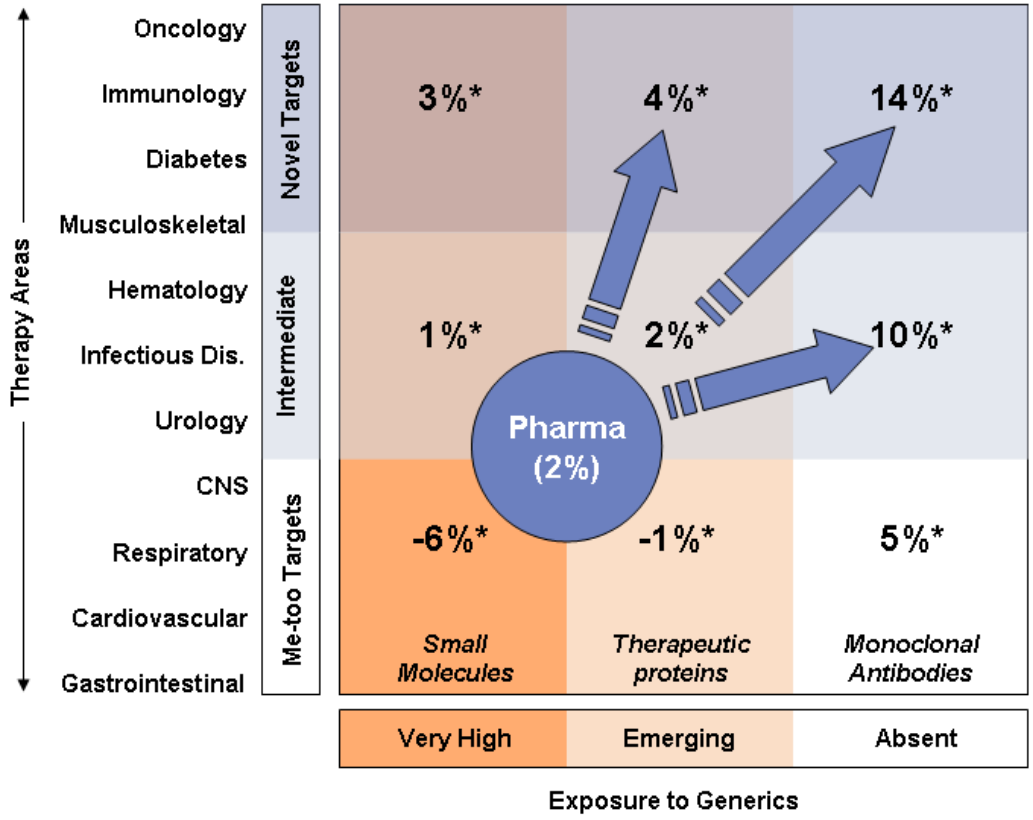
Costs of R&D

R&D process


DRUG DISCOVERY
PRECLINICAL
CLINICAL TRIALS
FDA REVIEW
LG-SCALE MFG
PRE-DISCOVERY
5,000 - 10,000
COMPOUNDS
250
5
ONE FDA-APPROVED DRUG
PHASE 1
PHASE 2
PHASE 3
NUMBER OF VOLUNTEERS
20-100
100-500
1,000-5,000
3 - 6 YEARS
6 - 7 YEARS
0.5 - 2 YEARS
IND SUBMITTED
NDA SUBMITTED
PHASE 4: POST-MARKETING SURVEILLANCE

How are pharma companies improving R&D?

Niche, specialty care markets offer Pharma the greatest growth potential



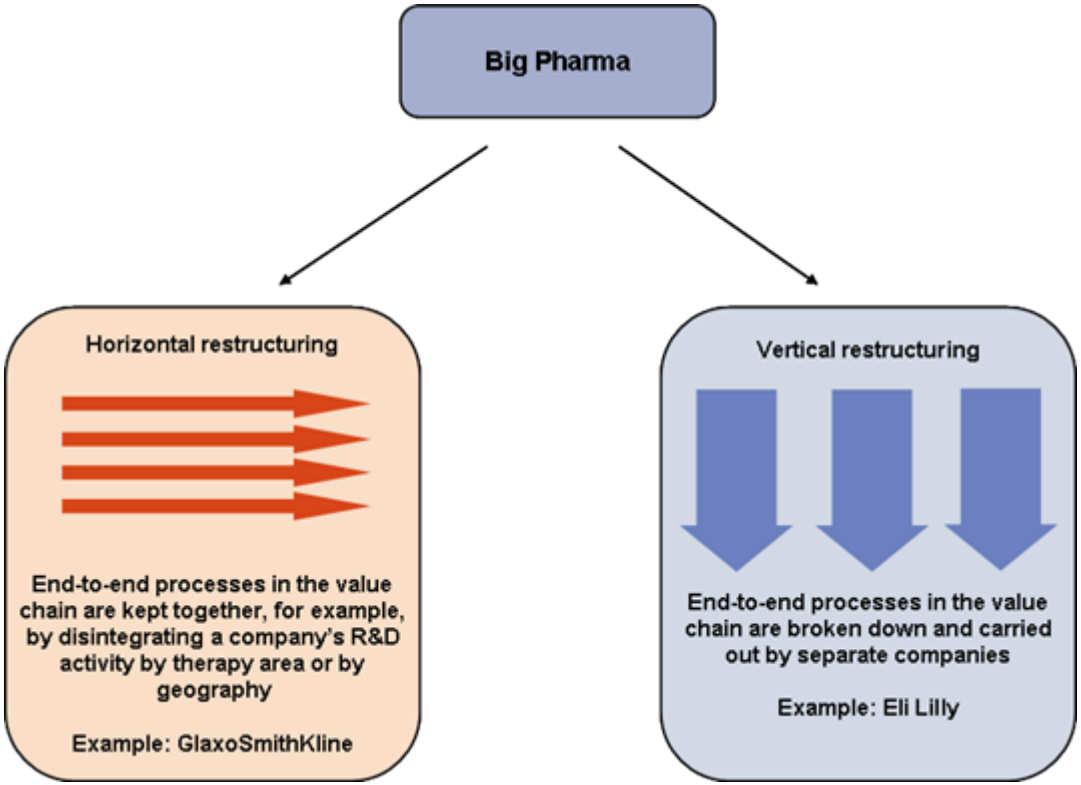
* = percentages represent 2007–2013 CAGR for segments

- In the face of traditional barriers to R&D, Pharma companies are starting to employ a number of strategies.
- These include, targeting niche indications and increasingly focusing on specialty markets, employing more creative lifecycle management strategies, widening the R&D bottleneck, creating satellite start-up R&D companies, and increasing utilizing CROs to cut internal R&D costs.

Source: Datamonitor, PharmaVitae Company Comparator Tool, IMHC0080, January 2009

Two key types of restructuring are available to Pharma

Restructuring Big Pharma R&D operations to increase productivity

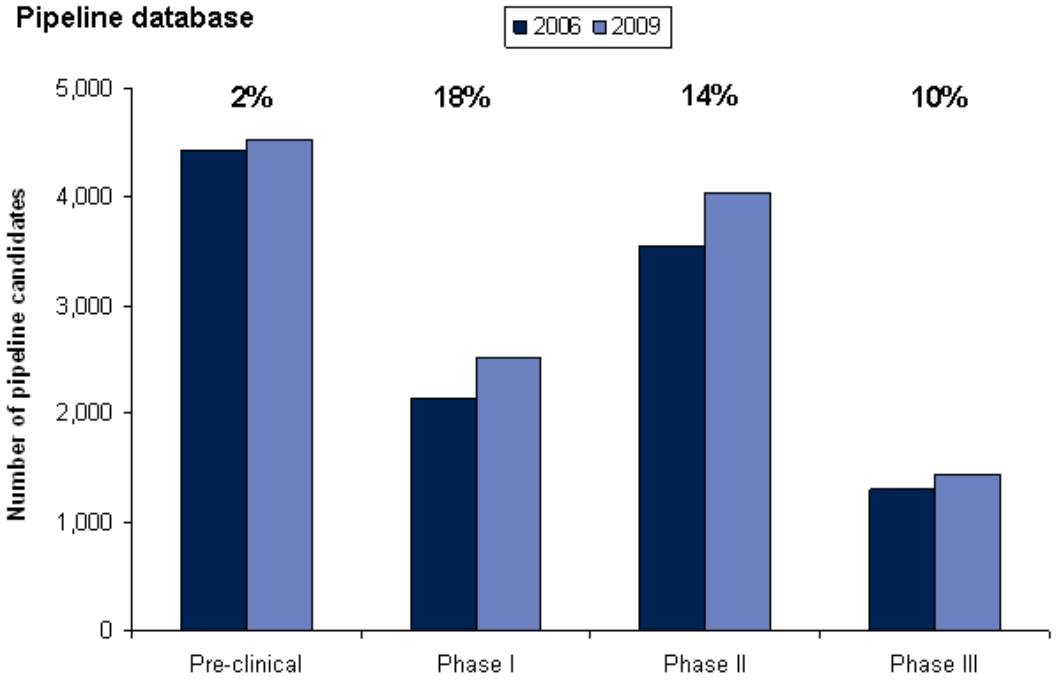


- While acquiring pipeline and marketed drugs through M&A increases the acquirer's portfolio, it does not necessarily address the core issue of low productivity.
- However, it does buy the company time with which it can use to implement R&D restructuring; be that horizontal or vertical restructuring in order to reorganize operations, creating smaller R&D units in an effort to re-create the entrepreneurial and innovative culture found in small biotech firms.

Source: Adapted from Man, 2009

Growth in product pipelines but decline in deal making activity

The greatest number of pipeline candidates are in preclinical and Phase II development

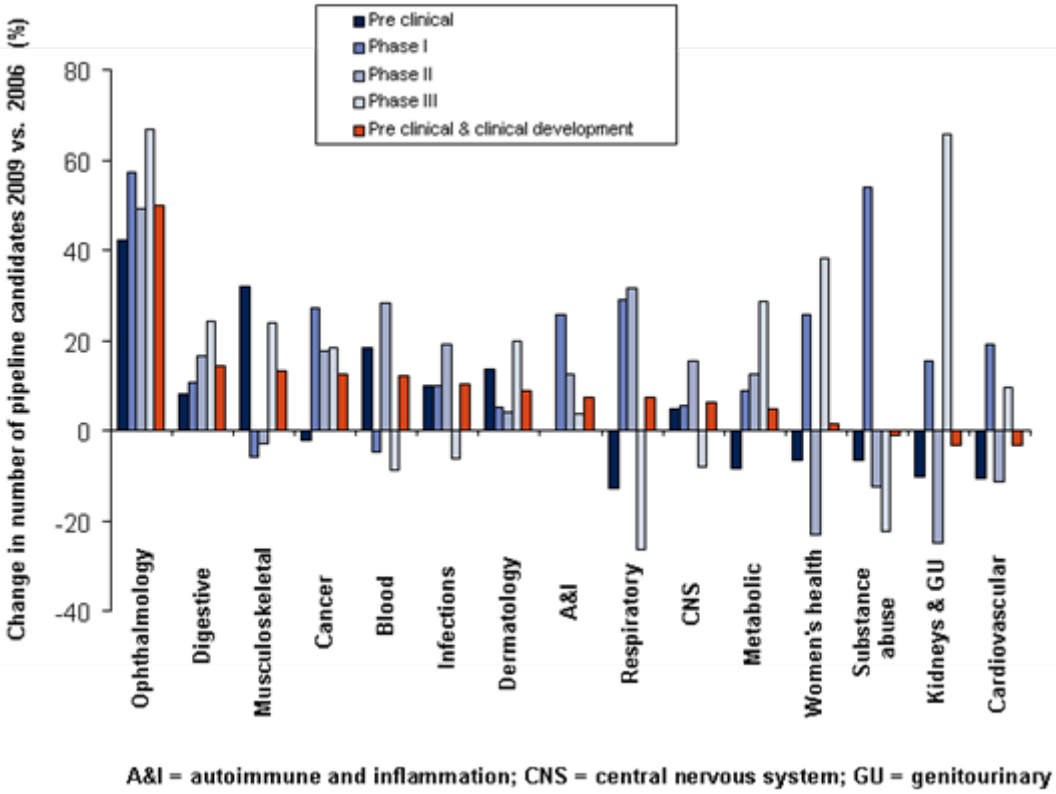


- The number of drug candidates in clinical development has increased between 2006 to 2009 by 9.7%, with the largest growth observed in Phase I clinical development, where there has been an 18% growth.
- However, Phase II remains the most populated clinical Phase and has grown by 14% since 2006, reflecting Pharma the growth in the Phase II/III bottleneck, but also the fact that more thorough early Phase clinical trials can reduce cost and attrition in Phase III clinical development.

Source: MedTRACK, Disease Hub, March 9 2009, © Datamonitor plc.

Pipeline candidates by therapy area and indication indicate an increased focus on niche markets

Change (%) in number of pipeline candidates, 2009 vs. 2006



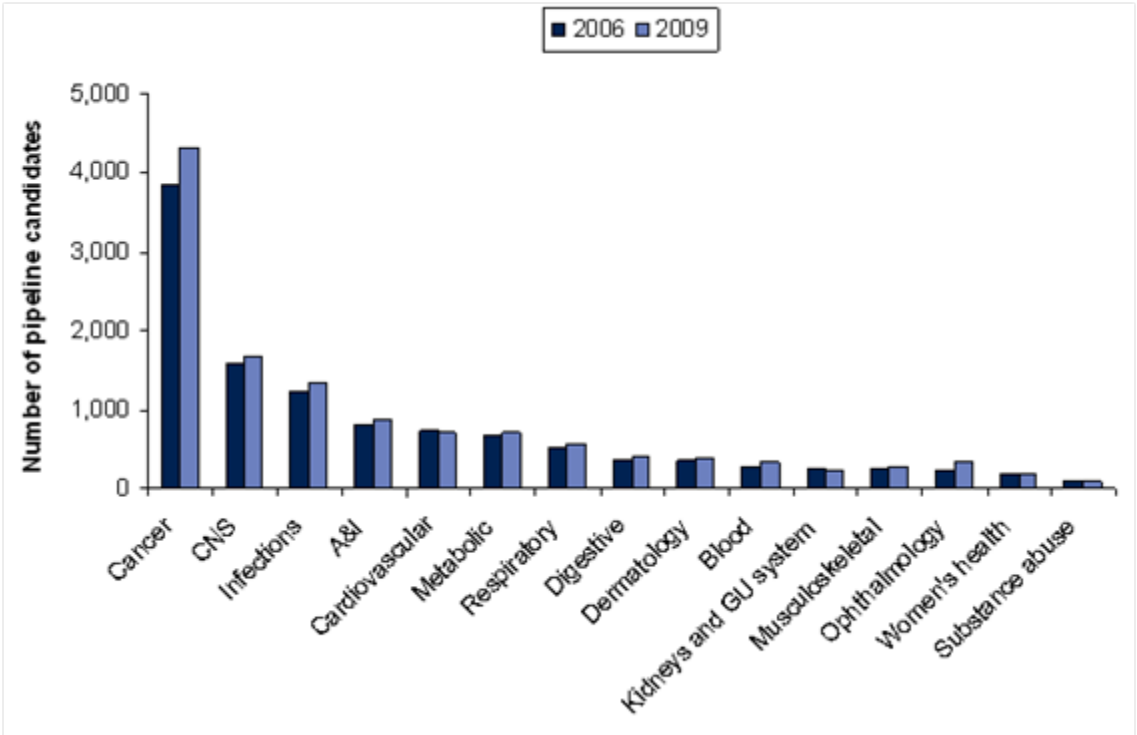
A&I = autoimmune and inflammation; CNS = central nervous system; GU = genitourinary

Source: MedTRACK, Disease Hub, March 9 2009, © Datamonitor plc.

- In terms of percentage points, the therapy area experiencing the largest growth in pipeline candidates was ophthalmology, while cardiovascular pipelines saw the largest decline, indicative of Pharma's shift towards niche markets and personalized medicines.
- Deal activity for pipeline drug candidates has declined in all but two therapy areas, between 2006 and 2008, a trend attributed to the current economic downturn.
- However, deal numbers remained flat for ophthalmology candidates and increased for pipeline drugs in development for autoimmune and inflammatory diseases, reflecting the growth potential of these areas.

Cancer, CNS and infections are the biggest growers in terms of number of drug candidates

Number of pipeline candidates by therapy area

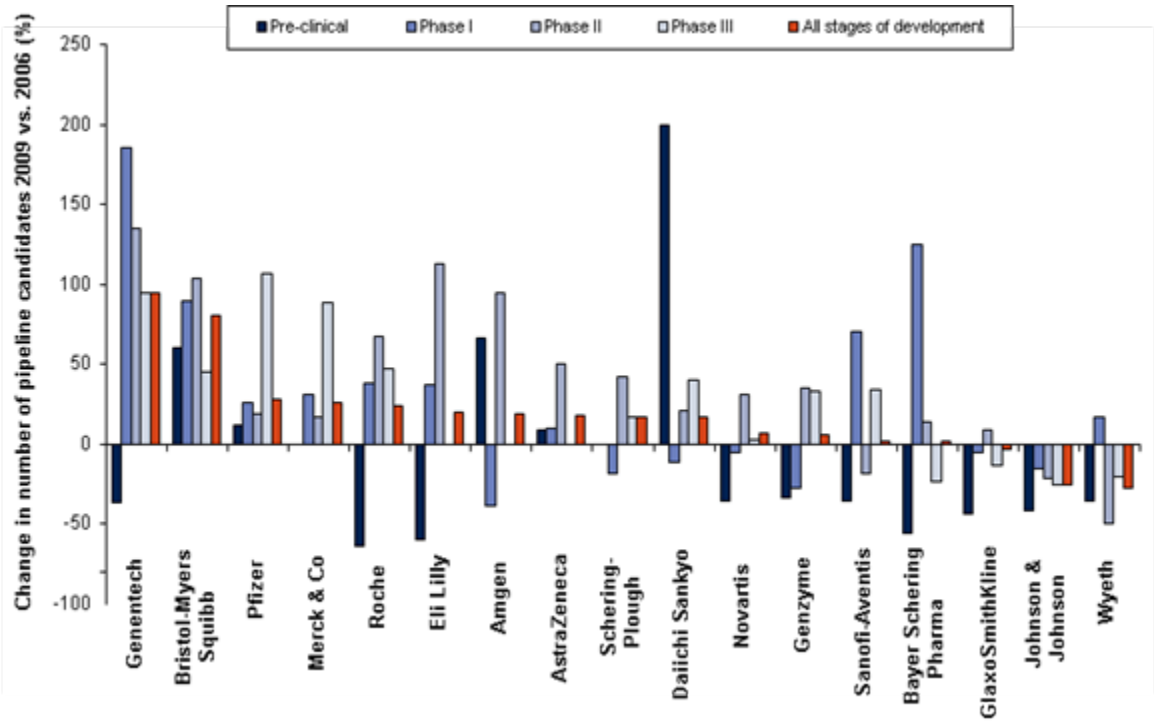


- The most commonly diagnosed cancers, known as “the big four” (breast, prostate, NSCLC and colorectal cancer), can offer developers the greatest opportunity for commercial success, although these markets are becoming increasingly competitive and saturated.
- Although these will remain the most popular R&D targets, niche indications are likely to raise interest in the pharmaceutical industry as these offer higher levels of unmet need and are currently less competitive, therefore providing a faster and less challenging entry route for market entery.

