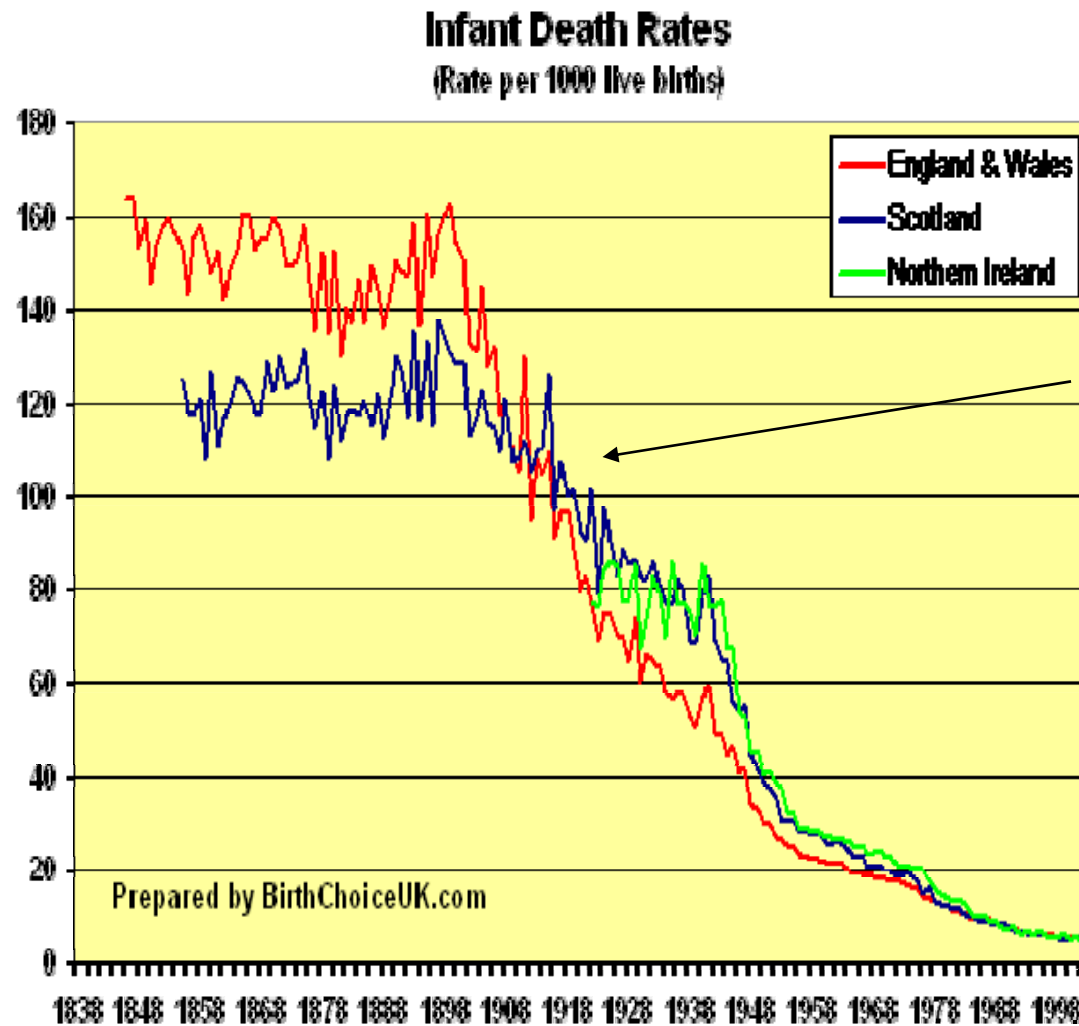


Challenges & Opportunities for the Pharmaceutical Industry

Dr Gino Martini FRPharmS

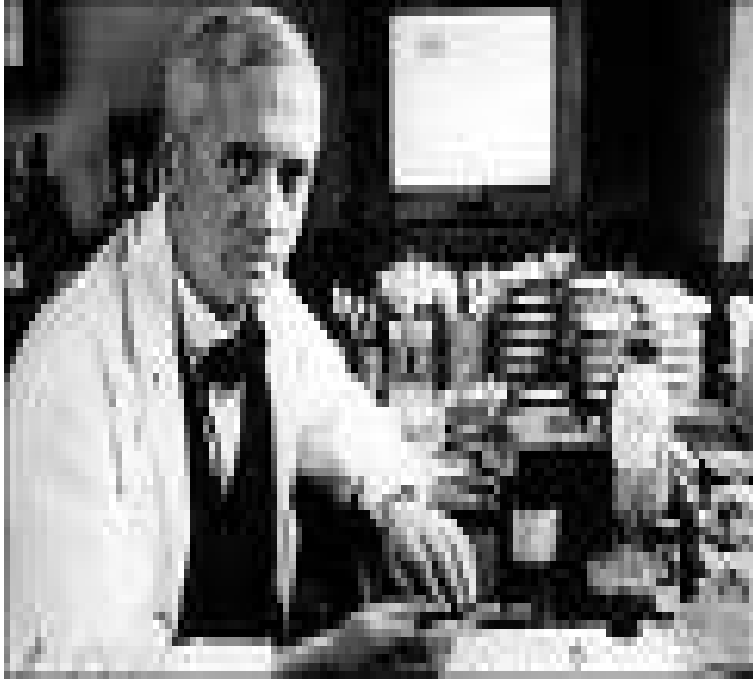
EIPG President

Why do I enjoy being an Industrial Pharmacist?