Source: MedTRACK, Disease Hub, March 9 2009

Genentech has the largest percentage growth in number of drug candidates in clinical development

Change (%) in number of pipeline candidates

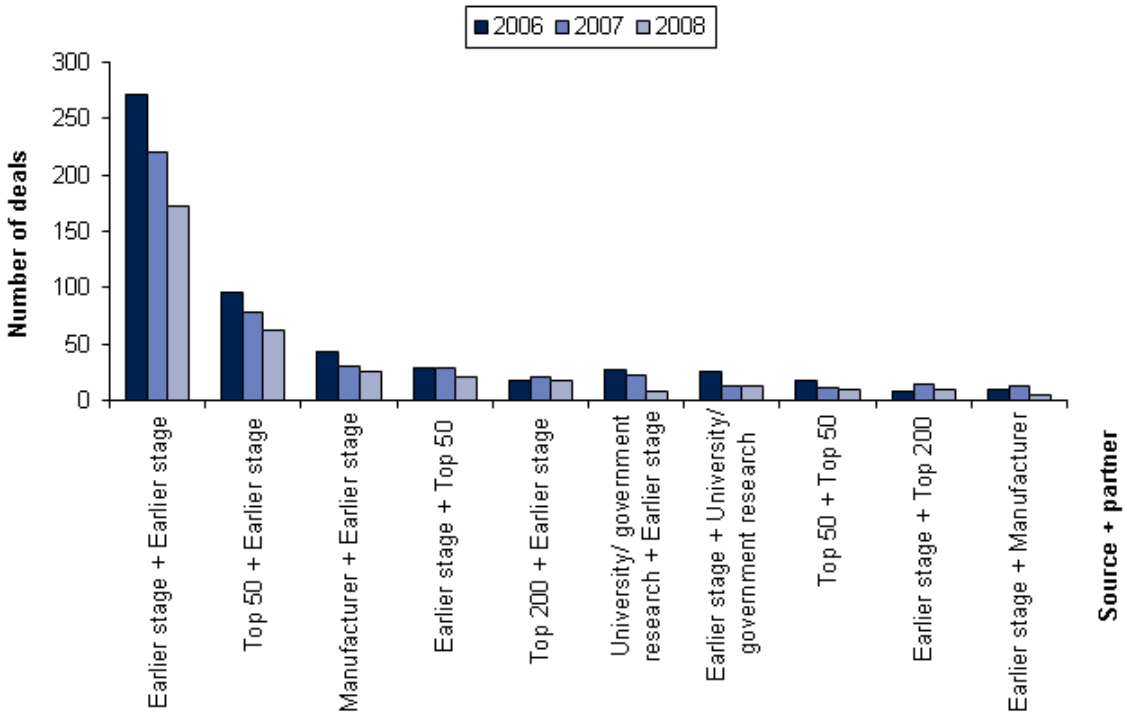


- Historically, Genentech's growth driver has been its internal drug development program, and even now the vast majority of its R&D pipeline is developed in-house and focuses on monoclonal antibodies for oncology. This is not surprising given Genentech's leading position in the oncology market thanks to its blockbusters, Avastin and Herceptin (developed in house), and Rituxan (in-licensed from Biogen Idec).
- The skyrocketing growth of its Phase I and Phase II portfolio can be ascribed to its science-driven approach to discovery, which has enabled it to launch truly innovative drugs targeting areas of high unmet need.

Source: MedTRACK, Disease Hub, March 9 2009

Early-stage partnerships are the most frequent R&D deal type, but have also seen the largest decline in recent years

Trends in source:partner mix for pipeline deal-making, 2006–09

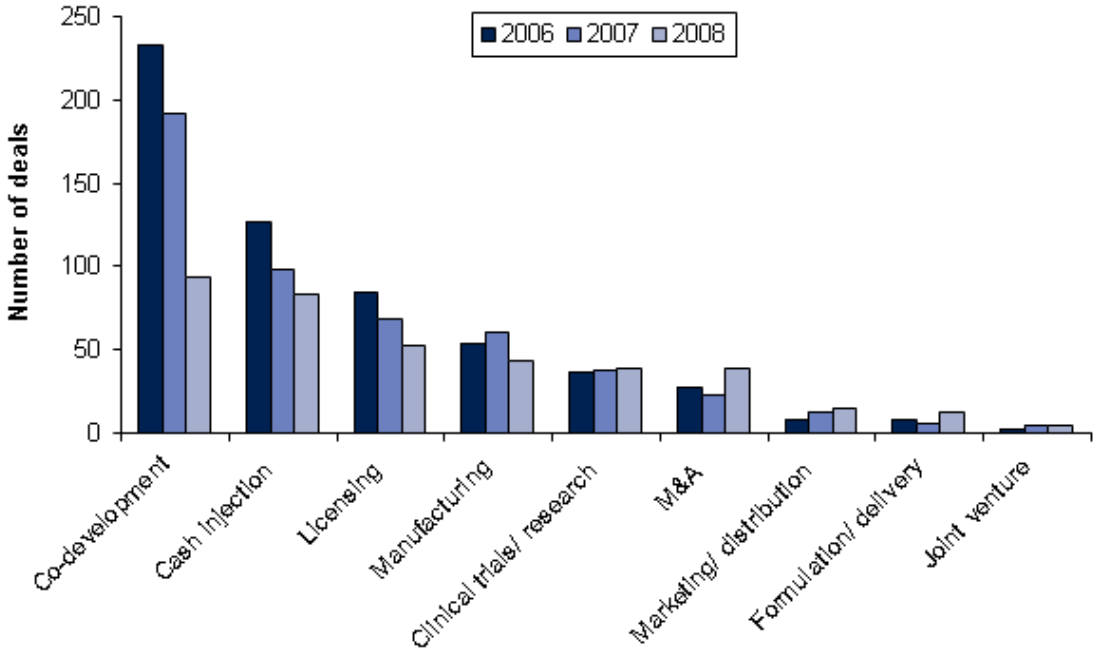


- Early stage players are the predominant company type involved in pipeline drug deals, both as the source and as a partner, reflecting the innovative environment cultivated in such companies as compared to Big Pharma.
- Top 50 Pharma companies were the second most common group of companies to enter into pipeline drug deals, although primarily as partners (21% of all deals) rather than a source companies (9% of all deals), exemplifying their need to access novel pipeline candidates through externalization strategies in order to supplement in-house drug development.

Source: MedTRACK, Deals and Alliances , March 13 2009, © Datamonitor plc.

Early-stage co-development deals remain the most popular deal type

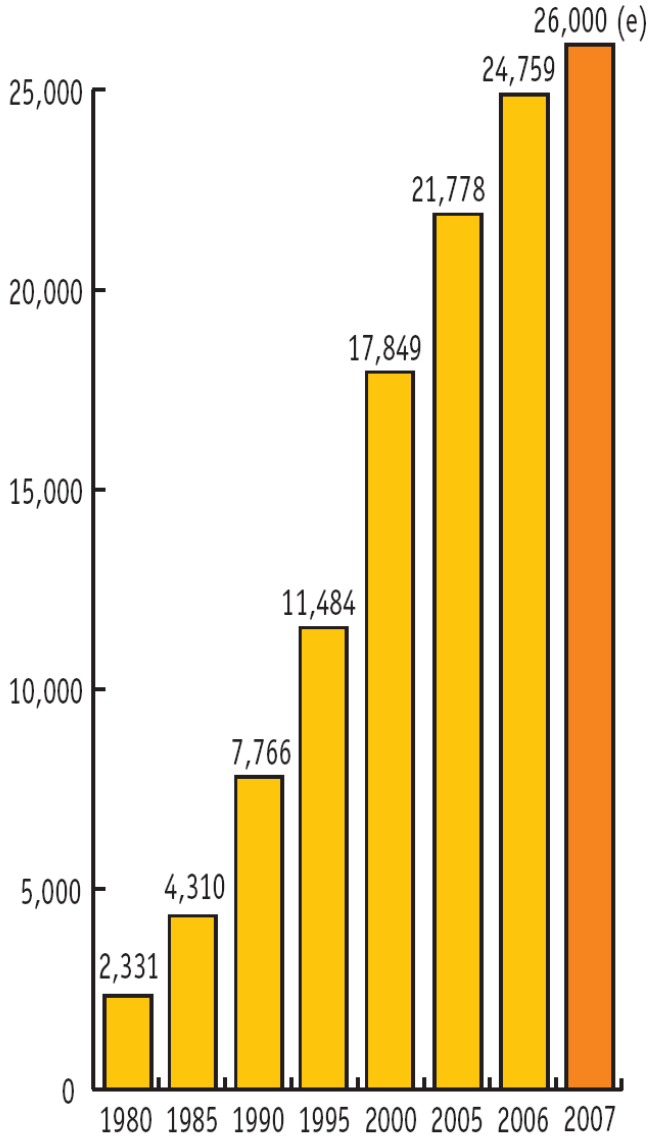
The most common deal types, 2006-08



- The most common pipeline drug deal type are co-development deals, followed by cash injections and licensing deals. However, the volume of such deals has declined over the last three years.
- Conversely though, the number of clinical trial/research, M&A, marketing and distribution, formulation/drug delivery and joint venture deals have all increased, albeit marginally between 2006 and 2008, illustrating that companies are increasingly outsourcing these aspects of drugs development and commercialization in order to cut costs and maximize future profits.

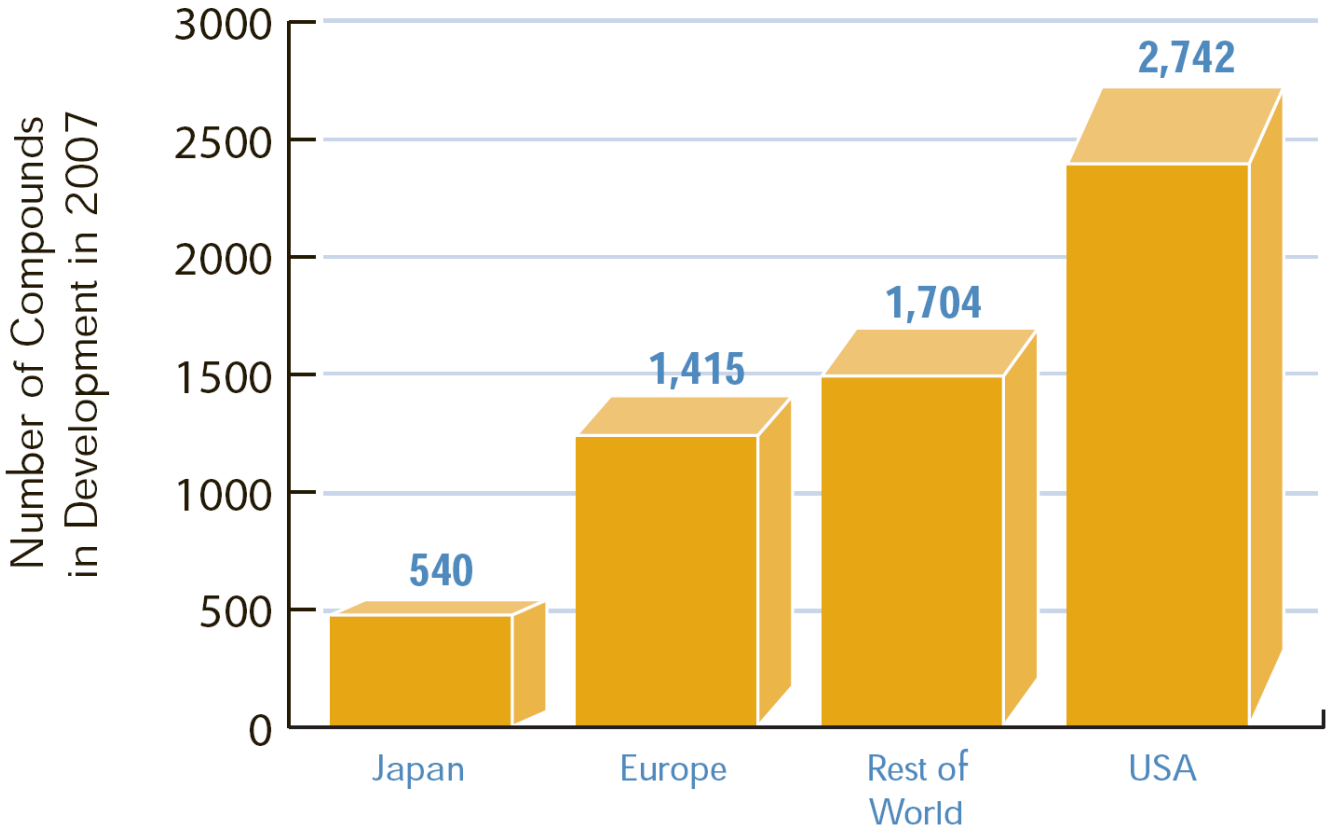
Source: MedTRACK, Deals and Alliances, March 13 2009

PHARMACEUTICAL R&D EXPENDITURE IN EUROPE (€ MILLION)



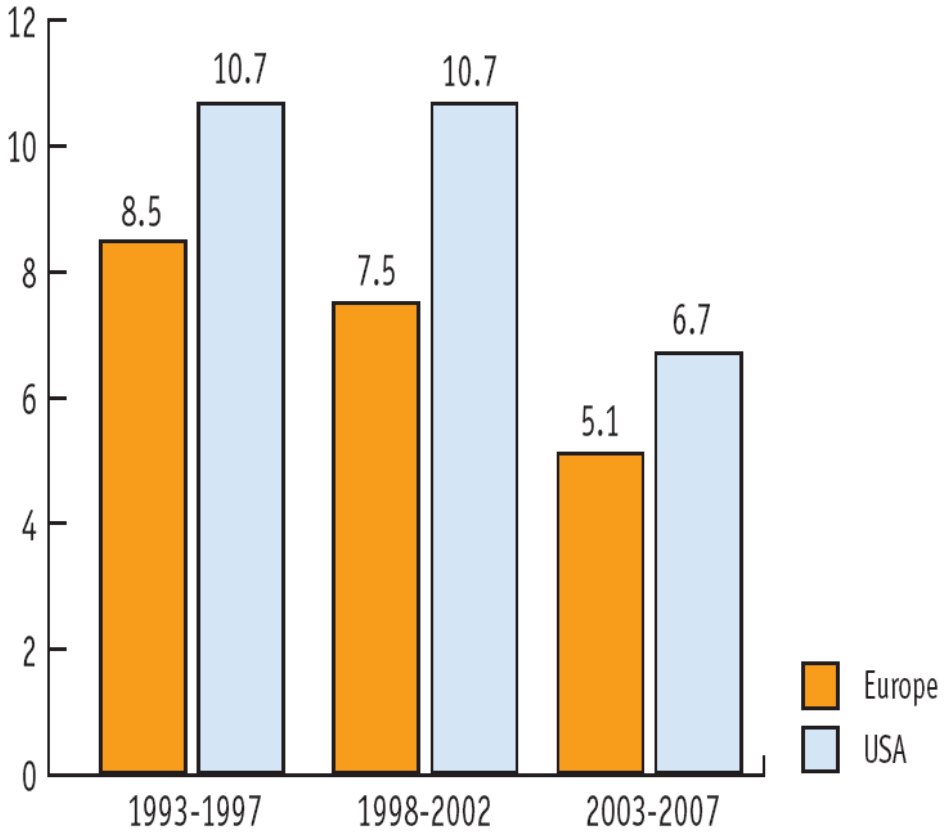
Source: EFPIA Member Associations (official figures) -
(e): EFPIA estimate

FIGURE 3: Medical Research in the U.S. Outpaces the Rest of the World



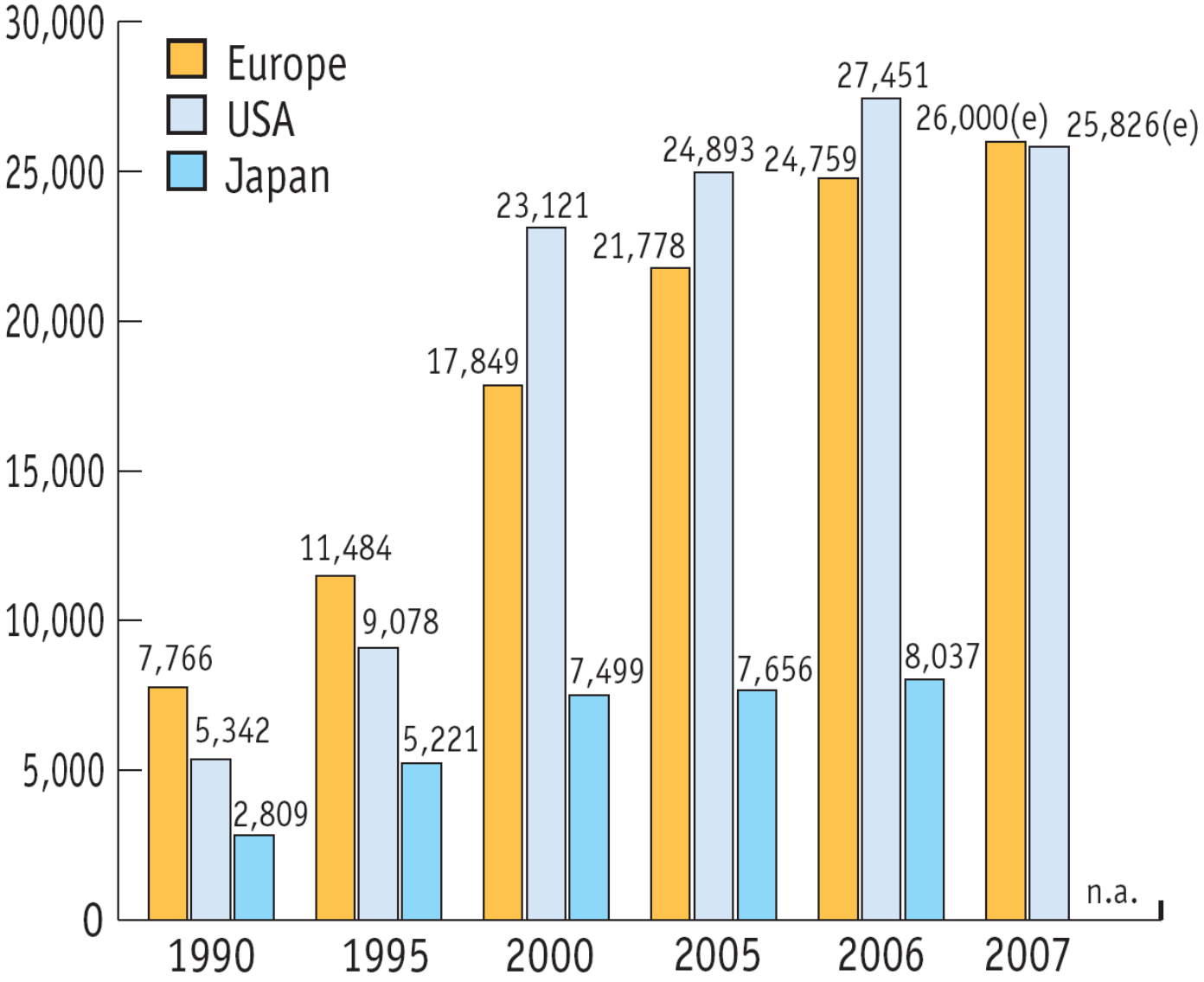
Source: Adis R&D Insight Database, customized run (December 2007).

PHARMACEUTICAL R&D EXPENDITURE ANNUAL GROWTH RATE (%)

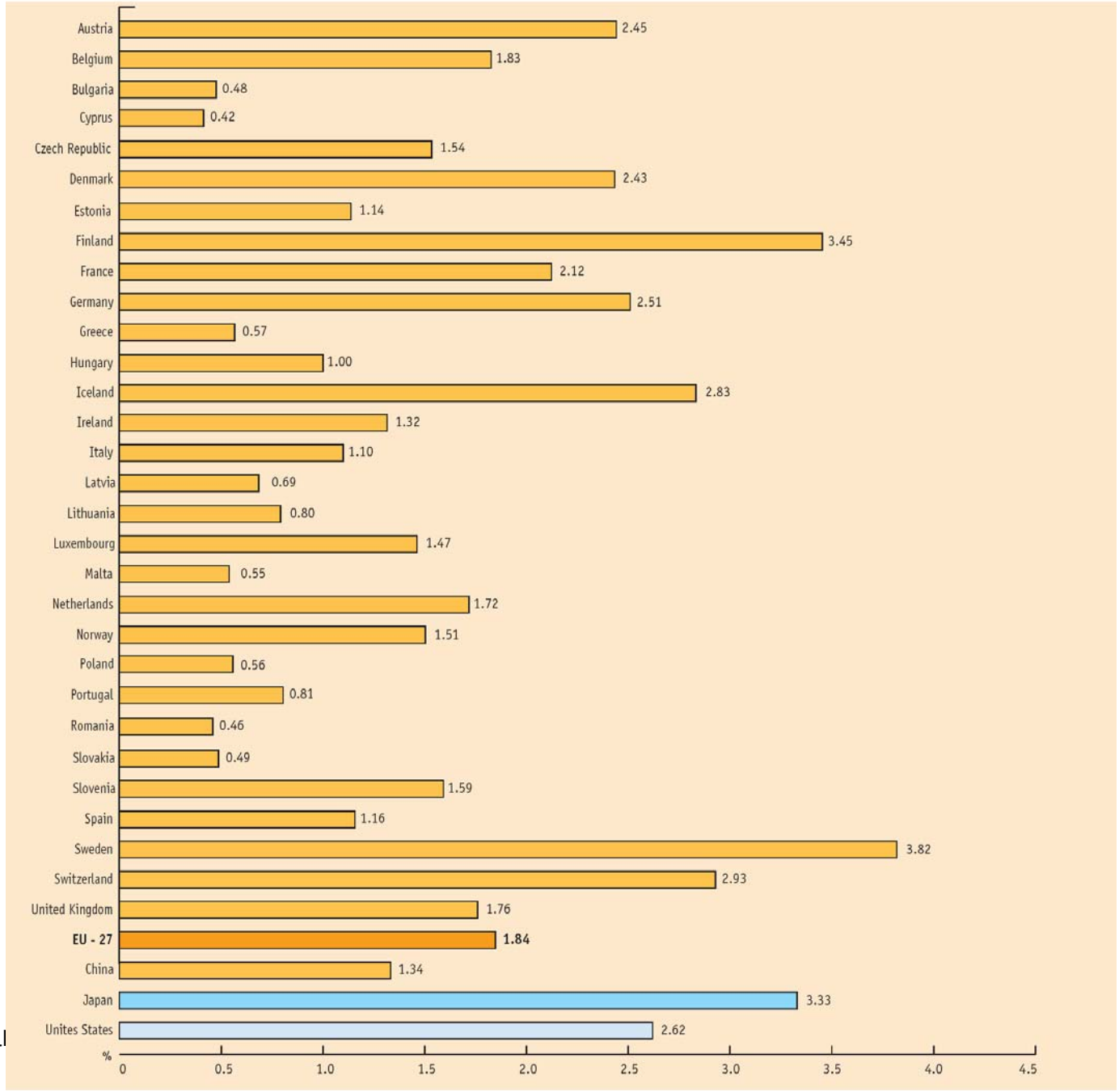


Source: EFPIA, PhRMA

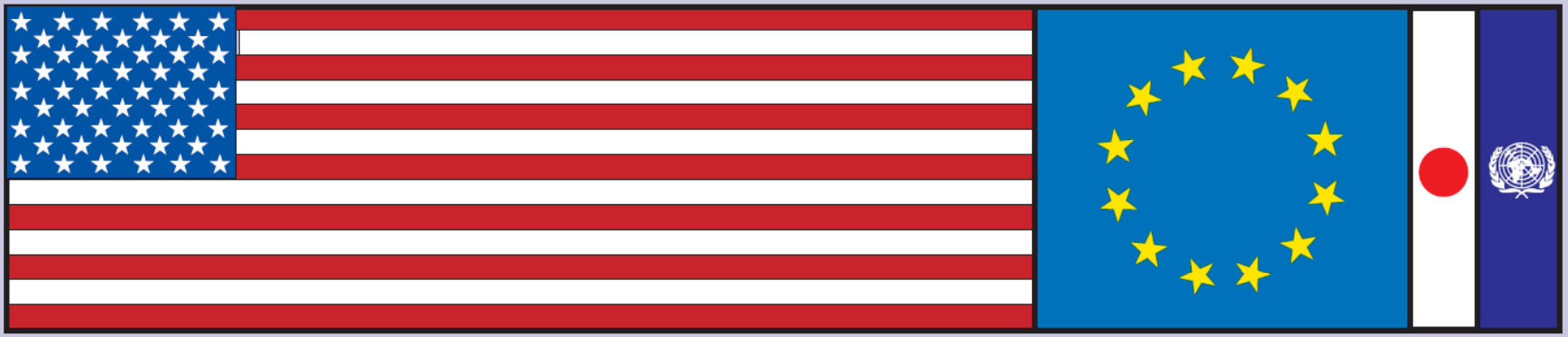
PHARMACEUTICAL R&D EXPENDITURE IN EUROPE, USA AND JAPAN (€ MILLION, CURRENT EXCHANGE RATES*), 1990-2007



R&D EXPENDITURE AS A PERCENTAGE OF GDP (2006)



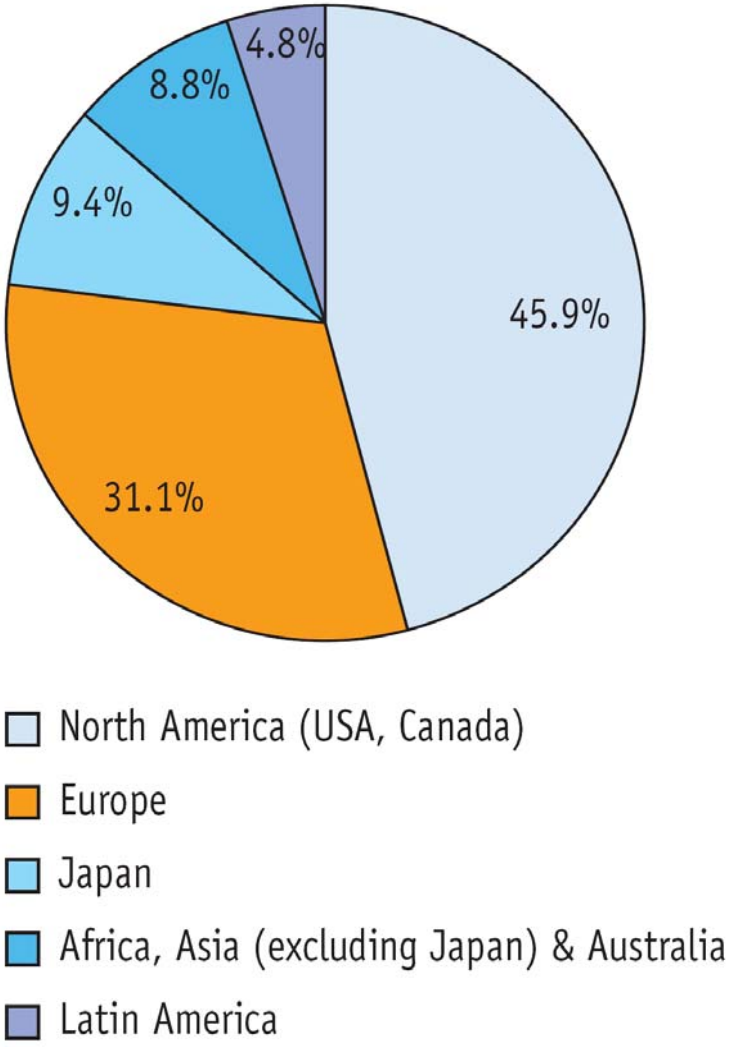
GEOGRAPHICAL BREAKDOWN (BY MAIN MARKETS) OF SALES OF NEW MEDICINES LAUNCHED DURING THE PERIOD 2002-2007



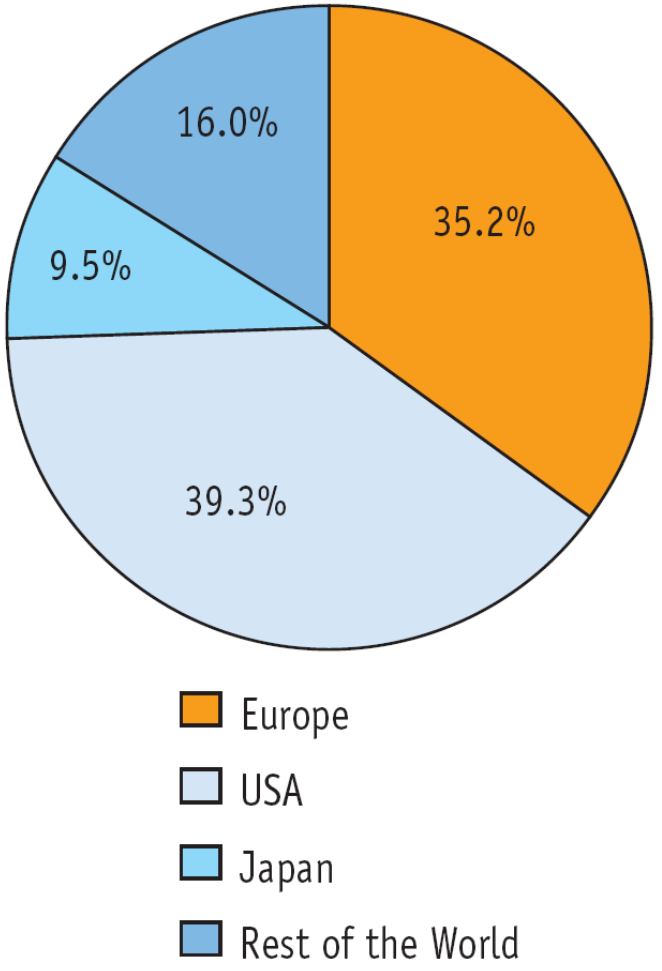
Note: New medicines cover all new active ingredients marketed for the first time on the world market during the period 2002-2007
Europe includes non-EU members and CIS markets

Source: IMS Health MIDAS MAT December 2007

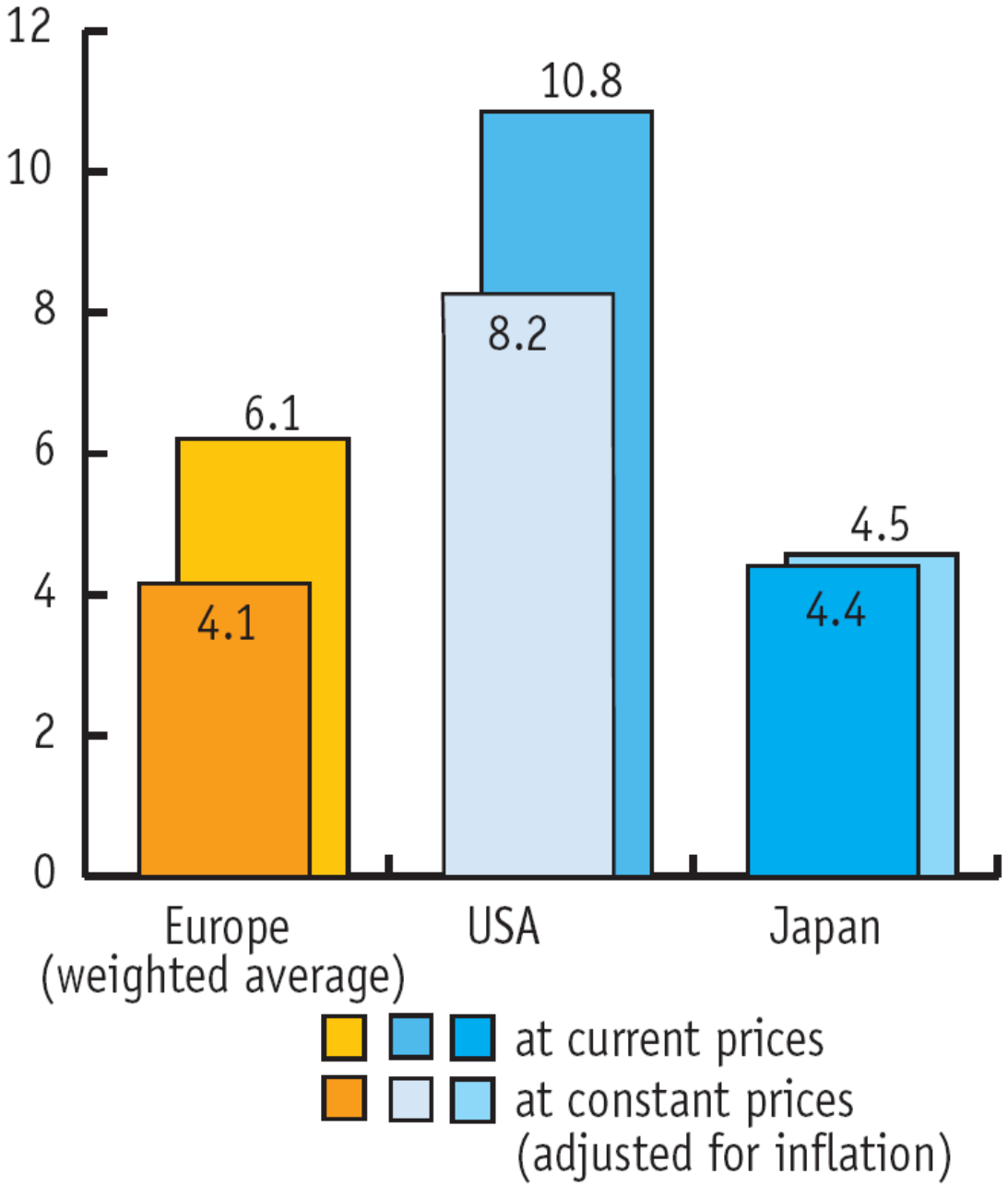
BREAKDOWN OF THE WORLD PHARMACEUTICAL MARKET – 2007 SALES



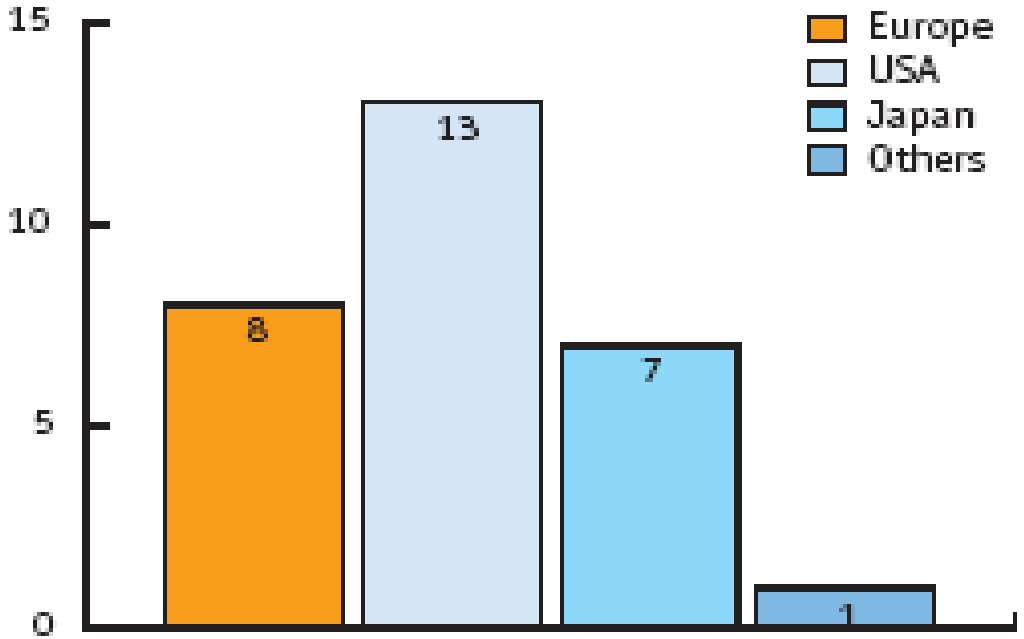
BREAKDOWN OF THE WORLD PHARMACEUTICAL PRODUCTION (AT EX-FACTORY PRICES), 2006



TOTAL PHARMACY MARKET
(AT EX-FACTORY PRICES)
AVERAGE GROWTH RATE FOR THE PERIOD 1996-2006
(%)

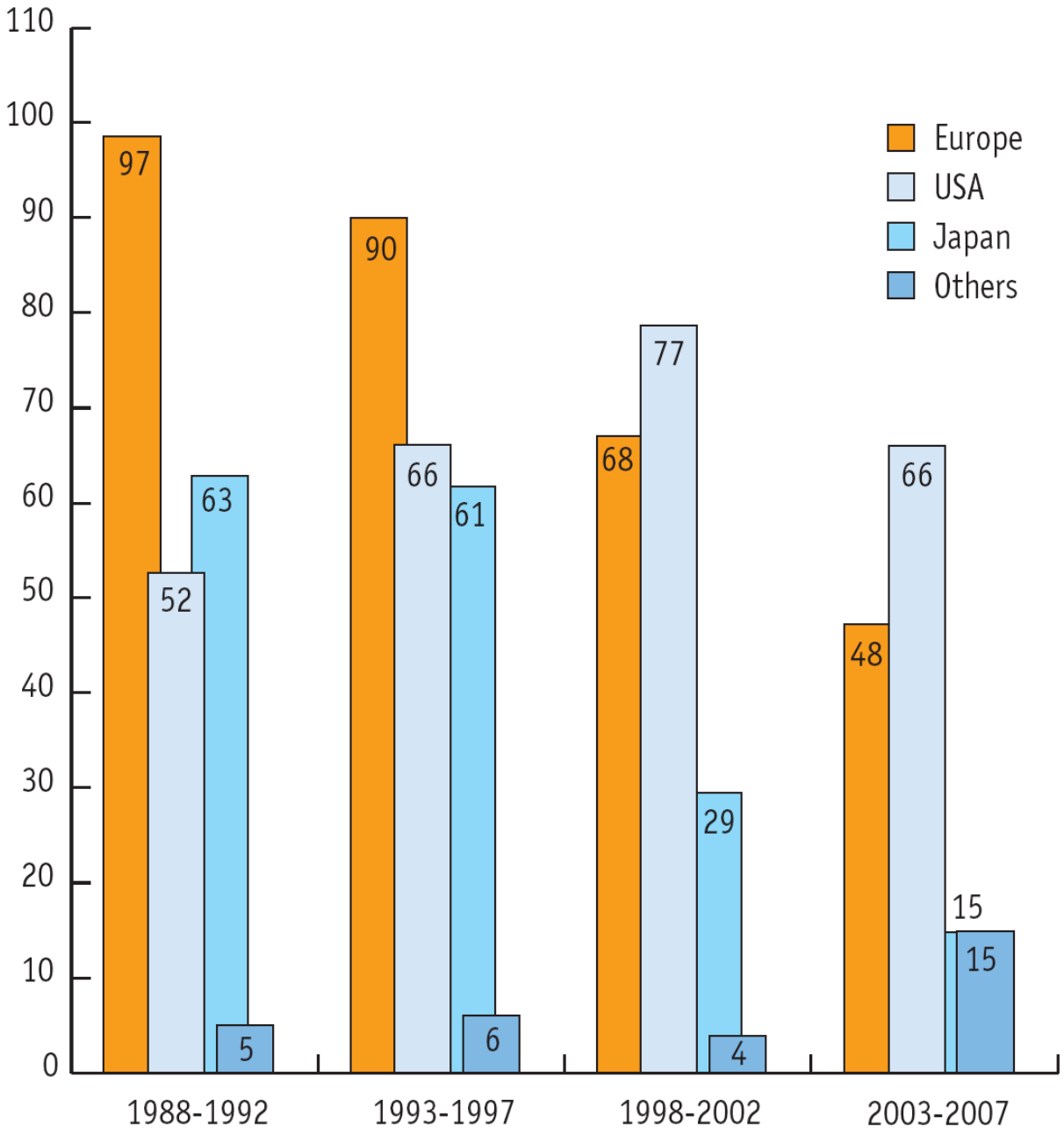


ORIGIN OF THE 29 NEW MOLECULAR (CHEMICAL AND BIOLOGICAL) ENTITIES LAUNCHED ON THE WORLD MARKET IN 2002

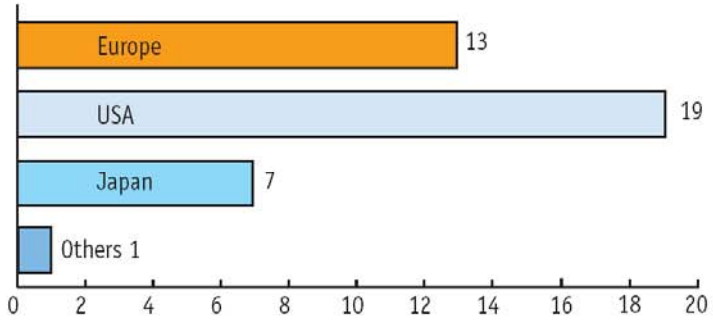


Source: SCRIP - EFPIA calculations (according to nationality of mother company)