Something
happened here

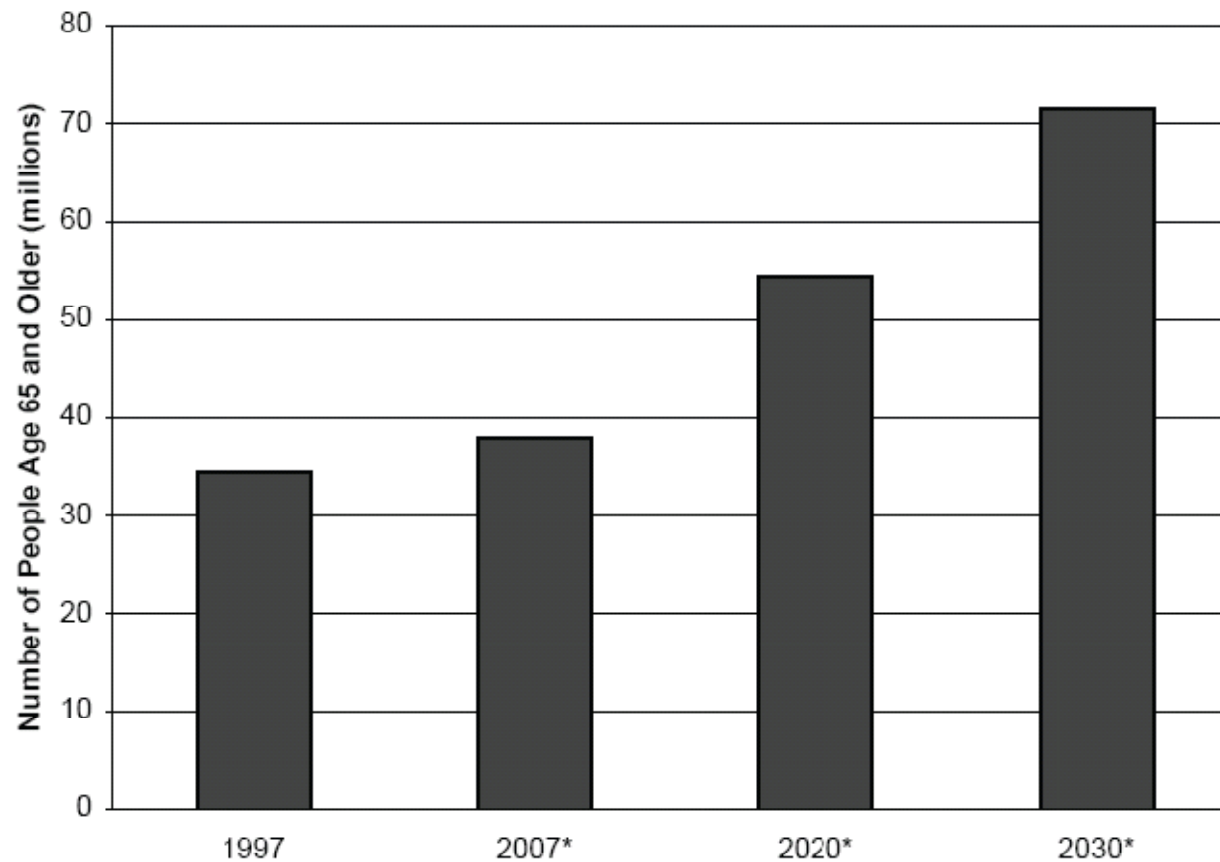
Sir Alexander Fleming & his mouldy sandwiches!



Discovery of Pencillin & Antibiotics revolutionised medical therapy

Longevity is improving

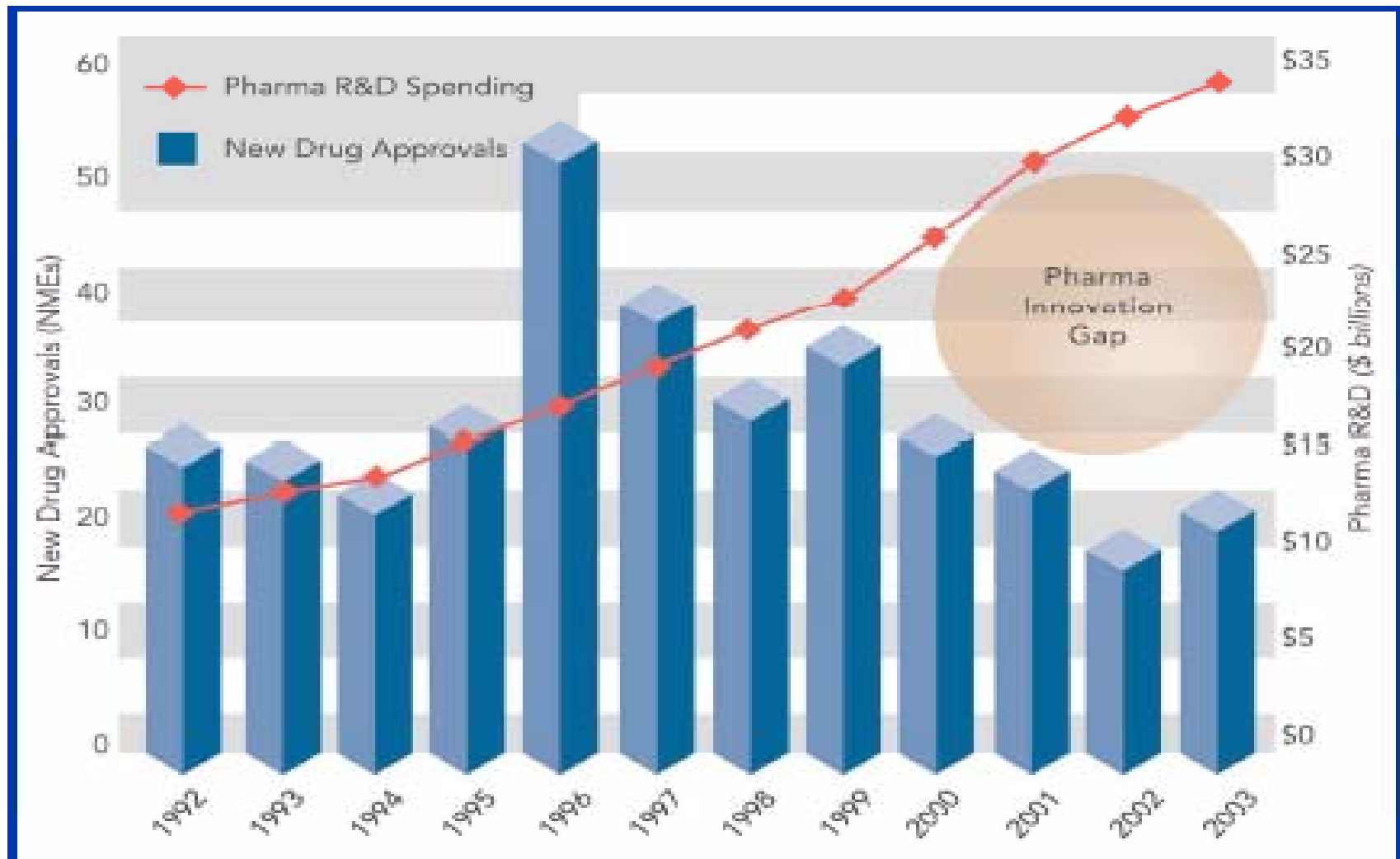
Number of People Over Age 65 in U.S. is Projected to Grow Rapidly