NEW CHEMICAL OR BIOLOGICAL ENTITIES (1988-2007)

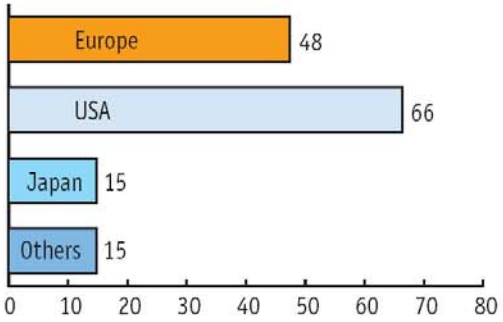


ORIGIN OF THE TOP 40 COMPANIES BY R&D INVESTMENT, 2006



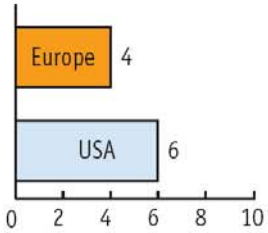
Source: UK Department of Trade and Industry, The 2007 R&D Scoreboard - EFPIA calculations

NEW CHEMICAL AND BIOLOGICAL ENTITIES LAUNCHED DURING THE PERIOD 2003-2007



Source: SCRIP - EFPIA calculations

ORIGIN OF THE TOP 10 MEDICINES BY WORLDWIDE SALES, 2007



Source: IMS Health, MIDAS, December 2007

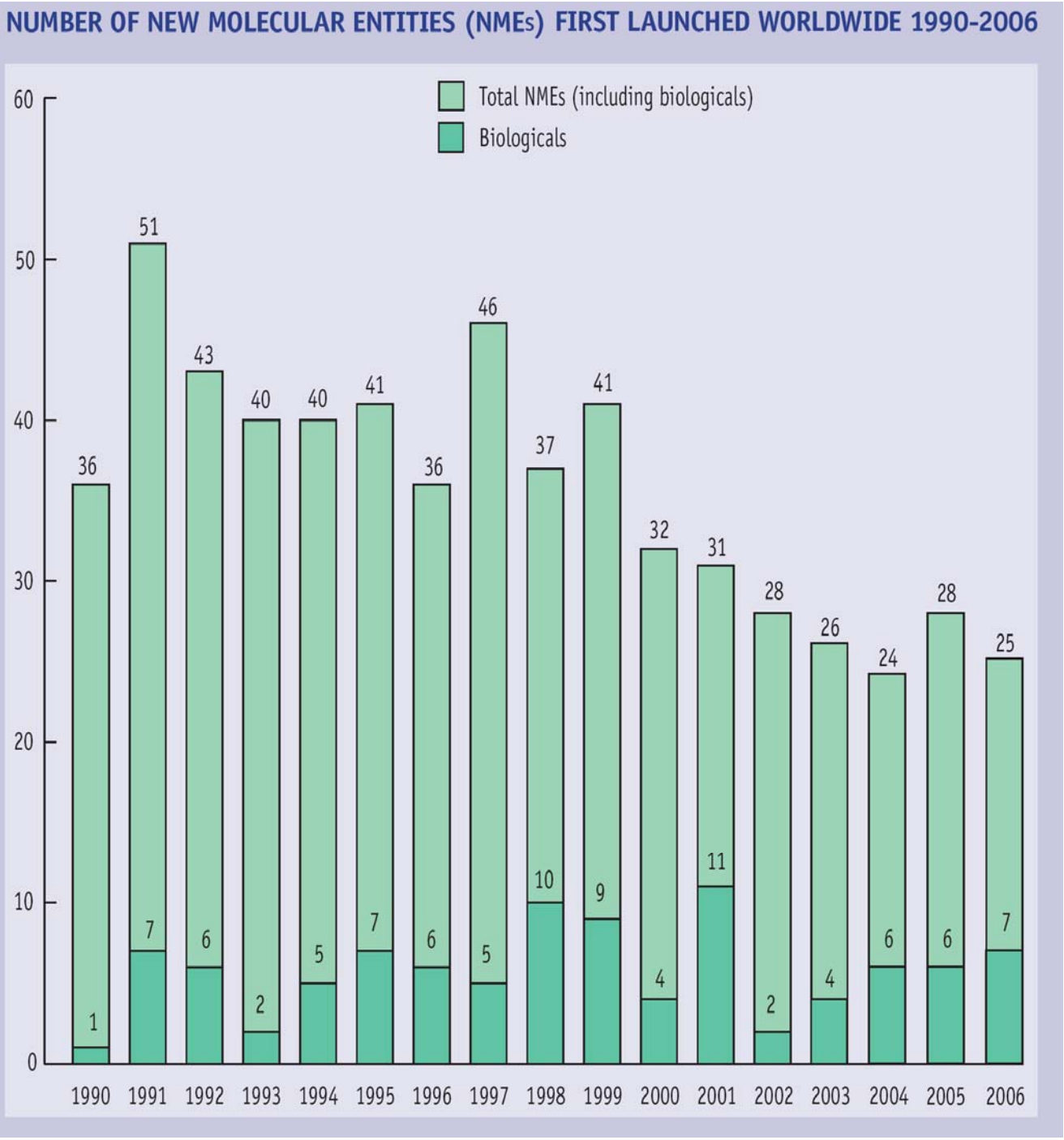
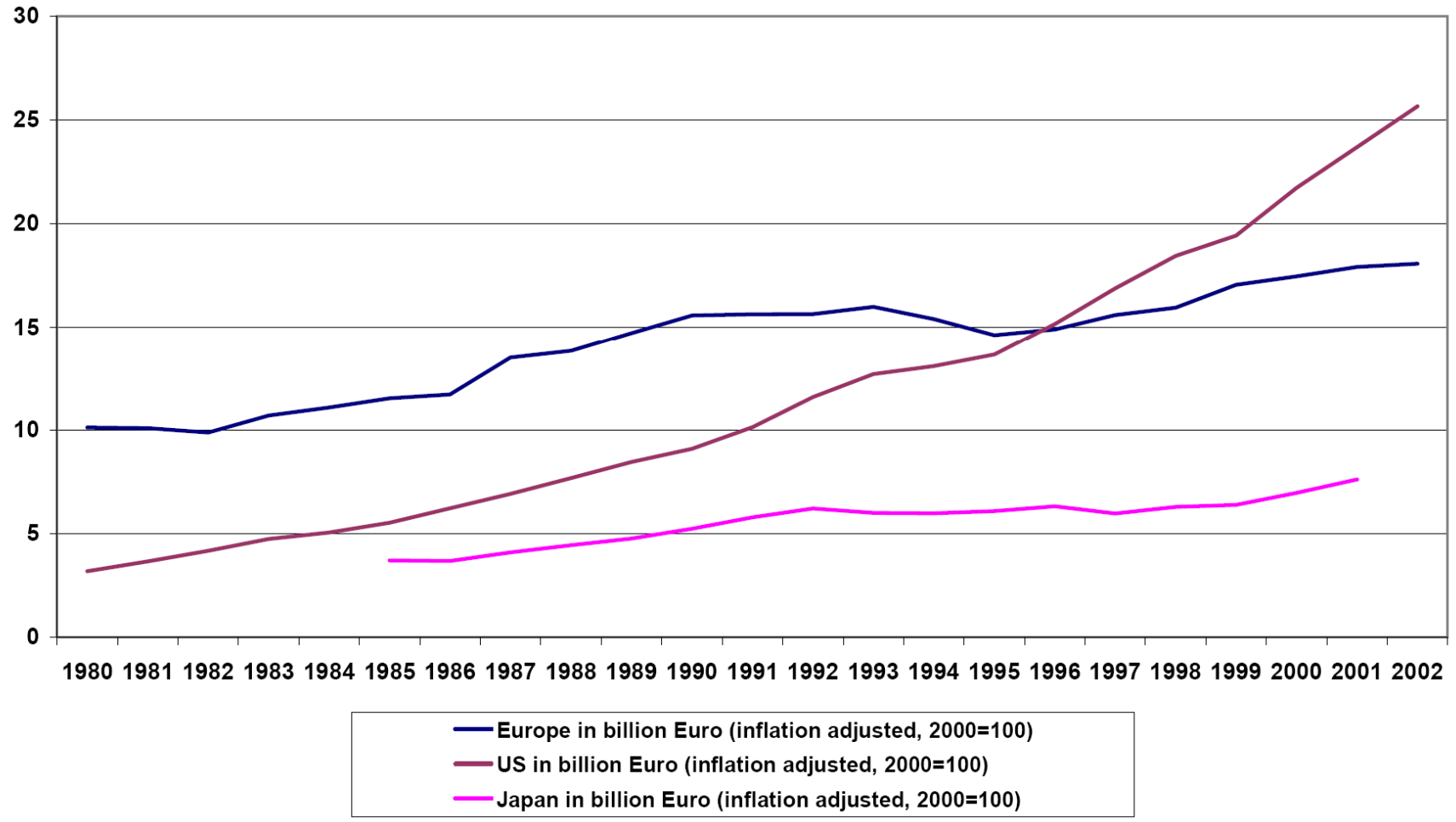
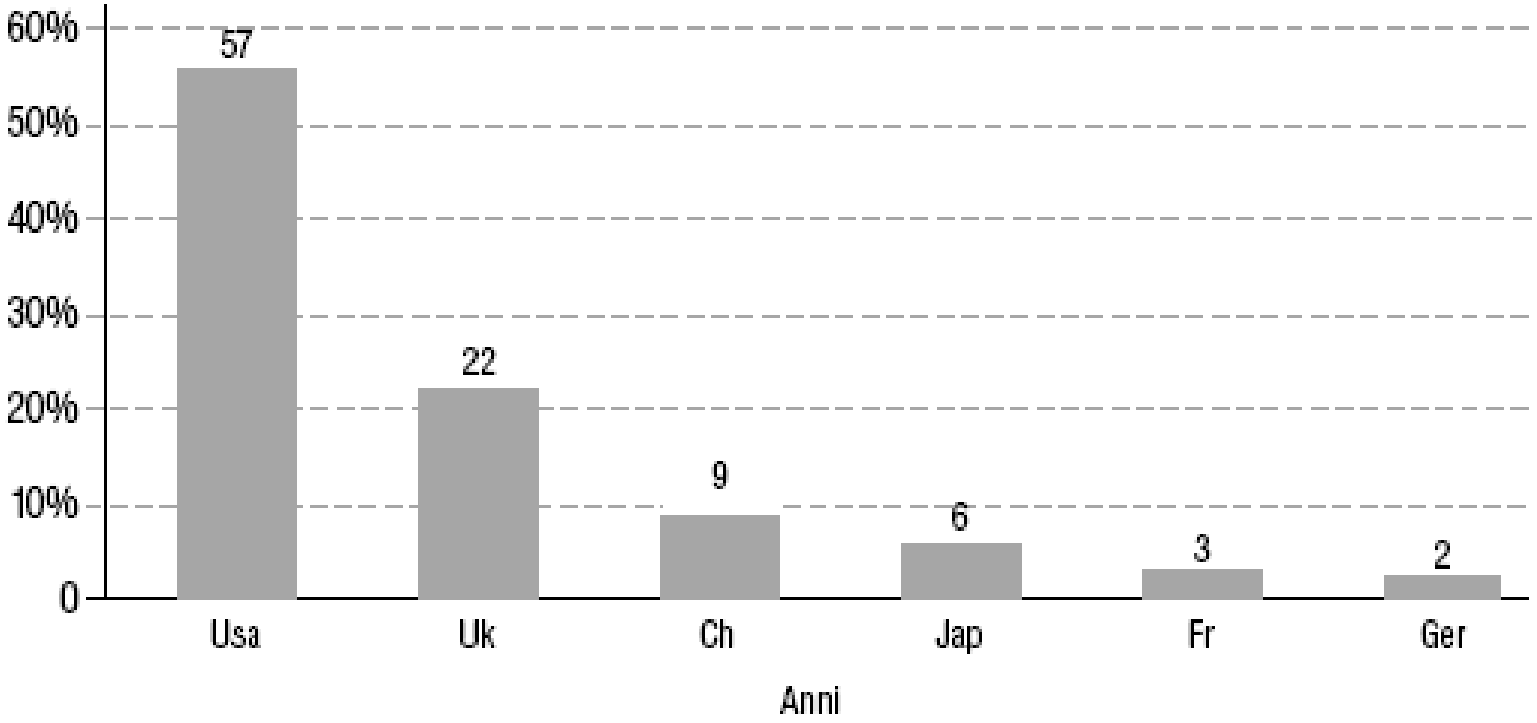

NUMBER OF NEW MOLECULAR ENTITIES (NMEs) FIRST LAUNCHED WORLDWIDE 1990-2006
Total NMEs (including biologicals)
Biologicals
60
50
40
30
20
10
0
1990 1991 1992 1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006
36 51 43 40 40 41 36 46 37 41 32 31 28 26 24 28 25
1 7 6 2 5 7 6 5 10 9 4 11 2 4 6 6 7

Figure 4: Pharmaceutical R&D expenditure 1980 to 2003 in billion Euro (adjusted for inflation, 2000=100)



(Innovation in the pharmaceutical sector. A study undertaken for the European Commission, 8th November 2004)

Figura 3.23 **Nazione di origine dei 100 prodotti medicinali che guidano le vendite mondiali**



Fonte: Abpi, 2002

Figure 1.2 | Only 3 of 10 Marketed Drugs Produce Revenues That Match or Exceed Average R&D Costs