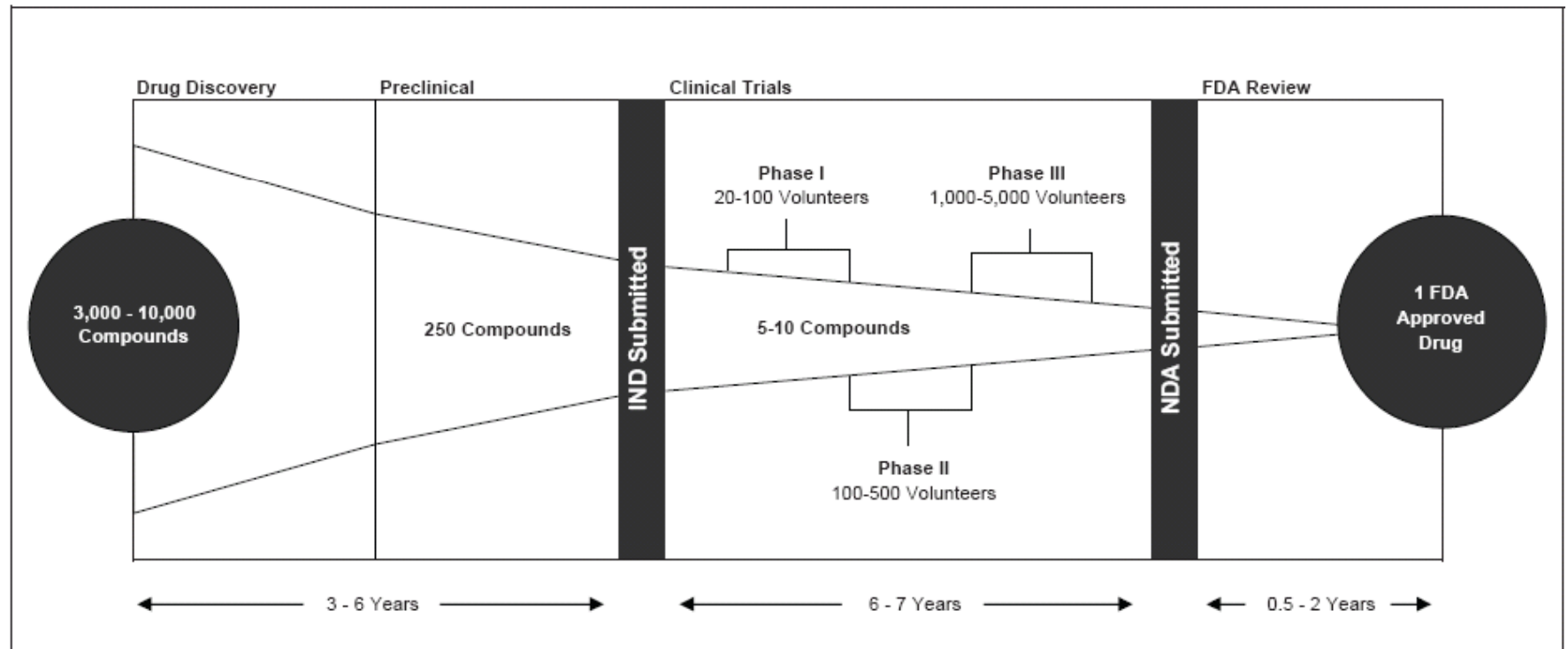
*Projected

Source: U.S. Census Bureau

Innovation gap...



Number of Compounds to Produce a New Drug



Source: PhRMA and FN estimates

Cost is now ~ £ 700-1billion

Success Rate 1 in 10,000

But its not easy, the odds are not in our favour

- For every 10,000 NCE's in Discovery
 - ✱ 10 enter pre-clinical development
 - ✱ 5 enter human trials
 - ✱ 1 is approved
- Interestingly.....

✱ Winning the lottery	1 in 5,200,000
✱ A Royal Flush in Poker	1 in 650,000
✱ Struck by lightning	1 in 600,000
✱ Appear on the Tonight Show	1 in 490,000
✱ Discovery to Market	1 in 10,000
✱ A son who will play pro football	1 in 8000

Need Blockbusters!

What is a “Blockbuster”?

- Significant amount of revenue from individual product
- Minority of products drive majority of revenue
- Product appeal beyond target market
- Initial demand often exceeds capacity

But, only a small % of NCEs
Become Blockbusters

<u>Sales Total Per Annum</u>	<u>% Achieving</u>
• \$1.8 Billion or >	1.0%
• \$920 Million - \$1.8 Billion	1.0%
• \$460 Million - \$920 Million	2.0%
• \$180 Million - \$460 Million	6.0%
• < \$180 Million	90.0%

Average for all Drugs -- \$265 Million per Annum

Sources: PriceWaterhouse Coopers, SCRIP

Revenue and Patent Expiration of Top 12 Pharmaceuticals

Drug	Company	1997 Revenue in \$ Millions	Patent Expiration
Zocor	Merck	3,575	2005
Losec	Astra	2,816	2001
Prozac	Eli Lilly	2,550	2001

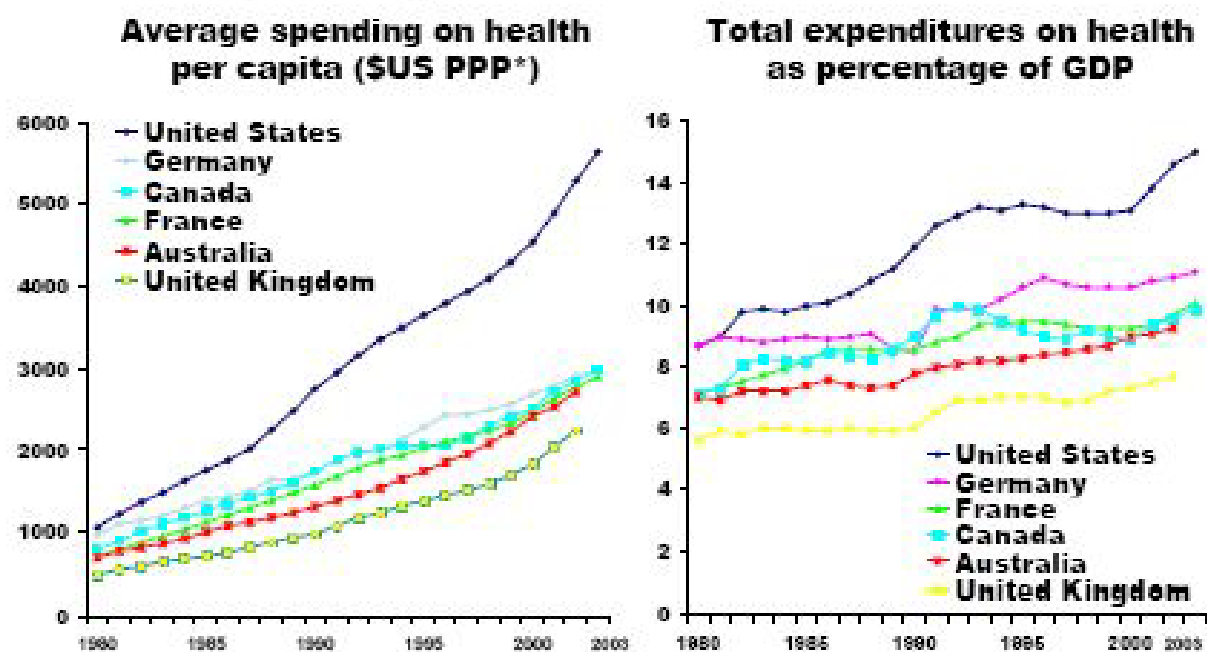
\$82 billion worth of global blockbusters will have lost US patent protection by 2007

Augmentin	SmithKline Beecham	1,517	2002
Zolft	Pfizer	1,507	2005
Paxill	SmithKline Beecham	1,474	2005
Cipro	Bayer	1,441	2004

Note: * Includes alliances with values estimated to be greater than \$20M including up-front payments, equity, R&D funding, and contingent milestone payments
Sources :Recombinant Capital, MedAd News

High Healthcare Costs

Figure 1. International Comparison of Spending on Health, 1980–2003



* PPP = Purchasing power parity — an estimate of the exchange rate required to equalize the purchasing power of different currencies, given the prices of goods and services in the countries concerned.