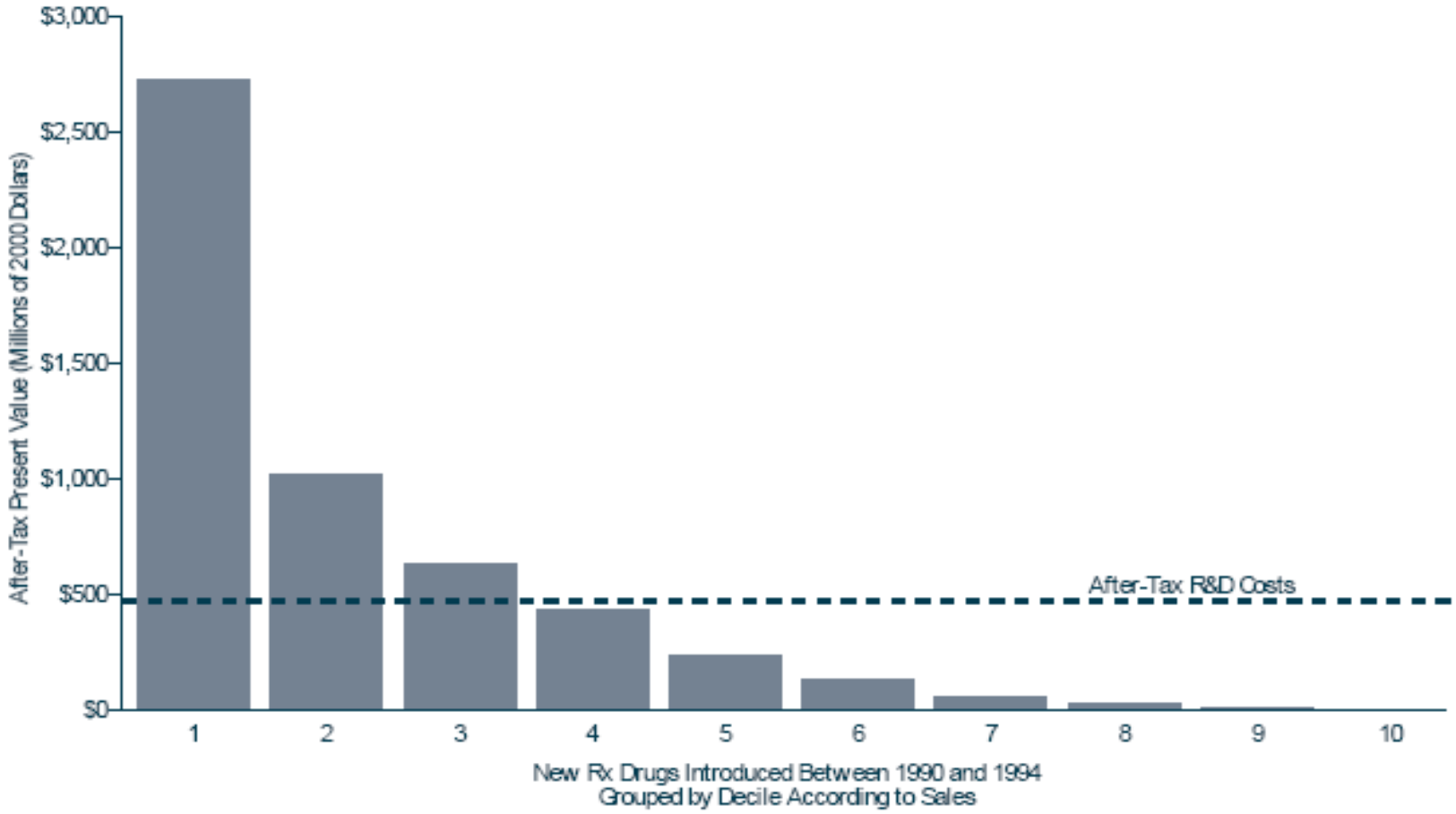
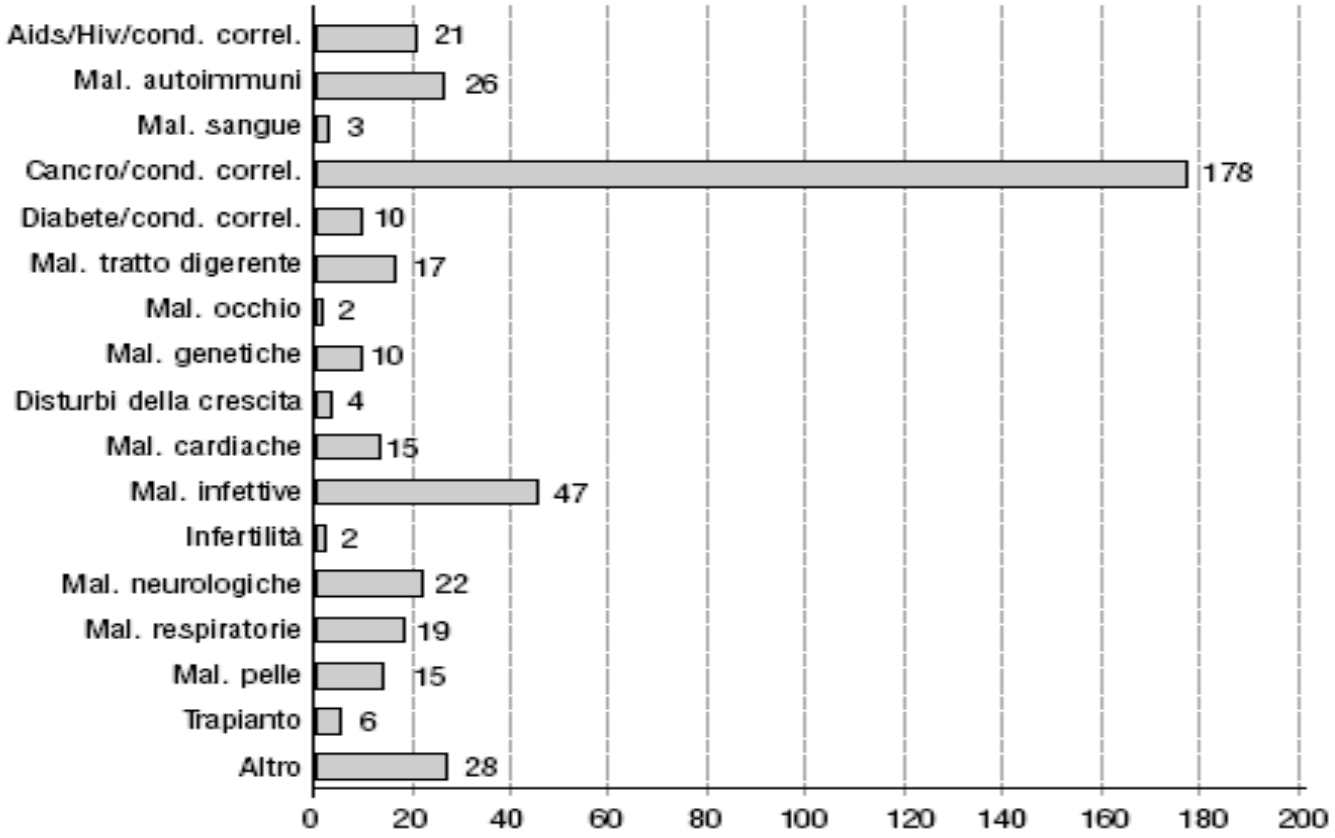
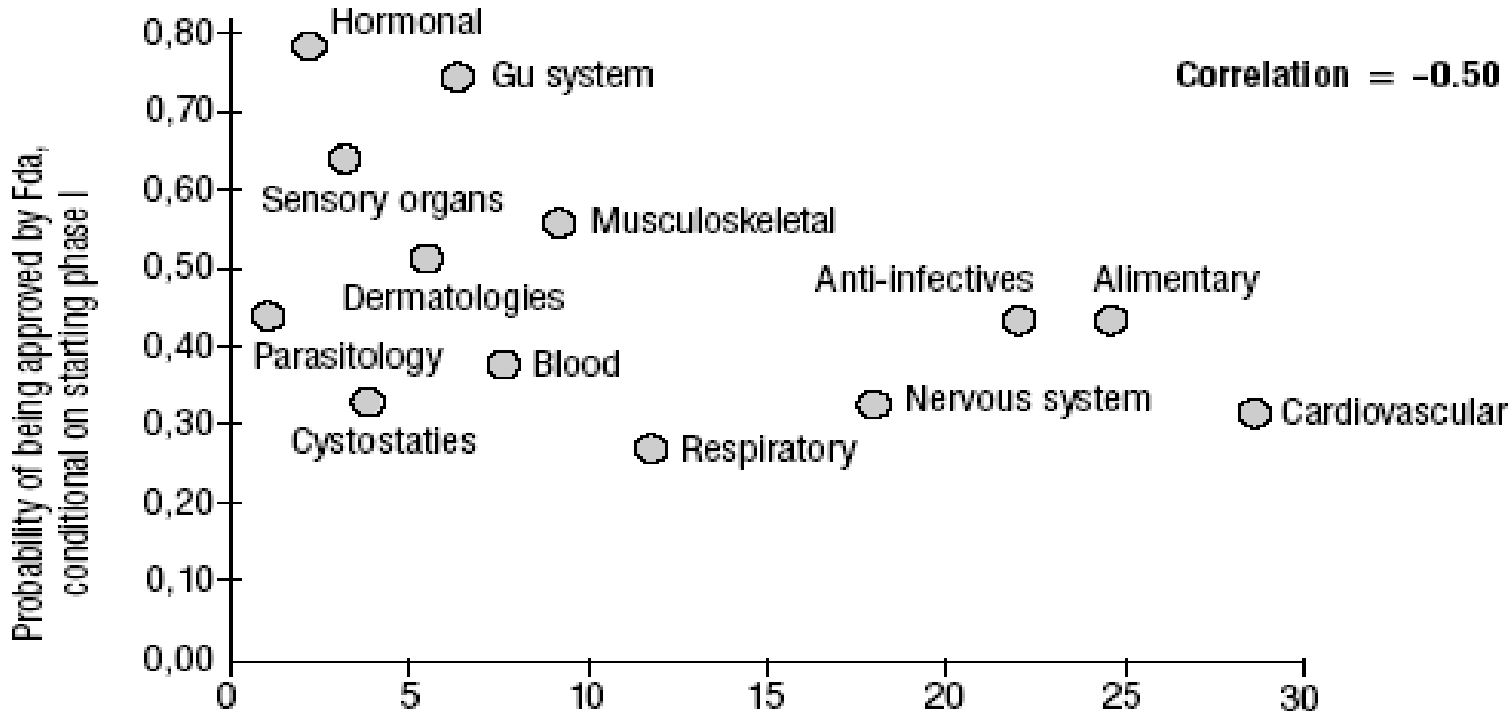


Figura 1.7 **Numero di prodotti medicinali biotech in sviluppo, per categoria terapeutica**



Fonte: PhRma, 2003

Figura 1.14 **Relazione tra la dimensione del mercato per area terapeutica e probabilità di ottenere l'approvazione del farmaco (condizionata alla prima fase)**

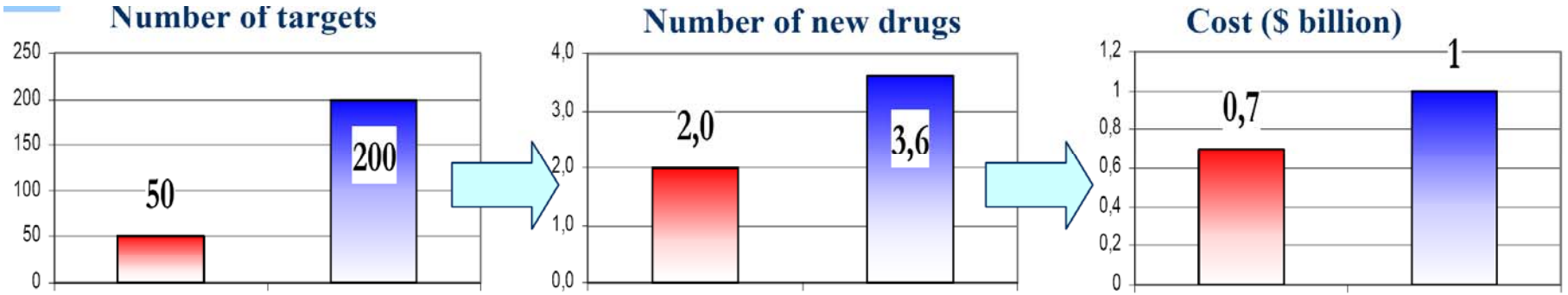


Fonte: Danzon, Nicholson e Pereira, 2003

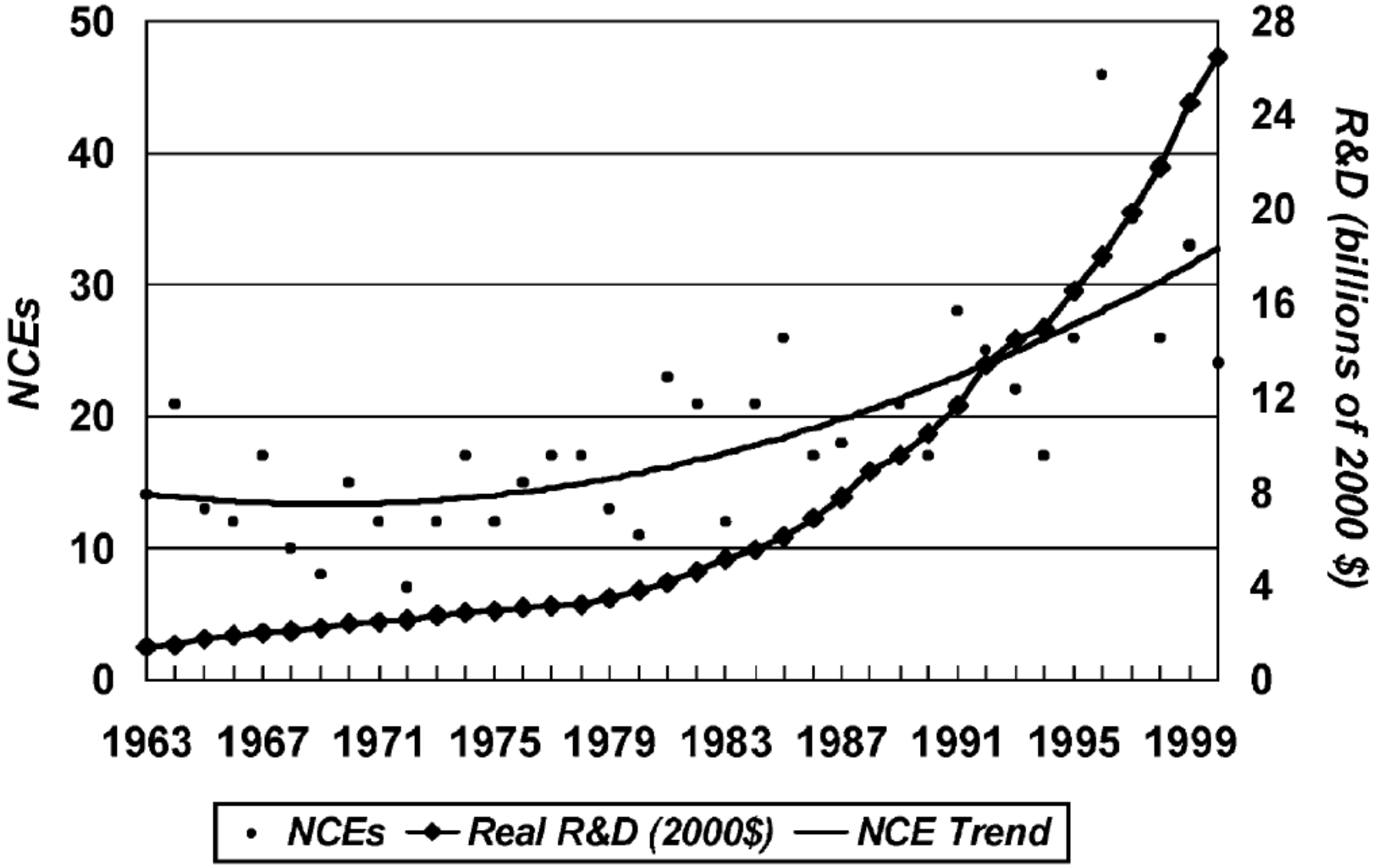
Increase in risk-adjusted R&D cost for new drugs, mainly due to:

- low number of approvals for biotech products
- increase in average approval time (18,8 months at FDA)
- difficulties in patient recruitment for clinical tests

Before and After the genomic revolution



Inflation-adjusted industry R&D expenditures (2000 dollars) and US new chemical entity (NCE) approvals from 1963 to 2000.



La stima dei costi di R&S

L’importanza di analizzare i costi della R&S sostenuti per scoprire e sviluppare un nuovo farmaco (New Chemical Entity) è data dai seguenti fattori:

- consente l’analisi del ritorno dell’investimento;
- rivela come viene organizzato lo sviluppo: ad esempio le fusioni tra imprese sono spesso dovute ai costi crescenti della R&S;
- influenza l’allocazione delle risorse tra le varie aziende di una impresa multinazionale;
- è importante sia per le politiche di regolamentazione sia per la performance dell’industria farmaceutica, nel senso che spesso entra nel dibattito sulla legittimità di prezzi elevati che contribuiscono ad aumentare la spesa sanitaria pubblica.

La stima dei costi di R&S

J.A. DiMasi and H.G. Grabowski, ‘The Cost of Biopharmaceutical R&D: Is Biotech Different?’,

Managerial and Decision Economics 28 (2007): 469-479

La stima dei costi di R&S

- il costo atteso delle fasi cliniche di una molecola analizzata nello studio è dato da:

$$C = E(c) = p_I \mu_{I|e} + p_{II} \mu_{II|e} + p_{III} \mu_{III|e} + p_A \mu_{A|e}$$

dove

p_I, p_{II}, p_{III} sono le probabilità che una molecola scelta casualmente (nel campione dello studio) passi nelle fasi I, II e III;

P_A è la probabilità che test di lungo periodo vengano effettuati sugli animali durante il periodo delle sperimentazioni cliniche;

μ sono le aspettative condizionate (ad esempio è il costo medio per la popolazione di farmaci che passano alla fase I).

La stima dei costi di R&S

- Poiché dal momento della scoperta di una molecola fino all'arrivo del farmaco sul mercato passano molti anni, diviene necessario aggiungere ai costi realmente sostenuti anche i costi attribuibili al deprezzamento del capitale investito (il costo opportunità del capitale)

Table 1. Out-of-pocket preclinical and clinical period cost per investigational biopharmaceutical compounds (in millions of 2005 dollars).[a]

Testing Phase	Mean cost	Probability of entering phase	Expected cost
Preclinical	$59.88	100%	$59.88
Phase I	$32.28	100%	$32.28
Phase II	$37.69	83.7%	$31.55
Phase III	$96.09	47.1%	$45.26
Total			$168.97

[a] All costs were deflated using the GDP Implicit Price Deflator.

Table 3. Capitalized preclinical and clinical period costs per investigational biopharmaceutical compound (in millions of 2005 dollars).[a]

Testing Phase	Expected Out-of-Pocket Cost	Phase length (mos.)	Monthly Cost	Start of phase to approval (mos.)	End of phase to approval (mos.)	Expected capitalized cost[b]
Preclinical	$59.88	52.0	$1.15	149.7	97.7	$185.62
Phase I	$32.28	19.5	$1.66	97.7	78.2	$71.78
Phase II	$31.55	29.3	$1.08	78.2	48.9	$56.32
Phase III	$45.26	32.9	$1.38	48.9	16.0	$60.98
Total						$374.70

[a] All costs were deflated using the GDP Implicit Price Deflator.

[b] Expenditures capitalized forward to the point of marketing approval for a representative time profile at an 11.5% real discount rate. The estimated length of the approval phase is 16.0 months.