Source: Organisation for Economic Co-operation and Development (OECD) Health Data, 2004.

Now outstripping Defense Spend

COUNTRY	Country Data			Defence Expenditure - 2004			Foreign Aid - 2003		
	Population (2004)	GDP (2003) (\$US billions)	GDP (2004) (\$US billions)	US\$ (billions)	US\$ per capita	% of GDP	US\$ (billions)	US\$ per capita	% of GDP
Argentina	38,377,000	129.60	151.50	1.60	\$42	1.06%	n/a	n/a	n/a
Australia	19,890,000	522.40	631.30	11.70	\$588	1.85%	0.51	\$25.39	0.10%
Brazil	174,471,000	505.70	604.90	9.20	\$53	1.52%	n/a	n/a	n/a
Canada	31,630,000	856.50	979.80	10.10	\$319	1.03%	2.03	\$6421	0.24%
China	1,288,400,000	1,400.00	1,600.00	25.00	\$19	1.56%	n/a	n/a	n/a
France	59,725,000	1,800.00	2,000.00	40.00	\$670	2.00%	7.25	\$121.44	0.40%
Germany	82,551,000	2,400.00	2,700.00	29.70	\$360	1.10%	6.78	\$82.18	0.28%
India	1,064,399,000	600.60	691.90	19.10	\$18	2.76%	n/a	n/a	n/a
Indonesia	214,471,000	238.50	257.60	2.30	\$11	0.89%	n/a	n/a	n/a
Italy	57,646,000	1,500.00	1,700.00	17.50	\$304	1.03%	2.43	\$42.21	0.16%
Japan	127,210,000	4,300.00	4,600.00	2.30	\$18	0.05%	8.88	\$69.81	0.21%
Korea (South)	47,912,000	608.10	679.70	16.40	\$342	2.41%	0.28	\$5.82	0.05%
Mexico	102,291,000	639.10	676.50	2.80	\$27	0.41%	n/a	n/a	n/a
Russia	143,425,000	430.10	582.40	14.20	\$99	2.44%	n/a	n/a	n/a
Saudi-Arabia	22,528,000	212.60	250.60	19.30	\$857	7.70%	n/a	n/a	n/a
South Africa	45,294,000	165.40	212.80	3.30	\$73	1.55%	n/a	n/a	n/a
Turkey	70,712,000	240.40	301.90	8.50	\$120	2.82%	n/a	n/a	n/a
United Kingdom	59,280,000	1,800.00	2,100.00	49.00	\$827	2.33%	6.28	\$105.97	0.35%
United States	291,044,000	10,900.00	11,700.00	460.50	\$1,582	3.94%	16.25	\$55.85	0.15%

SOURCES

Population

The International Institute For Strategic Studies, *The Military Balance 2004-2005* (London: Oxford University Press, 2005).

GDP

World Bank, World Development Indicators database, Updated 15 July 2005, available at: <http://www.worldbank.org/data/countrydata>

Defence Spend

The Military Balance 2004-2005

Foreign Aid

Data for all countries except South Korea and Saudi Arabia comes from the OECD, Development Co-operation Directorate, "FINAL". Where Foreign Aid data is unavailable, it is because no data could be found or the country is a net recipient of Foreign Aid according to the OECD.

Calculations

Foreign aid spending per capita and as a % of GDP was calculated based on the most recent available data on ODA (2003) and core aid. Defence spending per capita and as a % of GDP was calculated based on the most recent available data on defence expenditures (2004).

NOTE:

There are 19 nation state members of the G-20. The 20th member, European Union, is not represented here.

THESE CALCULATIONS ARE ESTIMATIONS ONLY.

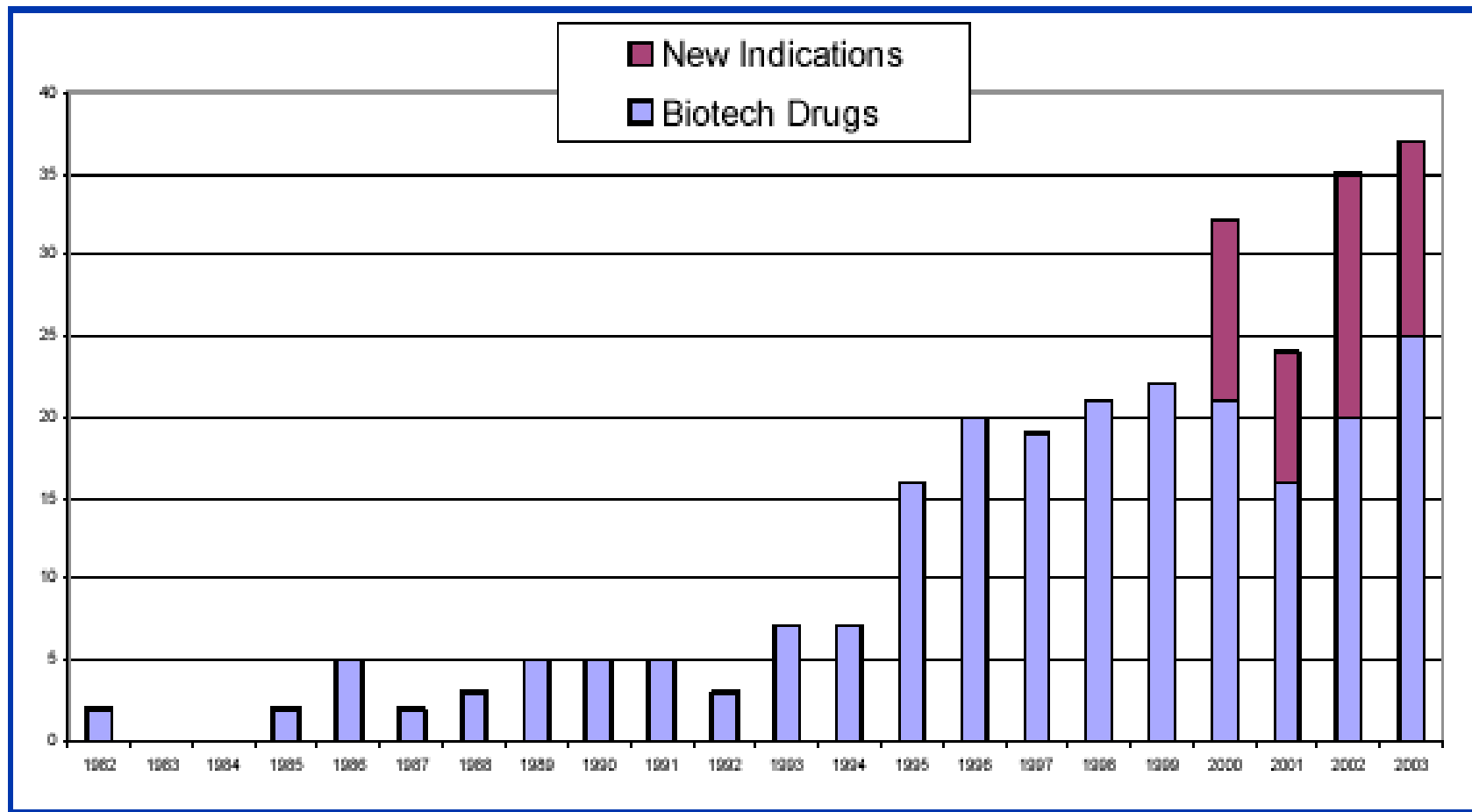
Big pharma challenges...

- ✓ R&D spending growing faster than sales growth
- ✓ New product discoveries lagging relative to industry growth needs
- ✓ Need for licensing products from outside Core Expertise!

“By 2010 most pharmaceutical research will be undertaken by biotechnology companies”

Deutsche Bank

Number of biotech products approved



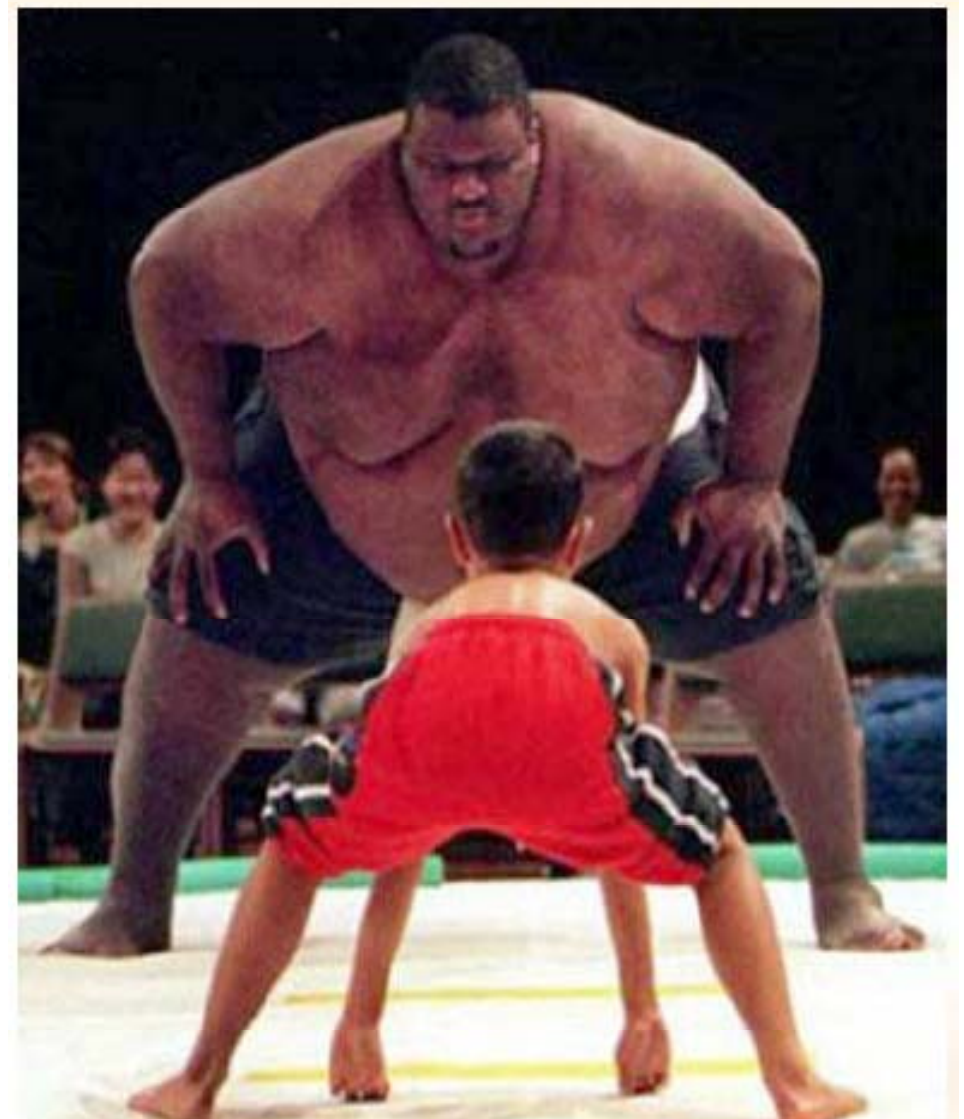
Biotech - Big pharma Alliances

Biotech does some things very well (invent, proteins, niche)

Big pharma does some things very well (develop, market, sell)

Must overcome NIH

As with any marriage, both parties must nurture the relationship



Big companies like small molecules, small
companies like big molecules.