Figure 1. Transition Probabilities for Clinical Phases

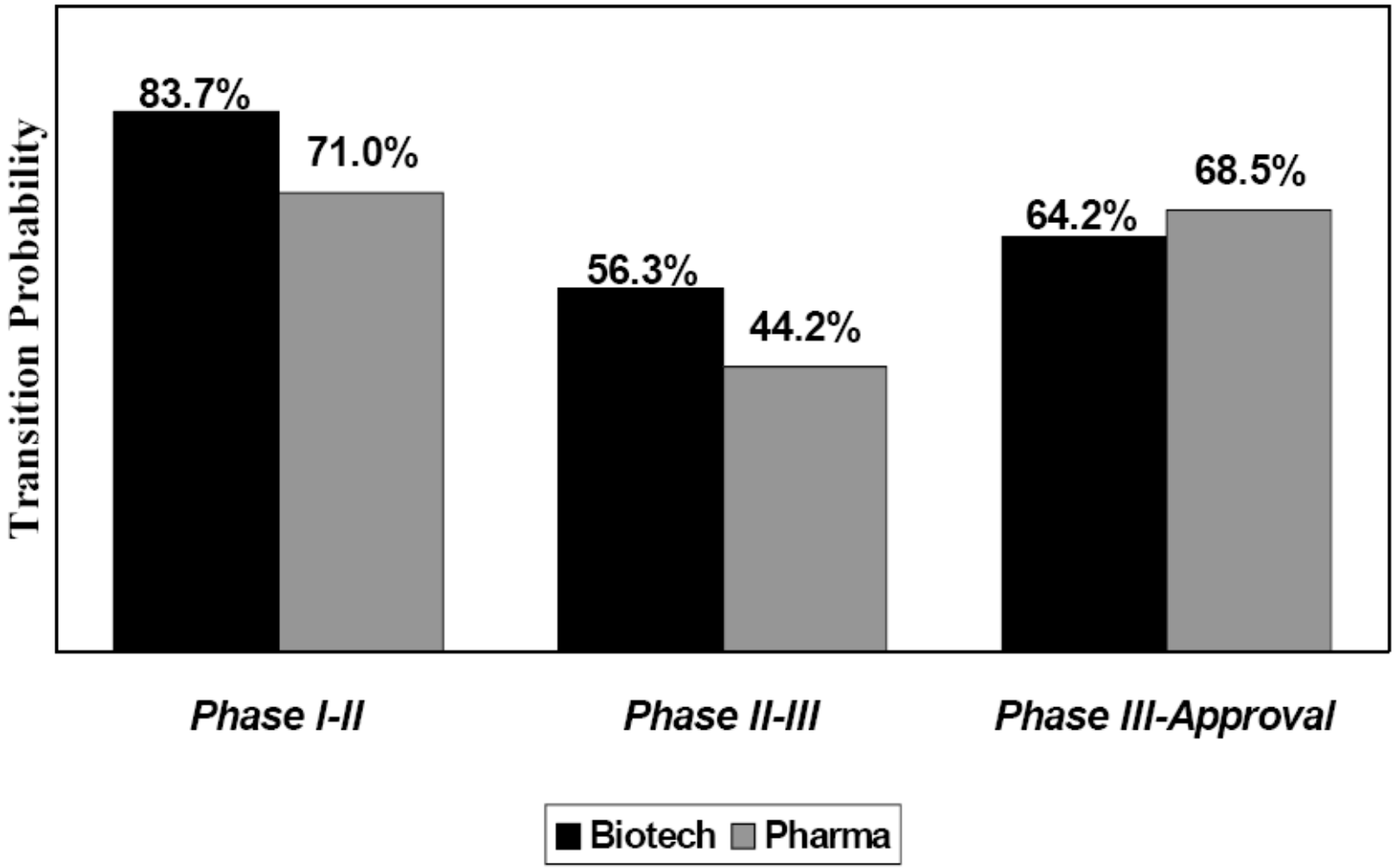


Figure 2. Clinical Development and Approval Times

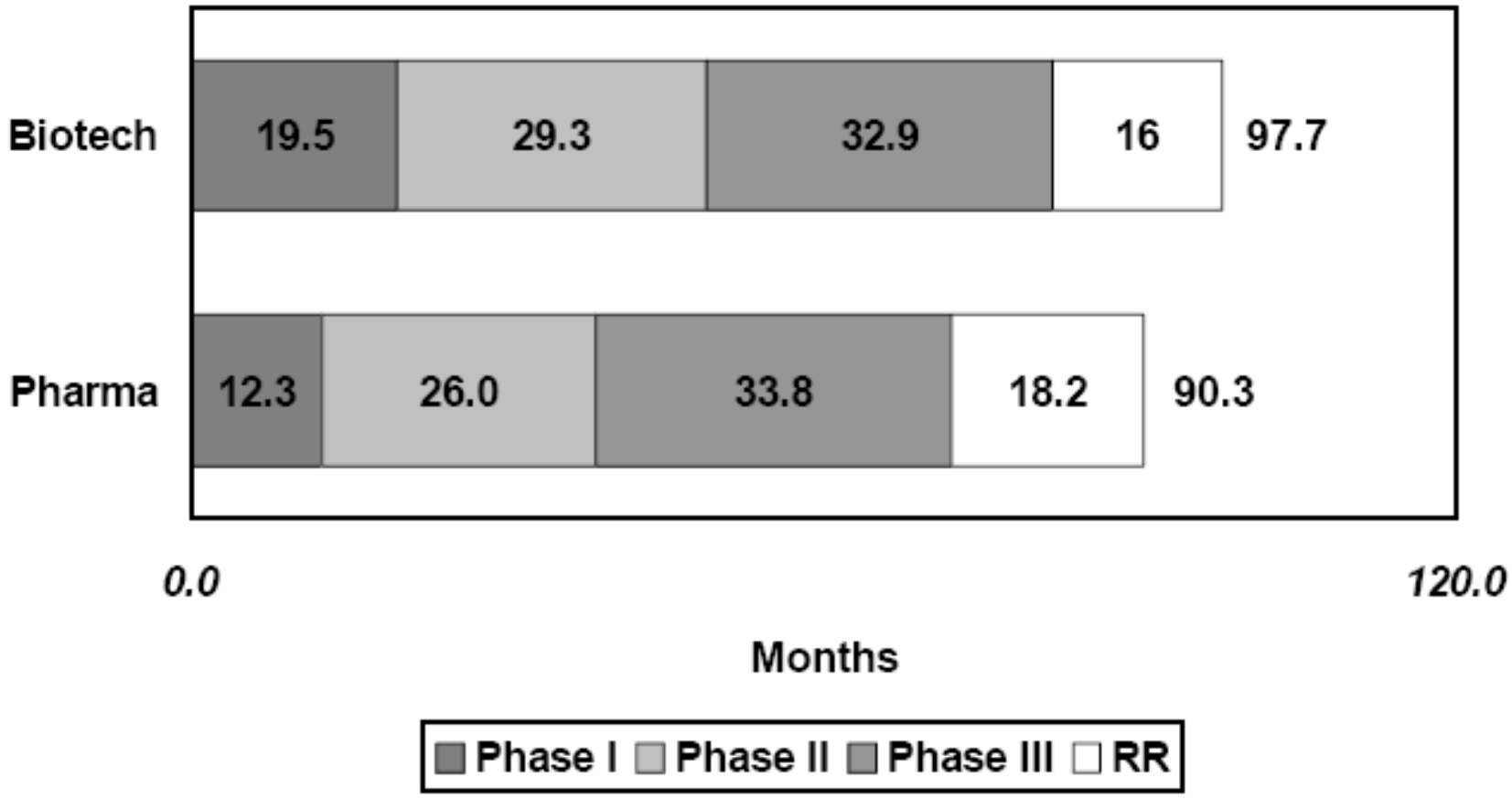
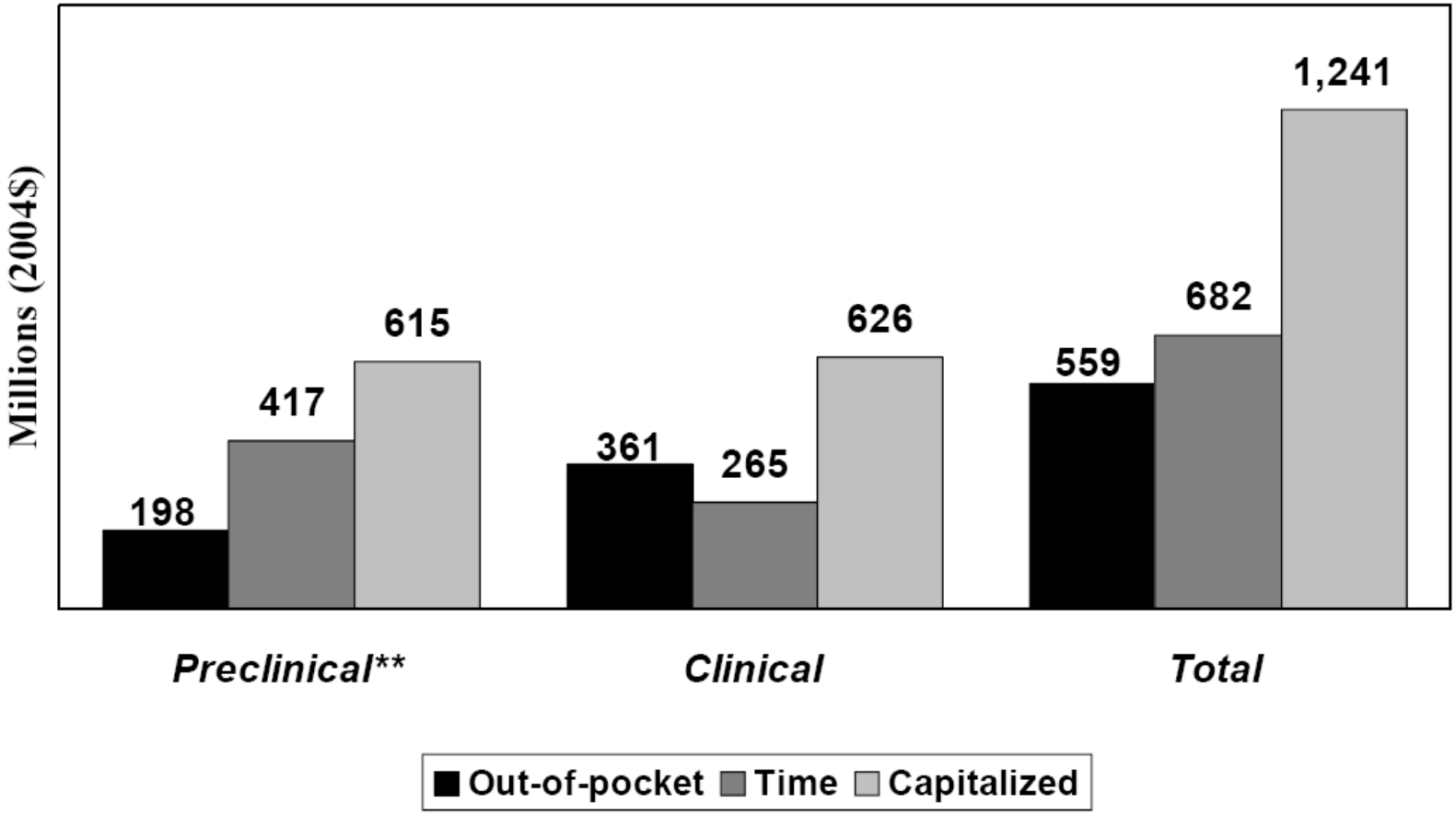
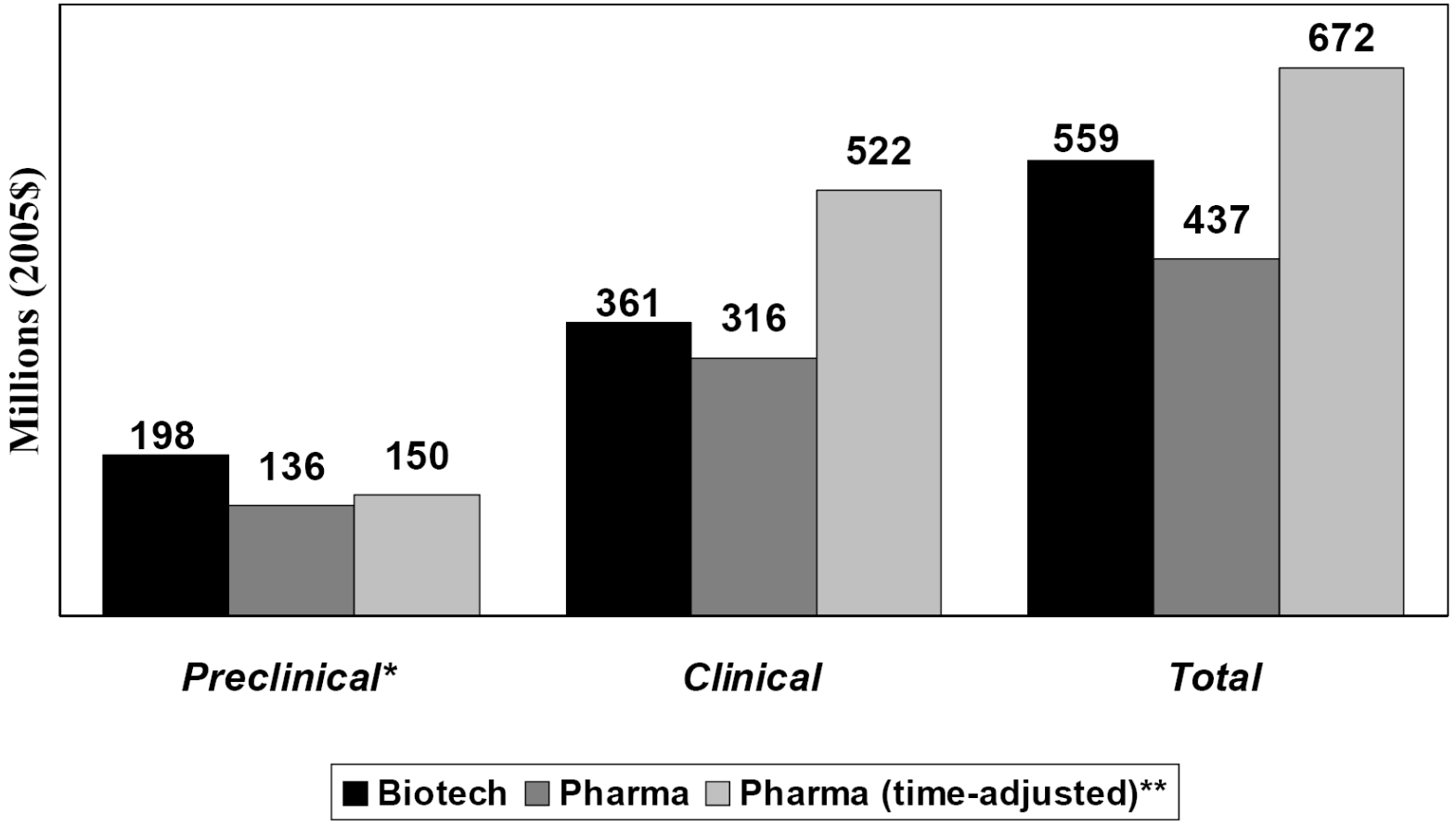


Figure 3. Pre-Approval Out-of-Pocket (cash outlay) and Time Costs per Approved New Biopharmaceutical*



* Based on a 30.2% clinical approval success rate
** All R&D costs (basic research and preclinical development) prior to initiation of clinical testing

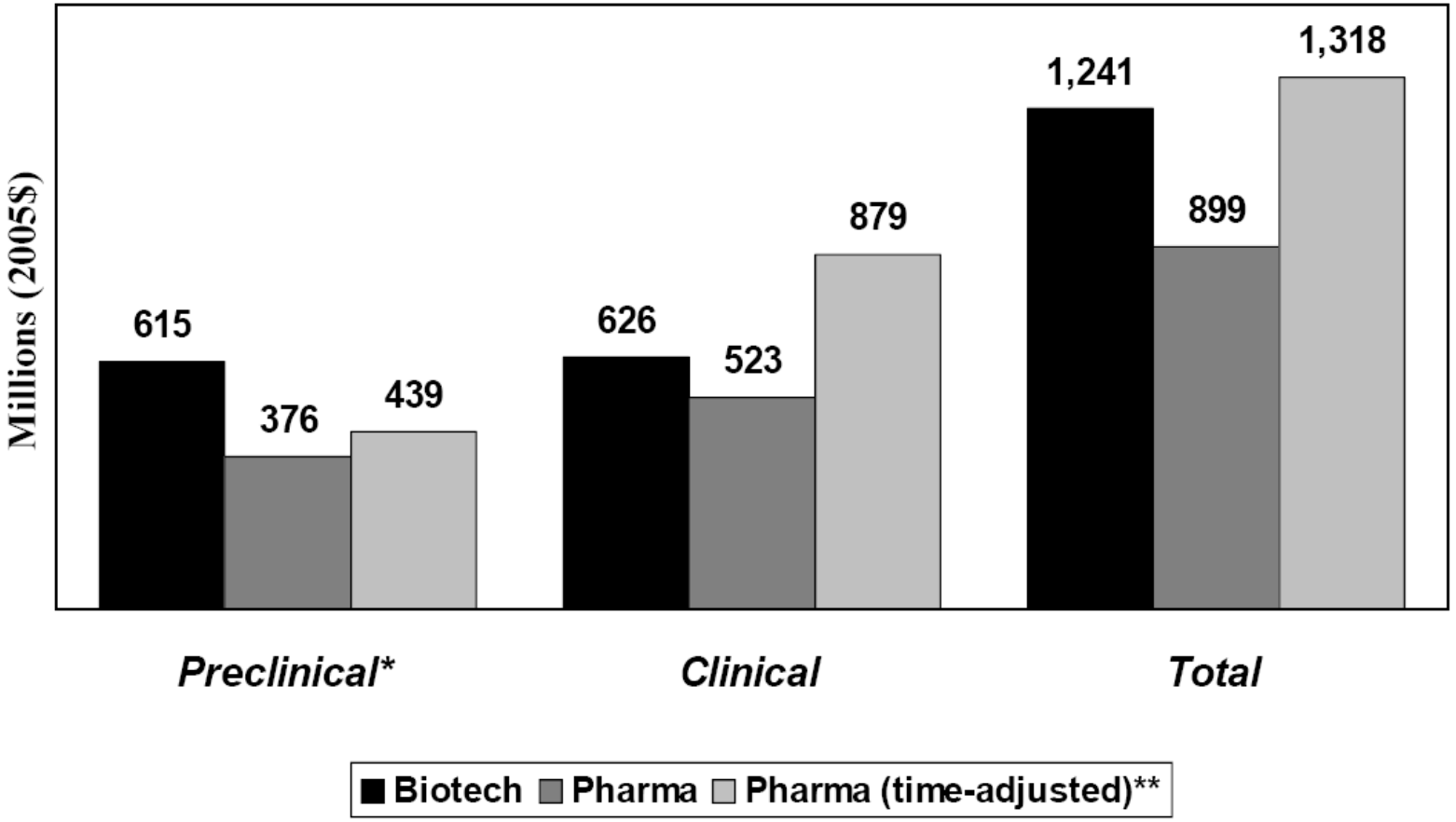
Figure 4. Pre-Approval Cash Outlays (out-of-pocket cost) per Approved New Molecule



* All R&D costs (basic research and preclinical development) prior to initiation of clinical testing

** Based on a 5-year shift and prior growth rates for the preclinical and clinical periods

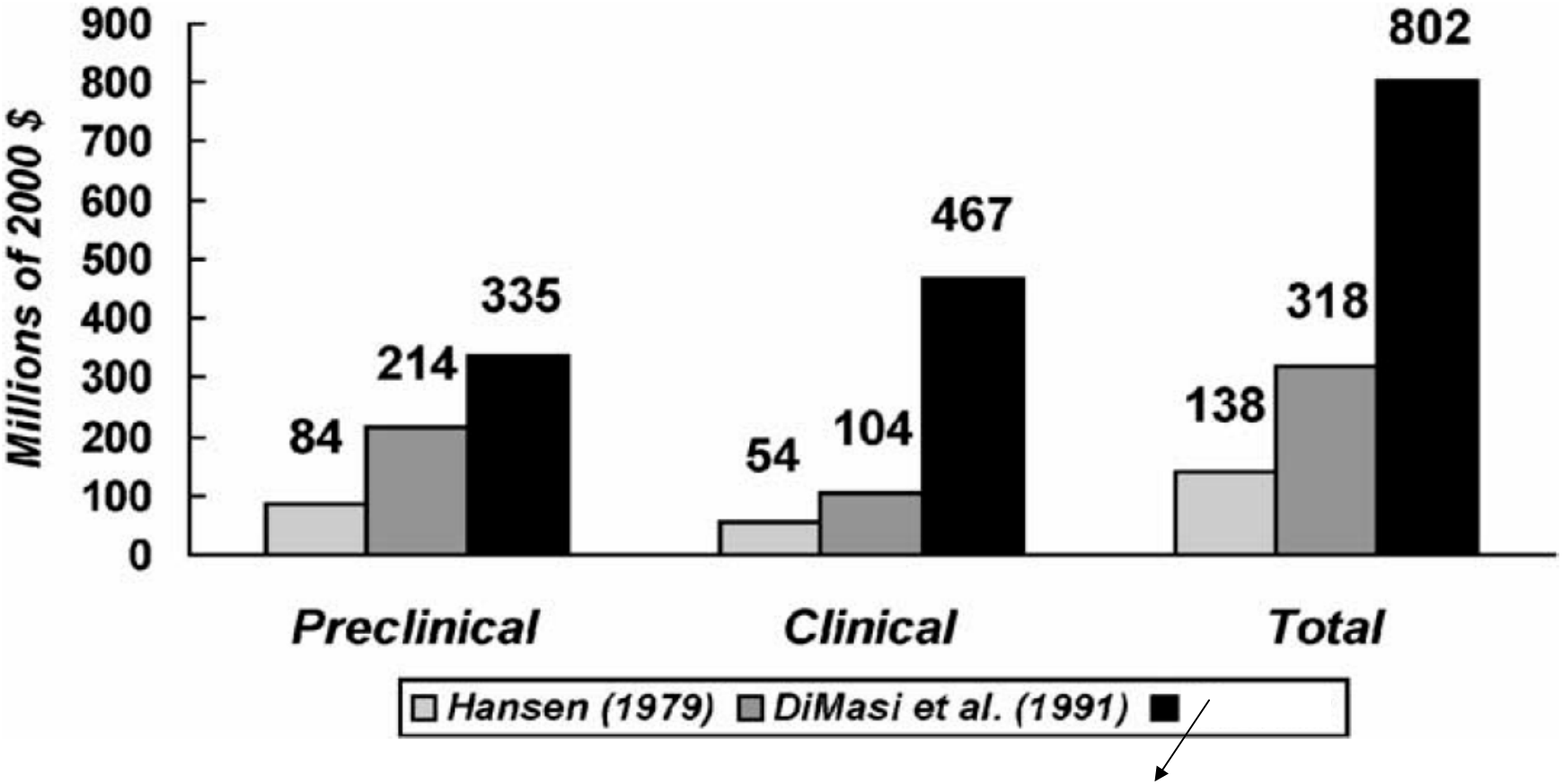
Figure 5. Pre-Approval Capitalized Cost per Approved New Molecule



* All R&D costs (basic research and preclinical development) prior to initiation of clinical testing

** Based on a 5-year shift and prior growth rates for the preclinical and clinical periods

Trends in capitalized preclinical, clinical and total cost per approved new drug.