Judah Folkman

But Big Companies are beginning to like Big Molecules
Gino Martini

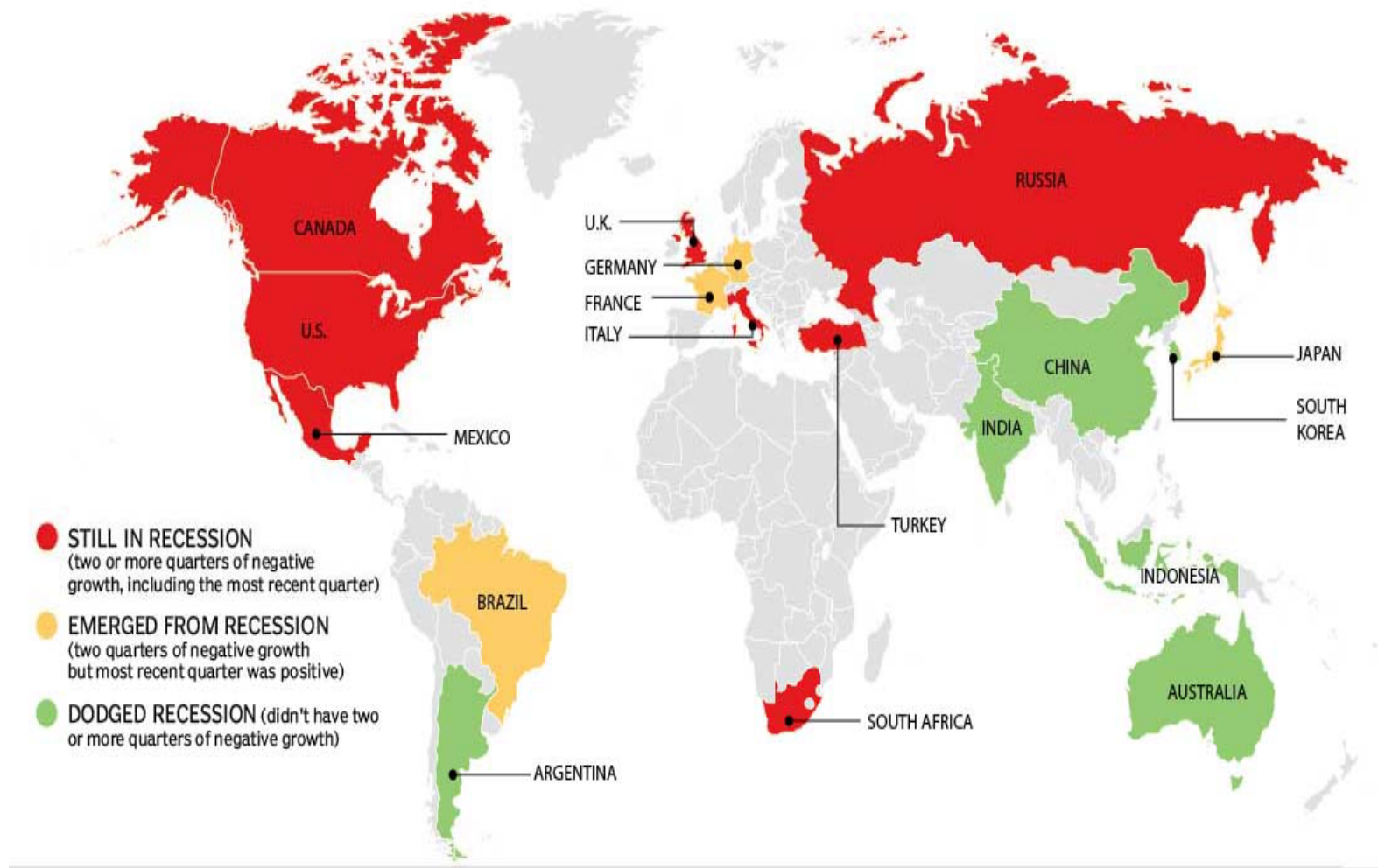
The race for emerging markets

- **GSK to drive growth in emerging markets with acquisition of UCB products**
- **Issued: Friday 23 January 2009, London UK**
- GlaxoSmithKline plc (GSK) today announced that it has signed an agreement with UCB S.A to acquire its current marketed product portfolio across certain territories in Africa, the Middle East, Asia Pacific and Latin America, for a cash consideration of €515 million (£483 million.)
- **Commenting on the acquisition Abbas Hussain, President, Emerging Markets, GSK said,** “As part of our strategy to grow and diversify GSK’s business, we are continuing to make new investments in emerging markets. This acquisition will strengthen and expand GSK’s product portfolio in these countries, helping us to meet the needs of patients, particularly in the areas of epilepsy and respiratory.”

Why all the fuss over Emerging Markets?

"It's the economy, stupid" was a phrase in [American politics](#) widely used during [Bill Clinton](#)'s successful 1992 presidential campaign against George H.W. Bush.

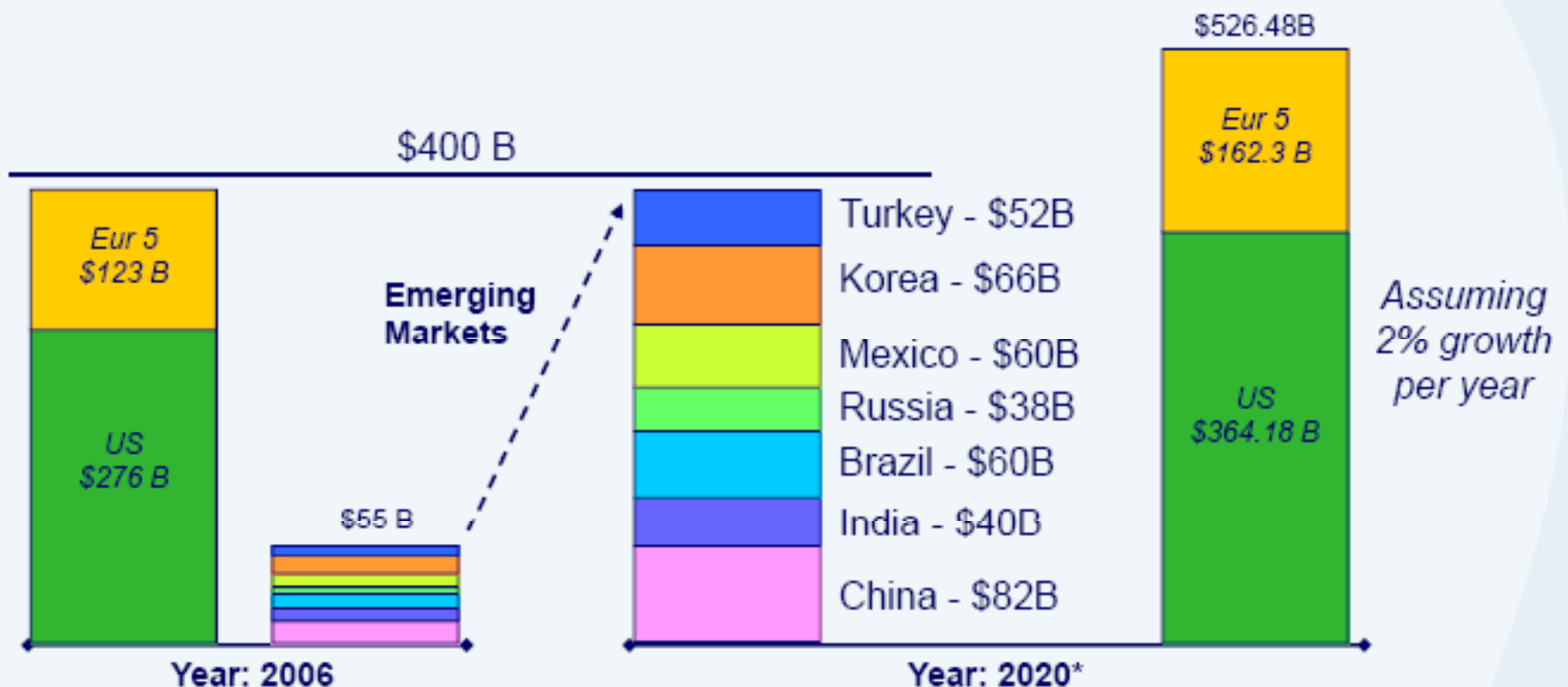
And if I did not need to remind you!



Fast growing

Emerging Markets will outgrow Developed Markets

"Annual pharmaceutical sales in emerging markets is expected to reach \$400 billion by 2020, equivalent to current sales in the US and the five major European markets combined."



Source: IMS MIDAS 2006 sales data, Total Pharmaceutical Market

* Extrapolations from 2006 to 2020 based on IMS projection and % of 2006 sales

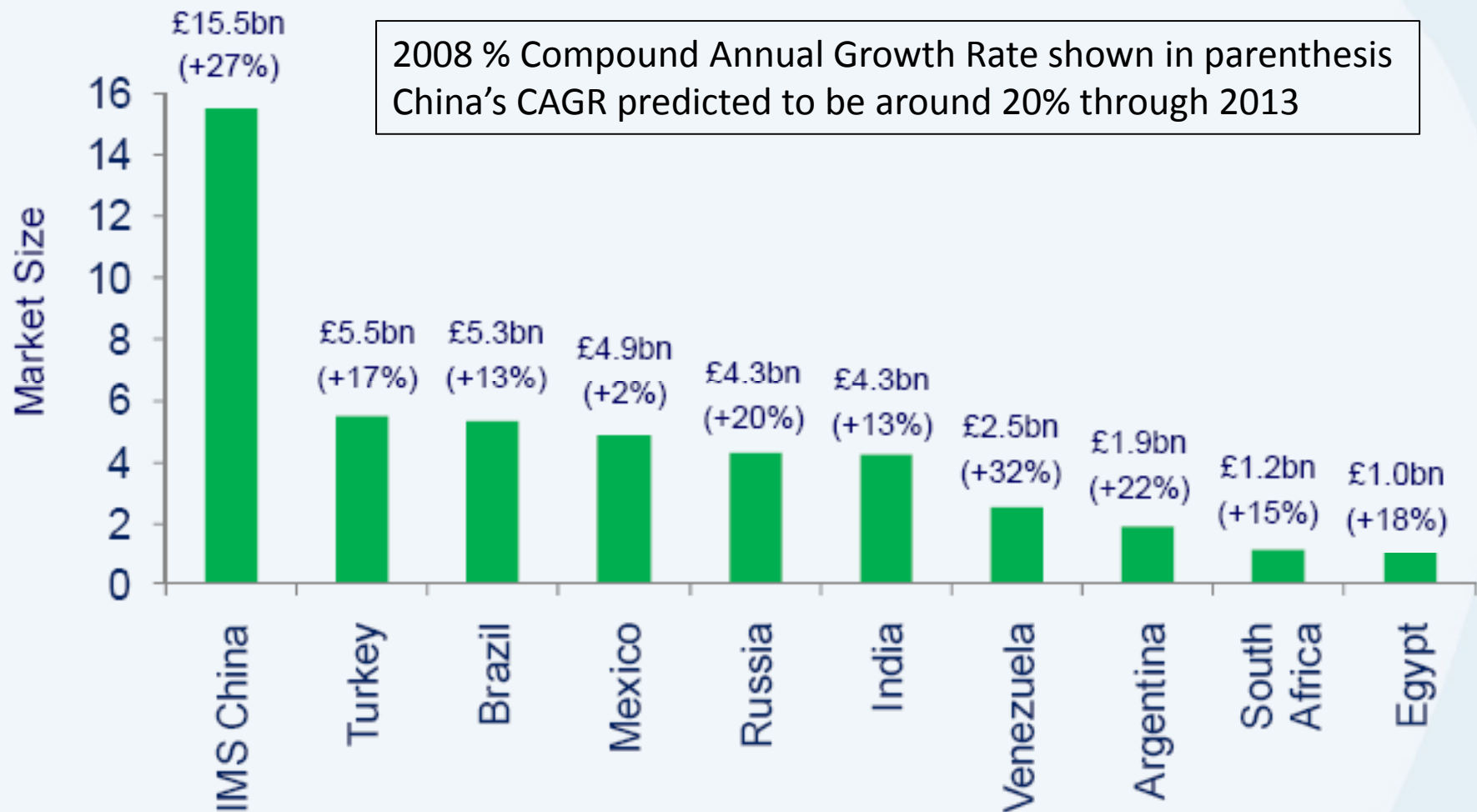
As a result, the top 20 league table will be significantly different in 2013

2003 Rank		2008 Rank		2013 Rank	
1	United States	1	United States	1	United States
2	Japan	2	Japan	2	Japan
3	Germany	3	France	3	China
4	France	4	Germany	4	Germany
5	Italy	5	China	5	France
6	United Kingdom	6	Italy	6	Spain
7	Spain	7	United Kingdom	7	Italy
8	Canada	8	Spain	8	Russia
9	China	9	Canada	9	Brazil
10	Brazil	10	Brazil	10	Canada
11	Mexico	11	Russia	11	United Kingdom
12	Australia	12	Mexico	12	Venezuela
13	India	13	Turkey	13	Turkey
14	Poland	14	India	14	India
15	Netherlands	15	South Korea	15	Mexico
16	Belgium	16	Australia	16	South Korea
17	South Korea	17	Greece	17	Greece
18	Russia	18	Poland	18	Poland
19	Turkey	19	Netherlands	19	Australia
20	Portugal	20	Belgium	20	Belgium

Source: IMS Health Market Prognosis, Jun 2009. Includes revised history and forecast for Russia. Market size ranking in Constant US\$.

Larger emerging markets

Top 10 countries account for 85% of emerging market sales



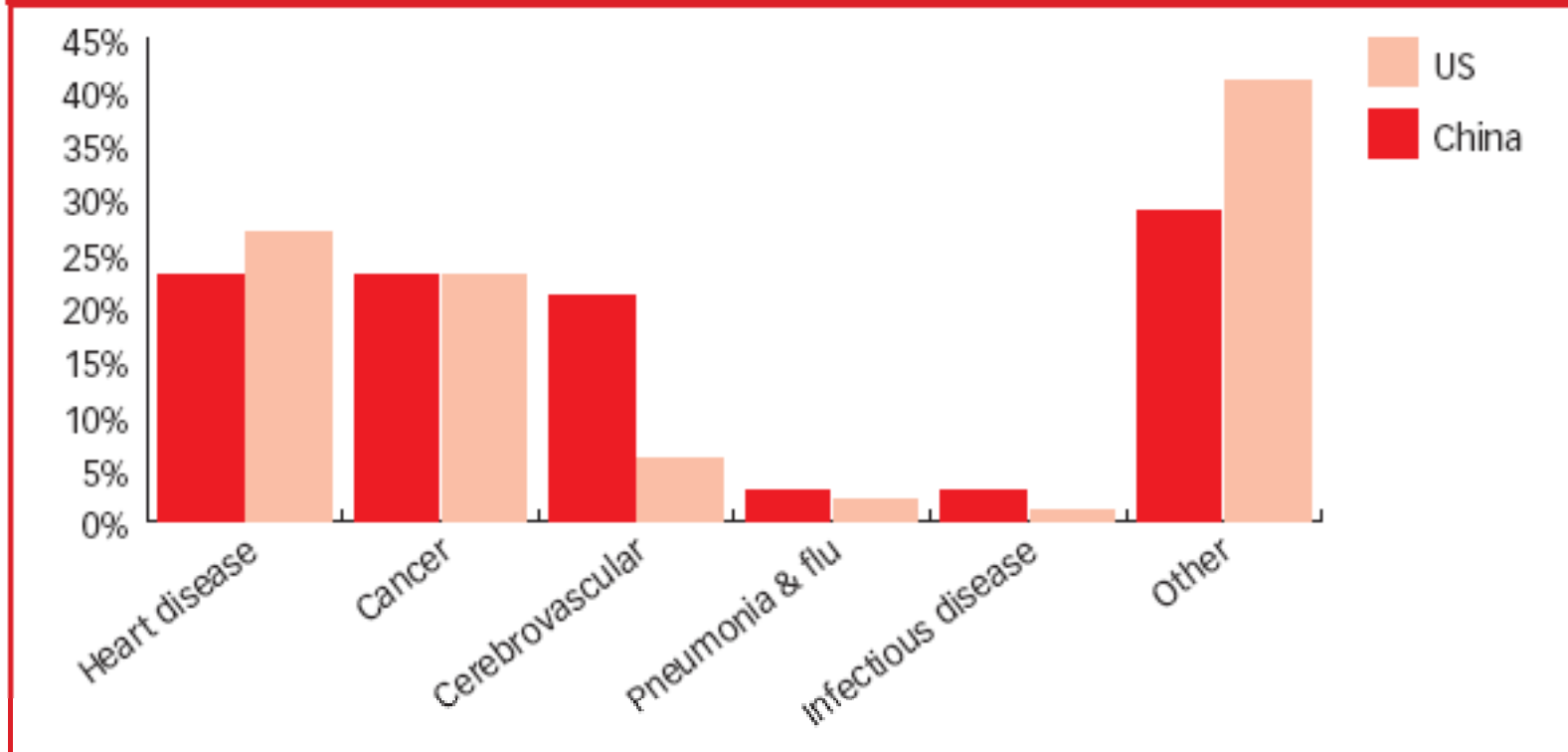
Source: IMS data (MAT Sep 09)