DiMasi Hansen, Grabowski. The price of innovation: new estimates of drug development costs. *Journal of Health Economics* 2003; 22:151–185.

ALLOCATION OF R&D INVESTMENTS BY FUNCTION (%)

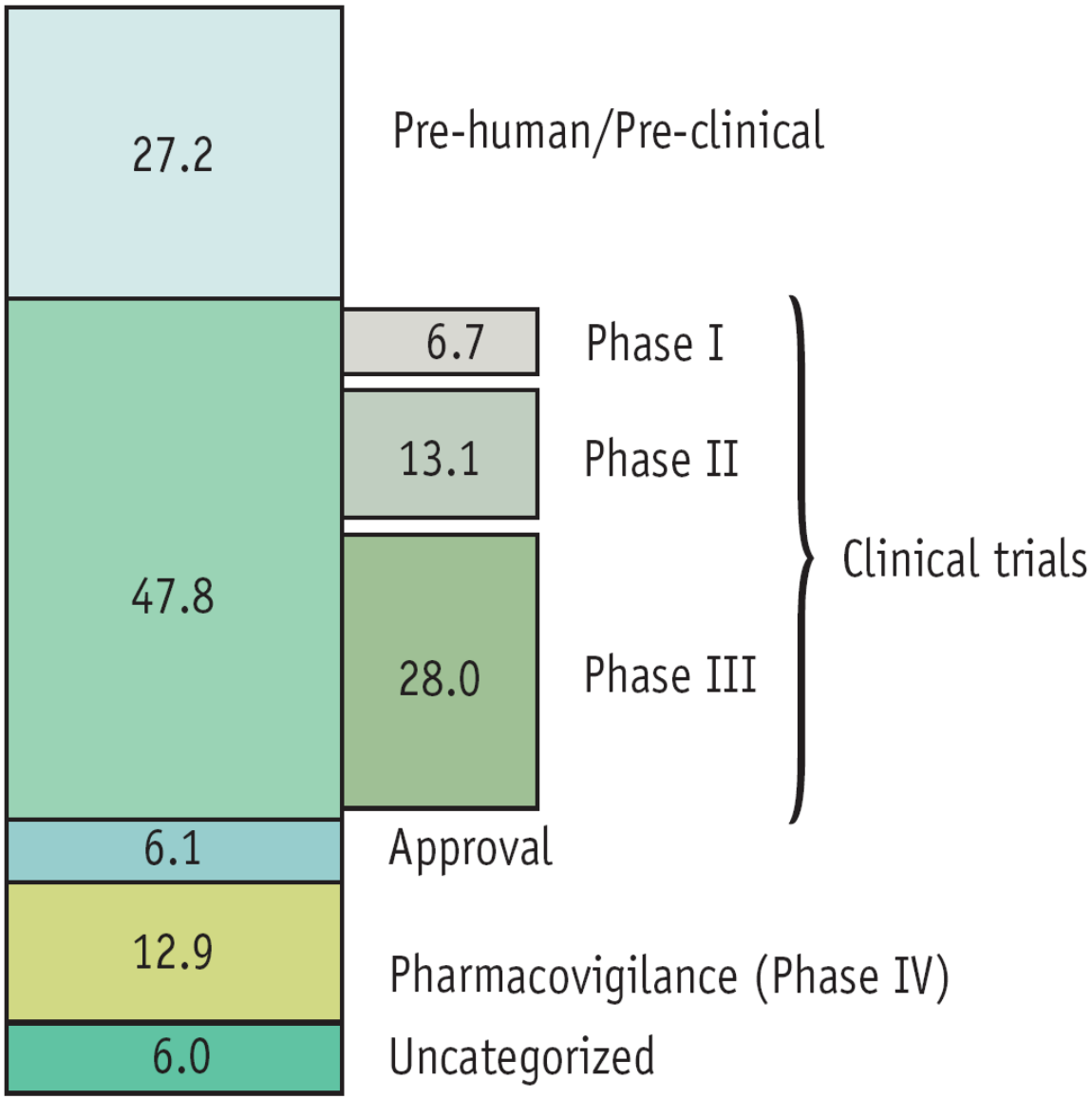


Table 5
R&D By Function, PhRMA Member Companies: 2006

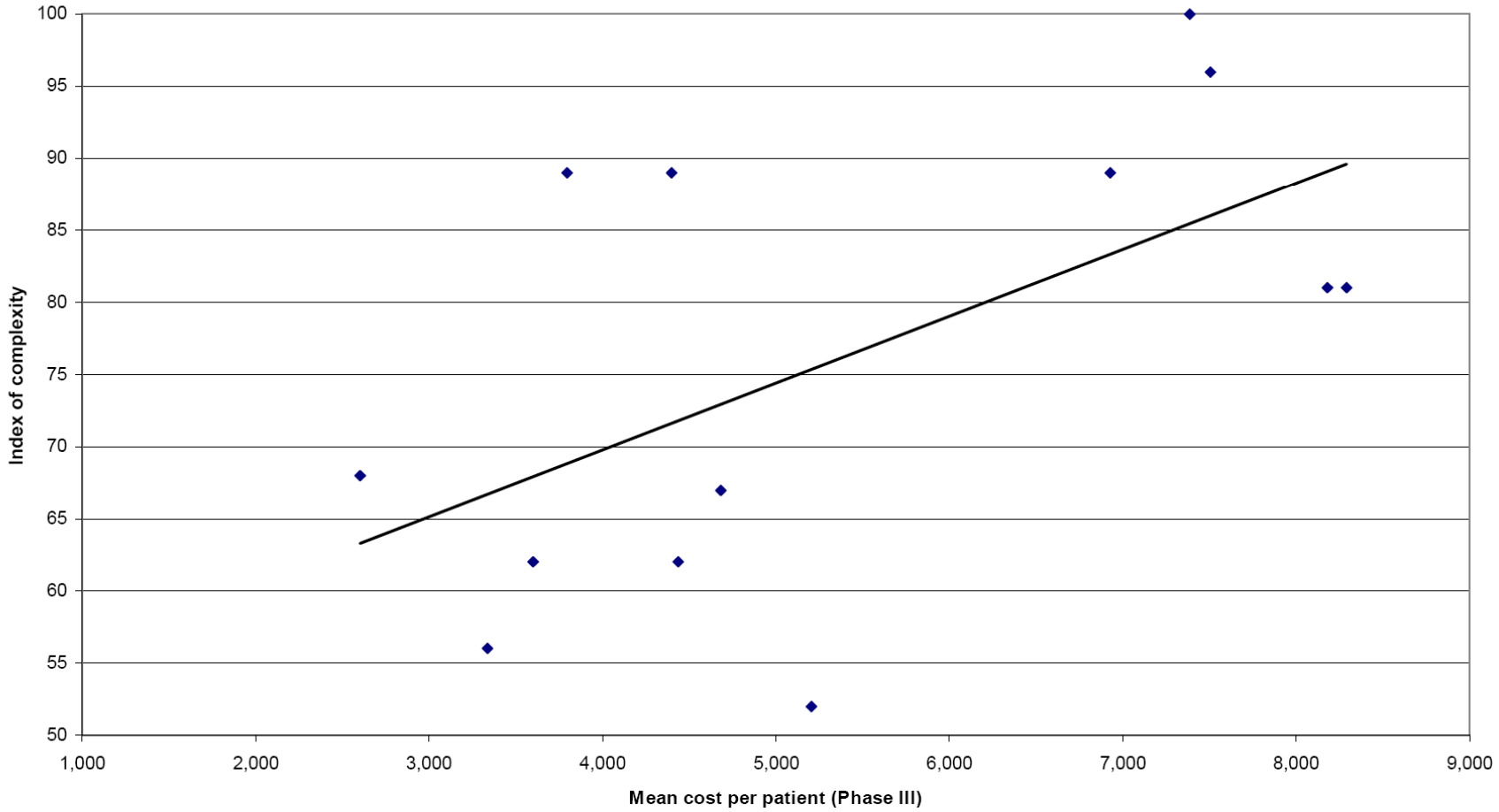
(dollar figures in millions)

Function	Dollars	Share
Prehuman/Preclinical	$11,816.1	27.2%
Phase I	2,902.7	6.7
Phase II	5,687.4	13.1
Phase III	12,187.3	28.1
Approval	2,649.3	6.1
Phase IV	5,584.6	12.9
Uncategorized	2,611.6	6.0
TOTAL R&D	$43,439.1	100.0%

Note: All figures include company-financed R&D only. Total values may be affected by rounding.

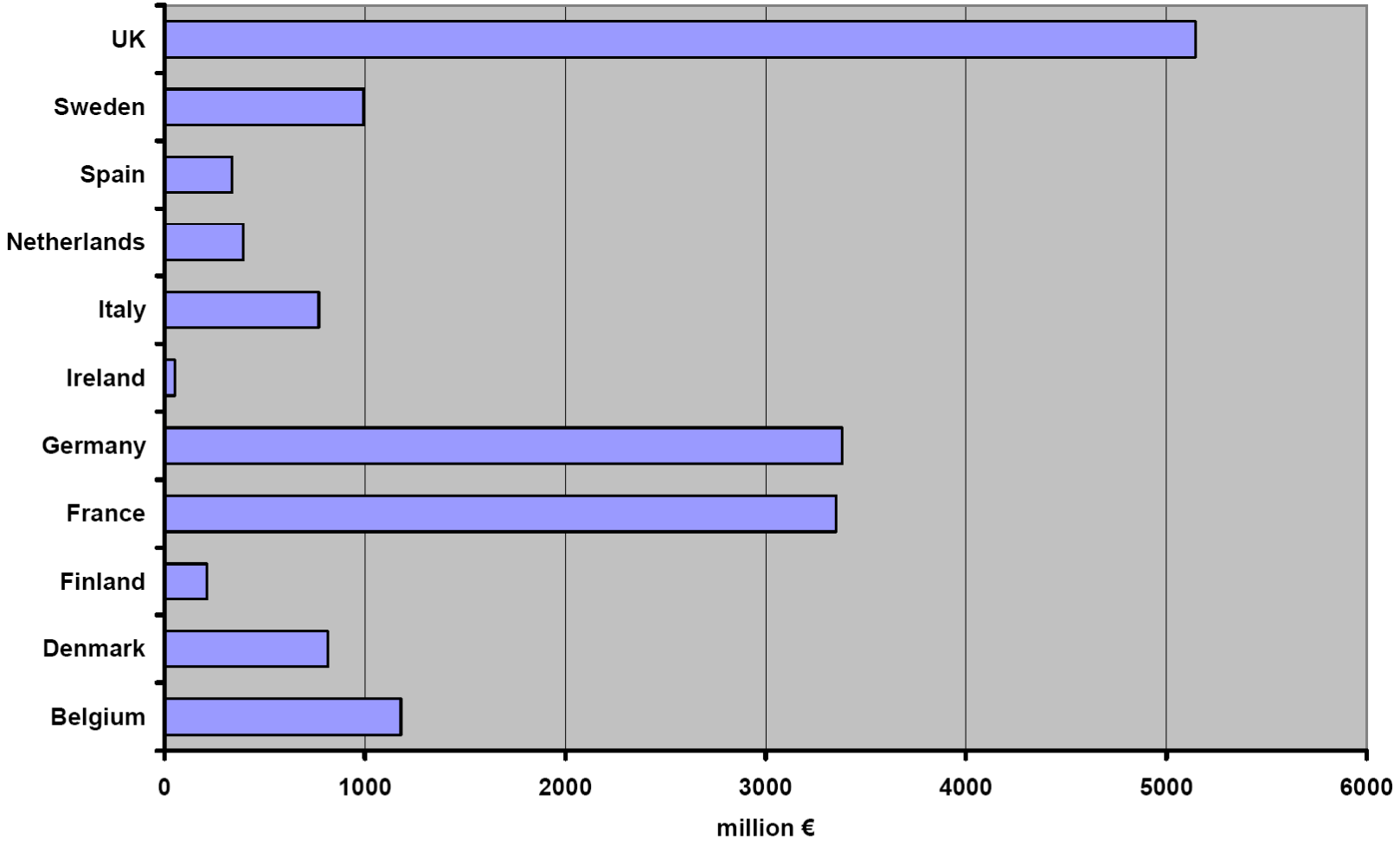
Source: Pharmaceutical Research and Manufacturers of America, PhRMA Annual Membership Survey, 2008.

Figure 35: Relationship between measures of complexity and average cost per patient in Phase III Trials



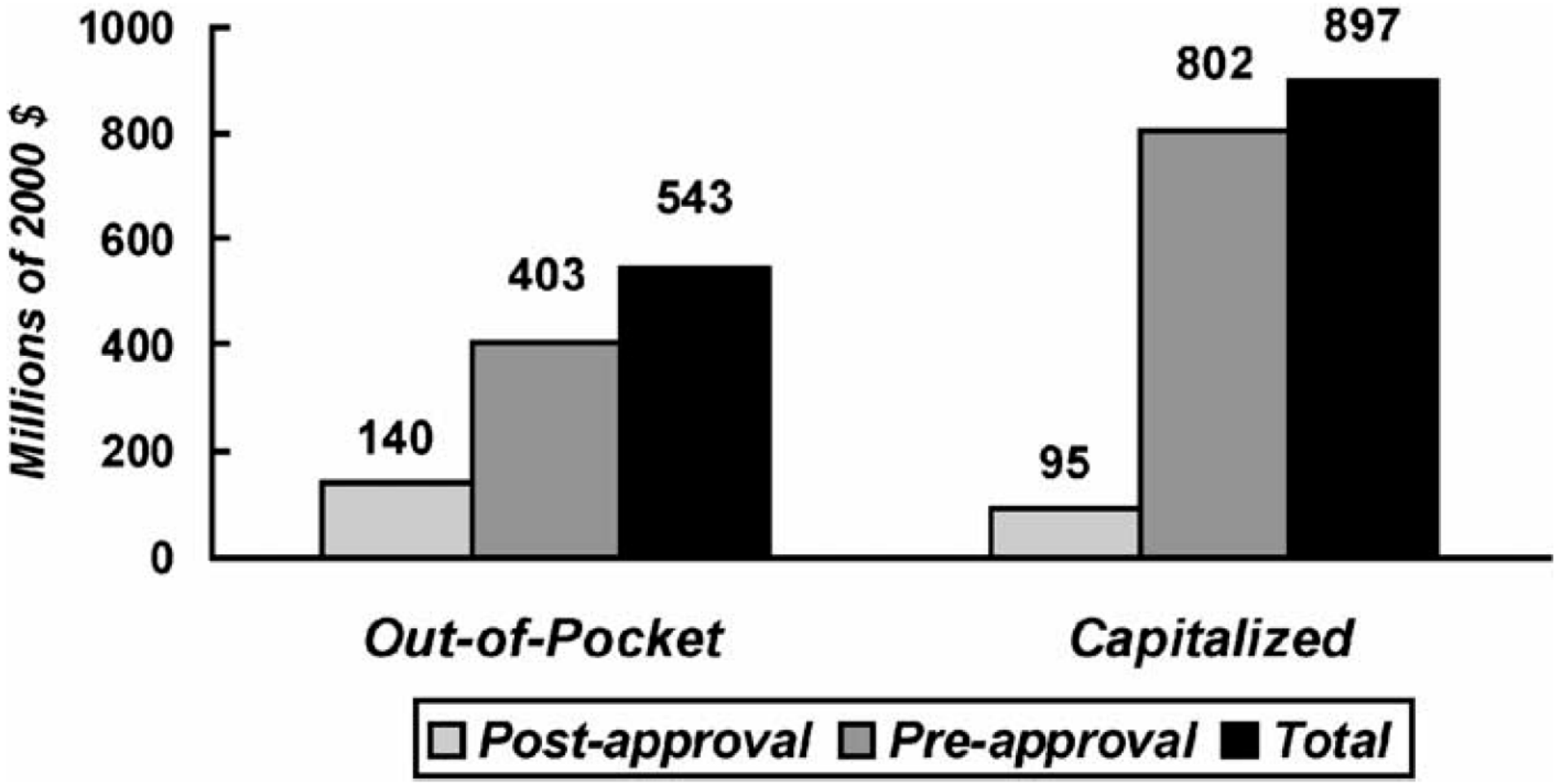
Source: DataEdge 2003

Figure 43: R&D spending by country in 2001



Source: EFPIA (2003). Denmark, Netherlands: 2000 data. Belgium, Denmark, France, Ireland, Italy, Spain, Sweden: estimates.

J.A. DiMasi et al. / Journal of Health Economics 22 (2003) 151–185



Capitalized preclinical, clinical, and total costs per approved new drug by discount rate.

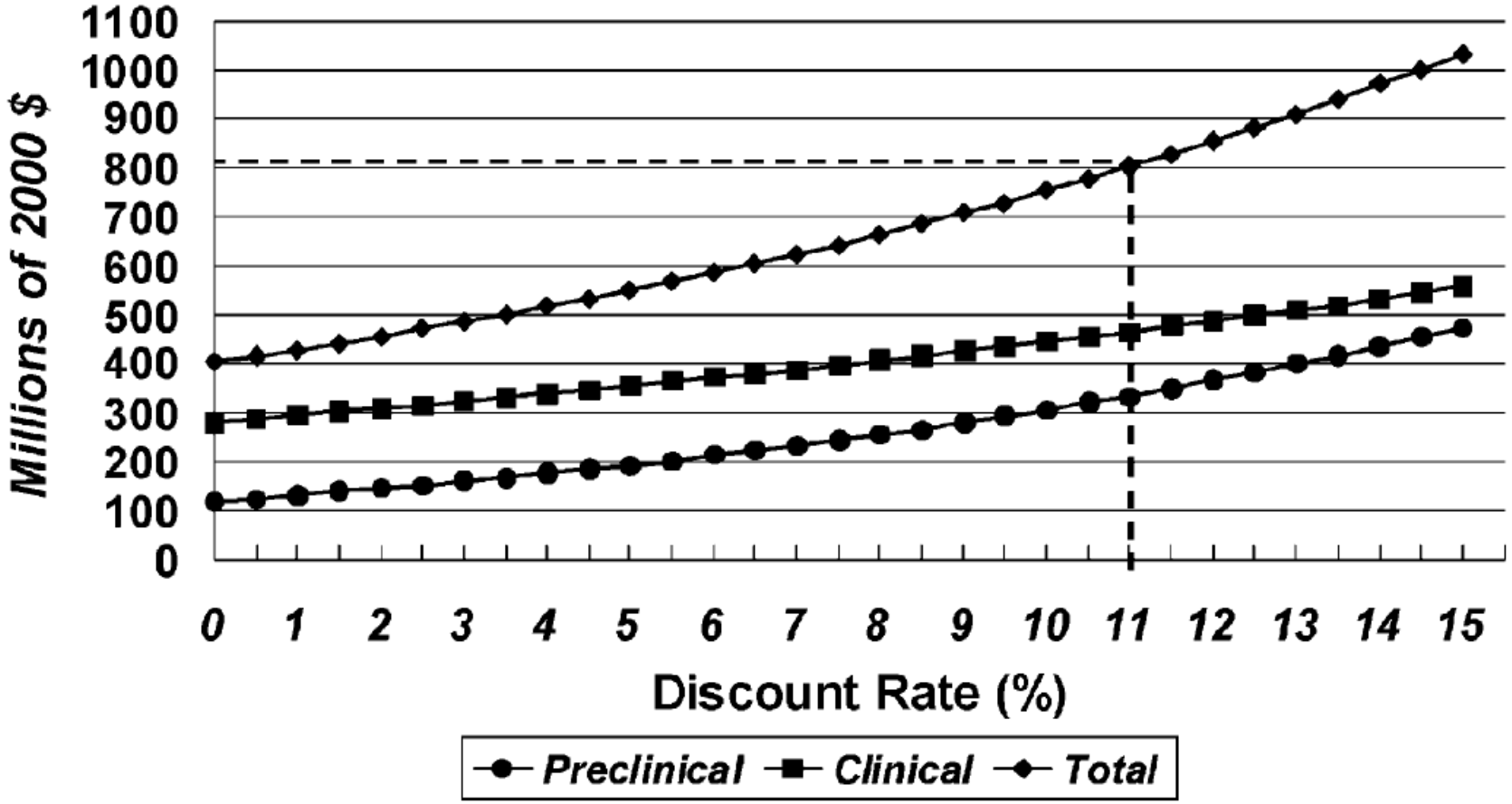


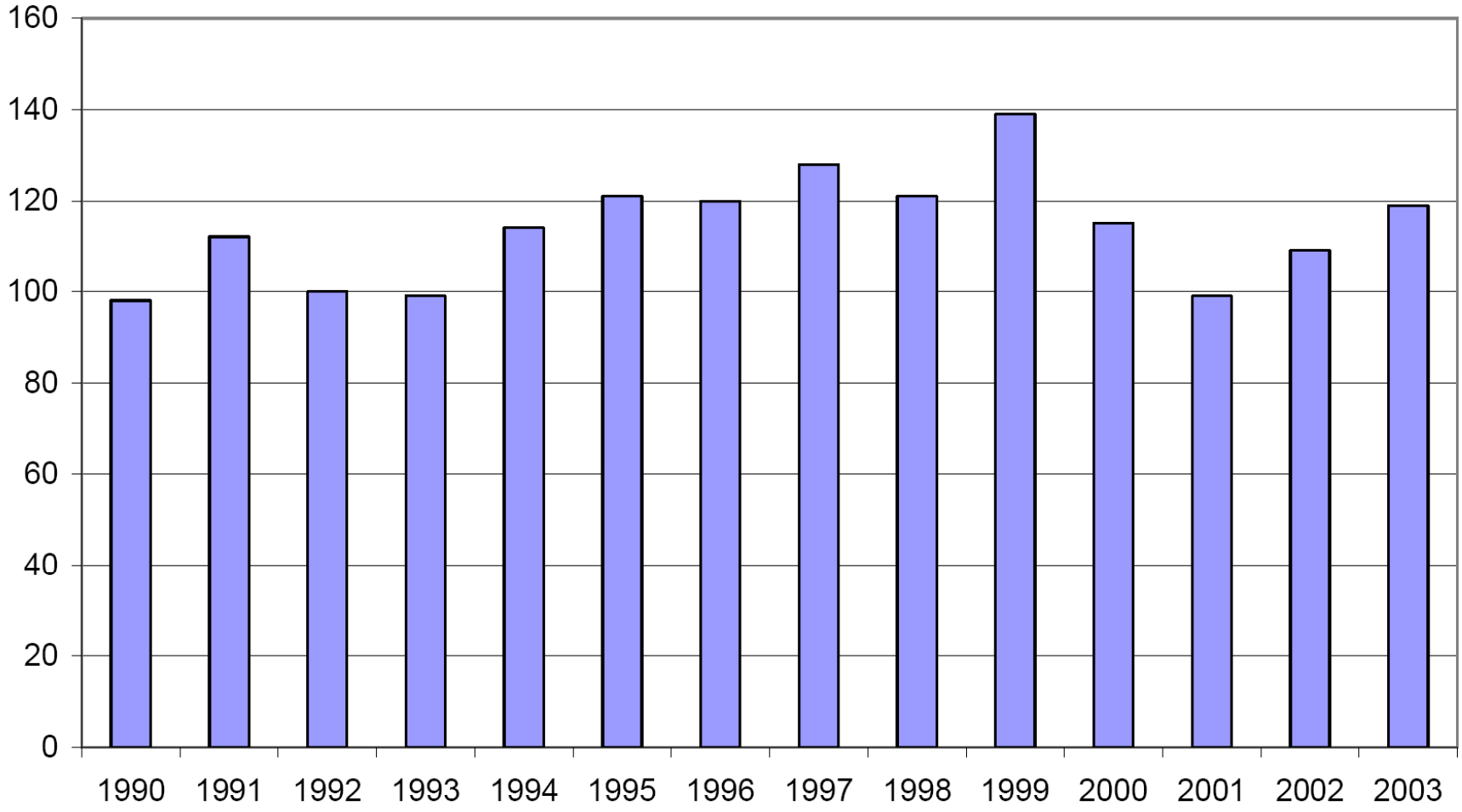
Table 2: Products by stage in development in Europe

Stage	1999	2000	2001	2002	2003
Phase I	353	394	417	404	439
Phase II	461	492	545	604	663
Phase III	203	209	201	214	218
Pre-registration	94	91	88	69	73
Registered	33	43	40	43	34

Source: IMS R&D Focus

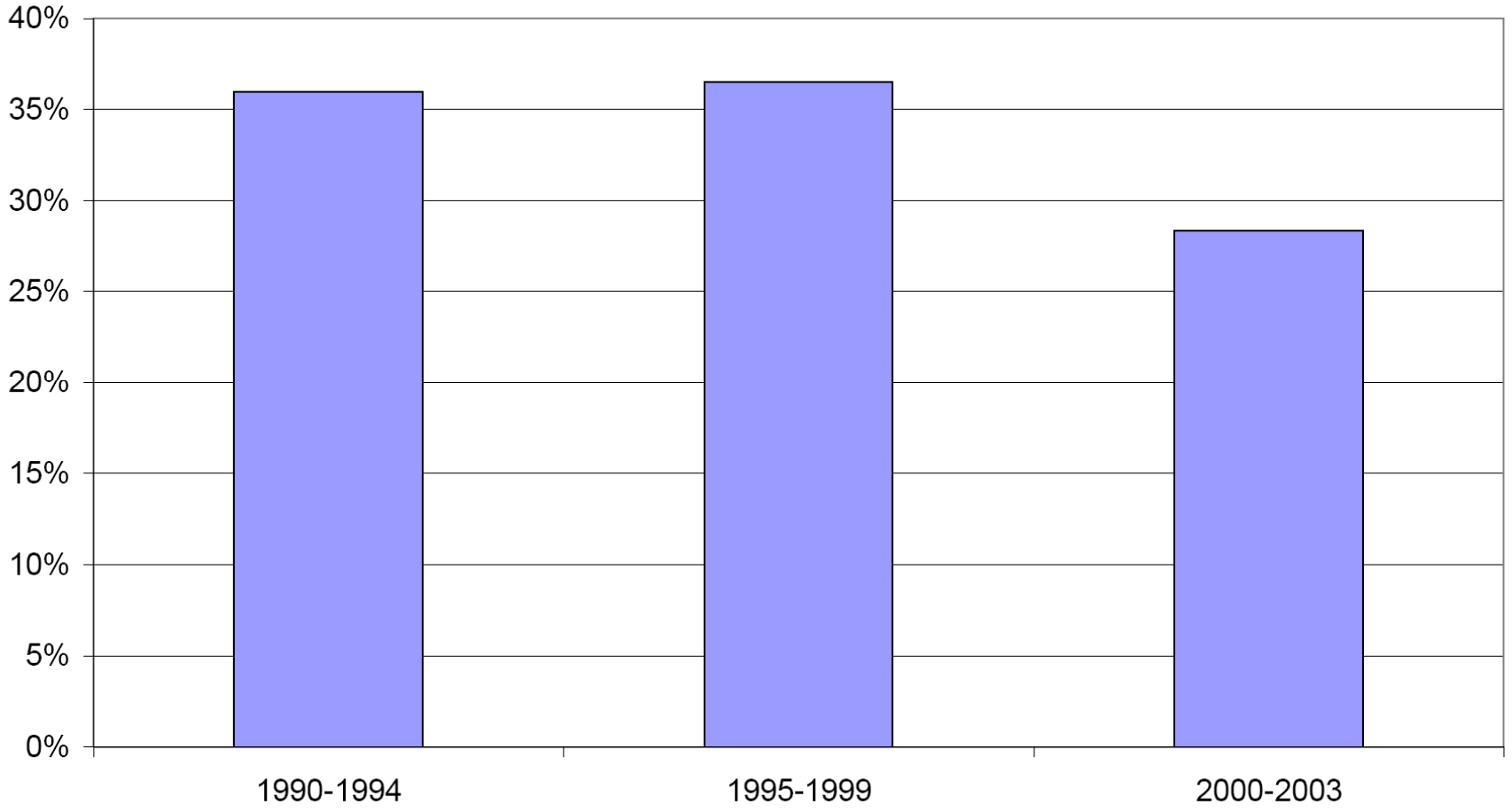
(Innovation in the pharmaceutical sector. A study undertaken for the European Commission, 8th November 2004)

Figure 12: NDA applications received – 1990 to 2003



Source: FDA http://www.fda.gov/cder/rdmt/
(Innovation in the pharmaceutical sector. A study undertaken for the European Commission, 8th November 2004)

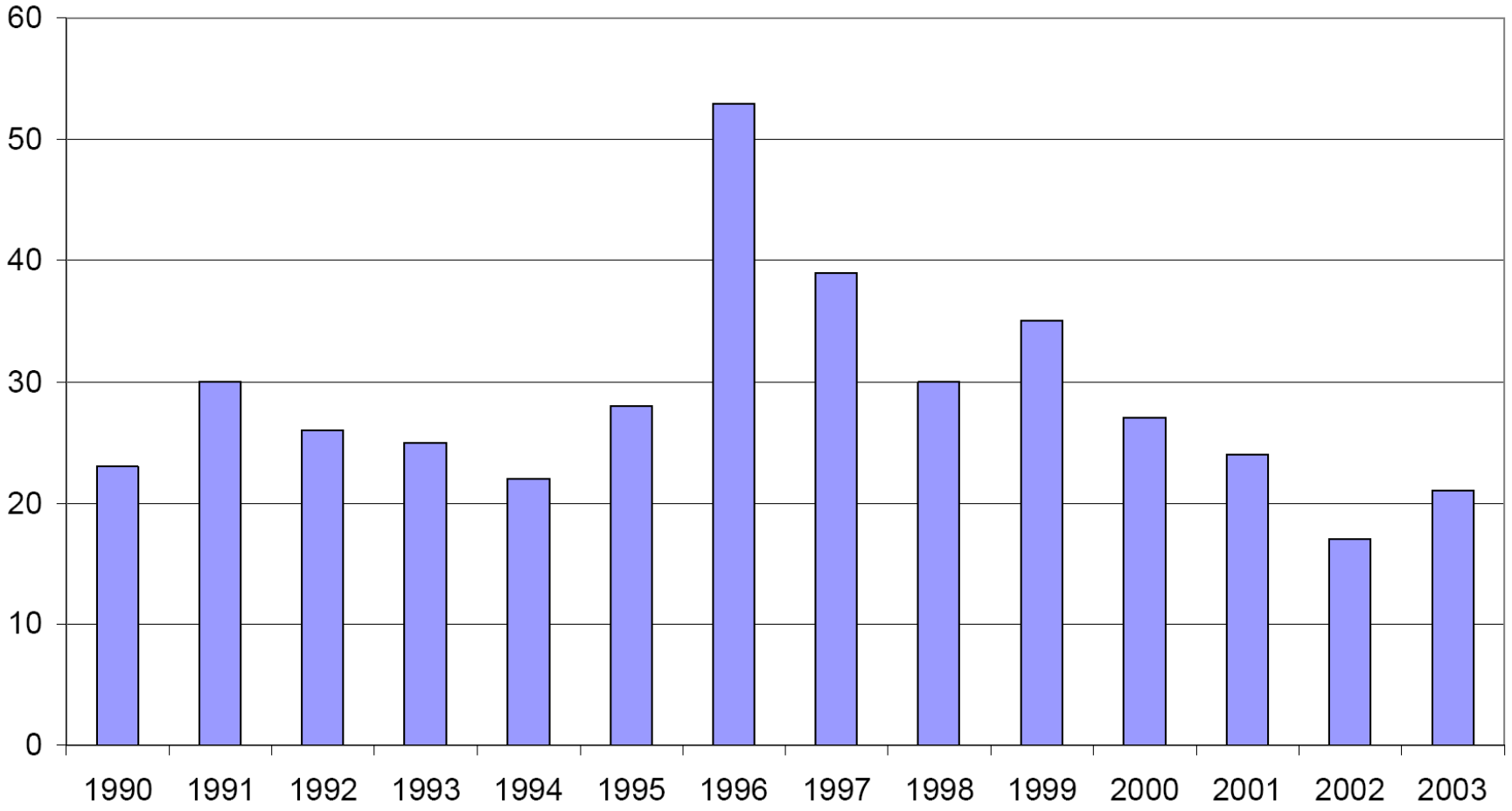
Figure 14: NMEs as % of NDAs



Source:FDA http://www.fda.gov/cder/rdmt/

(Innovation in the pharmaceutical sector. A study undertaken for the European Commission, 8th November 2004)

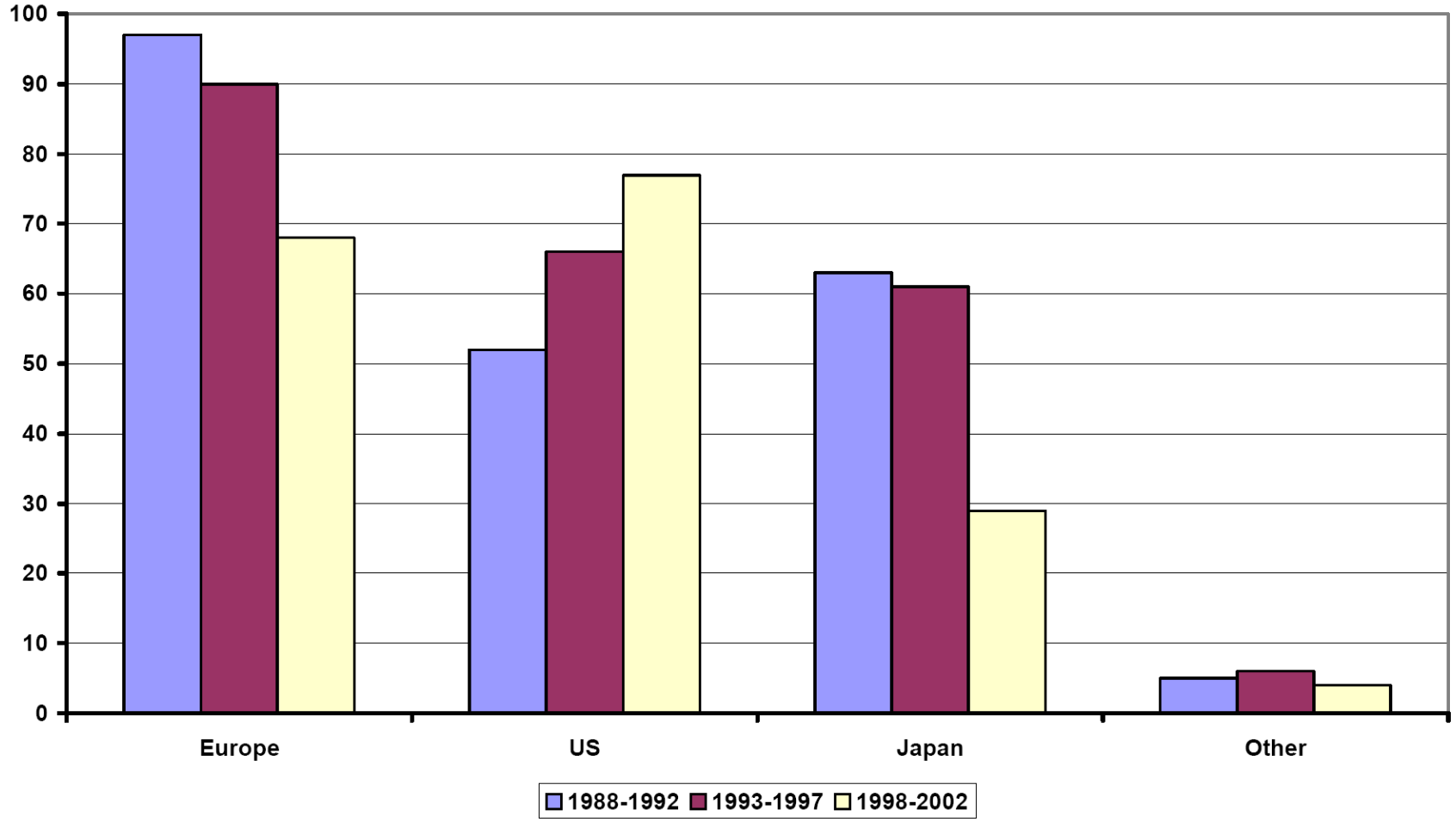
Figure 15: NMEs approved



Source:FDA http://www.fda.gov/cder/rdmt/

(Innovation in the pharmaceutical sector. A study undertaken for the European Commission, 8th November 2004)

Figure 27: Number of new chemical or biological entities by nationality of mother company 1988-2002



Source: SCRIP-EFPI calculations (according to nationality of mother company), see Efpia The Pharmaceutical Industry in Figures, p. 16

La stima dei costi di R&S

- E’ difficile stabilire se i costi di R&S continueranno a crescere con questo andamento, ma se ciò accadesse, la R&S iniziata nel 2001 porterebbe 12 anni dopo, nel 2013, al momento dell’approvazione del farmaco, ad un costo diretto di $970 milioni e capitalizzato di $1.900 milioni!

La stima dei costi di R&S

Alcuni elementi per verificare la validità dei dati di costo della R&S

1. Lo sviluppo di un farmaco è un processo ad alto rischio (si veda l'analisi delle probabilità di transizione dalla fase pre-clinica alla fase III fino all'approvazione/ registrazione del farmaco).
2. Solamente il 21,5% dei farmaci che iniziano la fase I raggiungono il mercato.
3. Il processo di sviluppo richiede molto tempo: circa 90,3 mesi in media dall'inizio dei test clinici alla approvazione per la commercializzazione (tale periodo si è accorciato nel tempo grazie ad una maggiore rapidità dei tempi di approvazione delle autorità regolatorie (FDA) passati da 30,3 mesi a 18,2 (DiMasi 1991).

La stima dei costi di R&S

4. Dei 98 farmaci approvati dall'FDA nel 2000, 27 erano New Molecular Entities, gli altri erano nuove formulazione o nuovi processi di produzione e sono esclusi dall'analisi di DiMasi. Tuttavia questi farmaci non completamente nuovi rappresentano quote importanti dei fatturati, e per la R&D si stima che possa rappresentare il 30% del totale (CMR International, 2002) (secondo PhRMA 2001 sarebbe solo il 18%,).
5. Prendendo l'intera spesa in R&S e dividendola soltanto per i NCE (come fa DiMasi) si ottiene un valore più alto di quello che si otterrebbe includendo anche i farmaci della categoria meno nuovi (cioè le estensioni terapeutiche, le nuove formulazioni, i nuovi processi produttivi). Oppure bisognerebbe togliere dalla spesa in R&S la quota imputabile ai non NCE.

La stima dei costi di R&S

OTA (U.S. Congress, Office of Technology Assessment, 1993):

auspicava una crescente concorrenza sul prezzo dei farmaci simili sul piano terapeutico, prevedendo di conseguenza un declino della spesa totale in R&S. I dati qui presentati dimostrano come questa previsione fosse profondamente errata.

Occorre quindi chiedersi: è stato un bene o un male?

I costi crescenti della R&S sono ripagati dai benefici che la società riceve dai nuovi farmaci, cioè i costi rappresentati dagli alti prezzi dei farmaci sostenuti dalla società sono inferiori ai benefici ottenuti dalla società?