So its simple then, lets access the Emerging Markets

- . Not quite that easy:
 - Diverse healthcare systems (No NHS)
 - Fragmented markets
 - Complex regulatory systems
 - Cultural and Language barriers
 - Increased Competition (local & global)
 - Infrastructure is varied
 - Dynamic situation (regulations and technology changes occur daily)

Major diseases in China

Figure 1: Major causes of death in China and the US (adapted from CDC National Vital Statistics, 2007²).



700,000 individuals with HIV, 75,000 full blown AIDS
170 Million individuals with Hepatitis B – poorly served
40 Million diabetics
High incidence of lung, mouth and neck cancers

Source LG. Martini and S. Macrae (GSK): Pharm Tech 1 May 2010

Chinese healthcare reform impacts

Today

- Branded generics
- Originator product price premium
- Weak IP protection
- Central government control
- Local manufacturing important
- Clinical development important
- Complex drug approval process

Future ~2020

- R&D driven market, premium price for innovation
- Harmonisation of generic prices
- Stronger IP protection
- Greater decision making in the provinces
- Local manufacturing a requirement for EDL products
- Local R&D key driver for access and acceleration
- Chinese data important for drug approvals

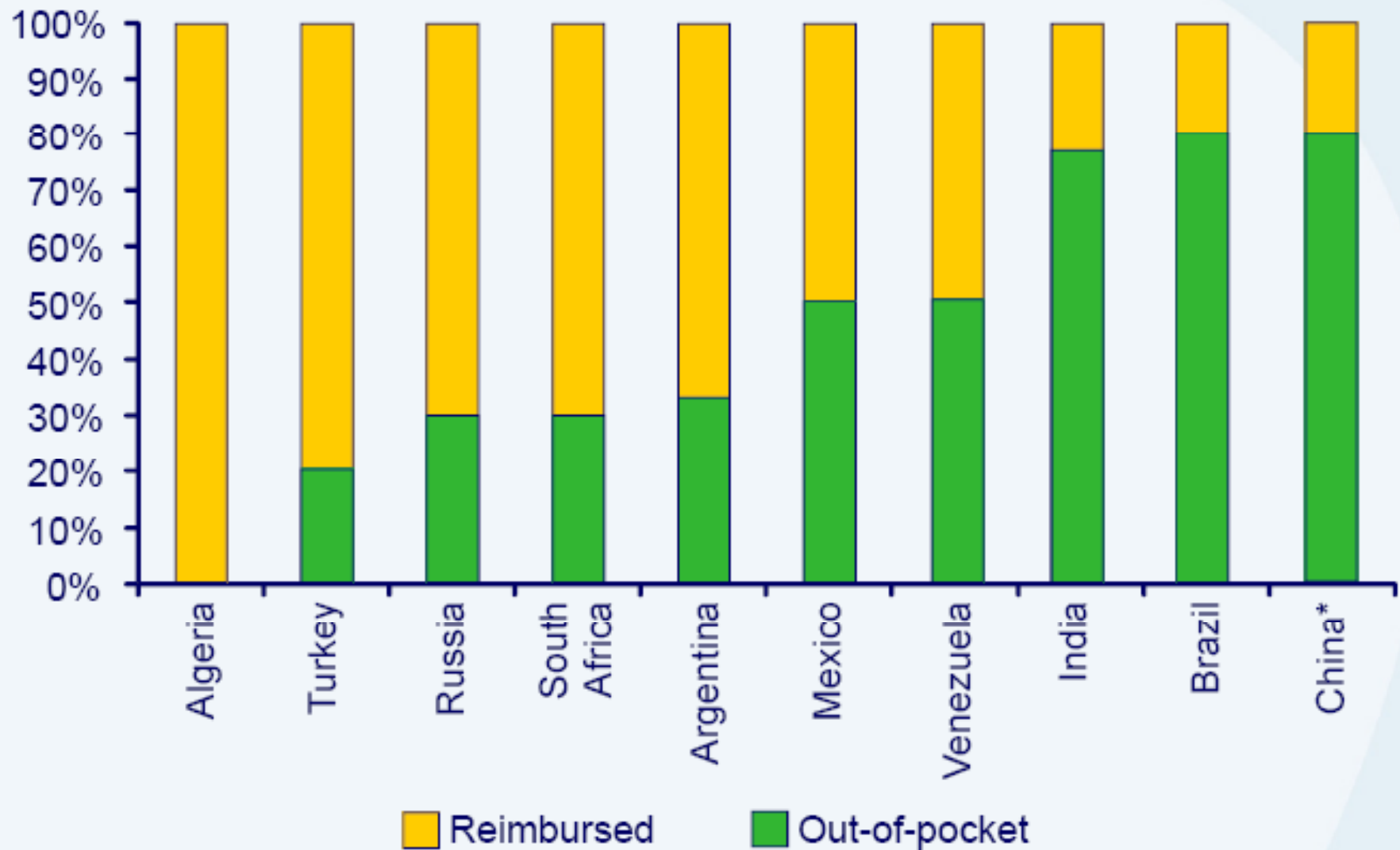


**Evolution vs revolution:
current market exists for foreseeable future**

EDL = Essential Drugs List

Source GSK.com website

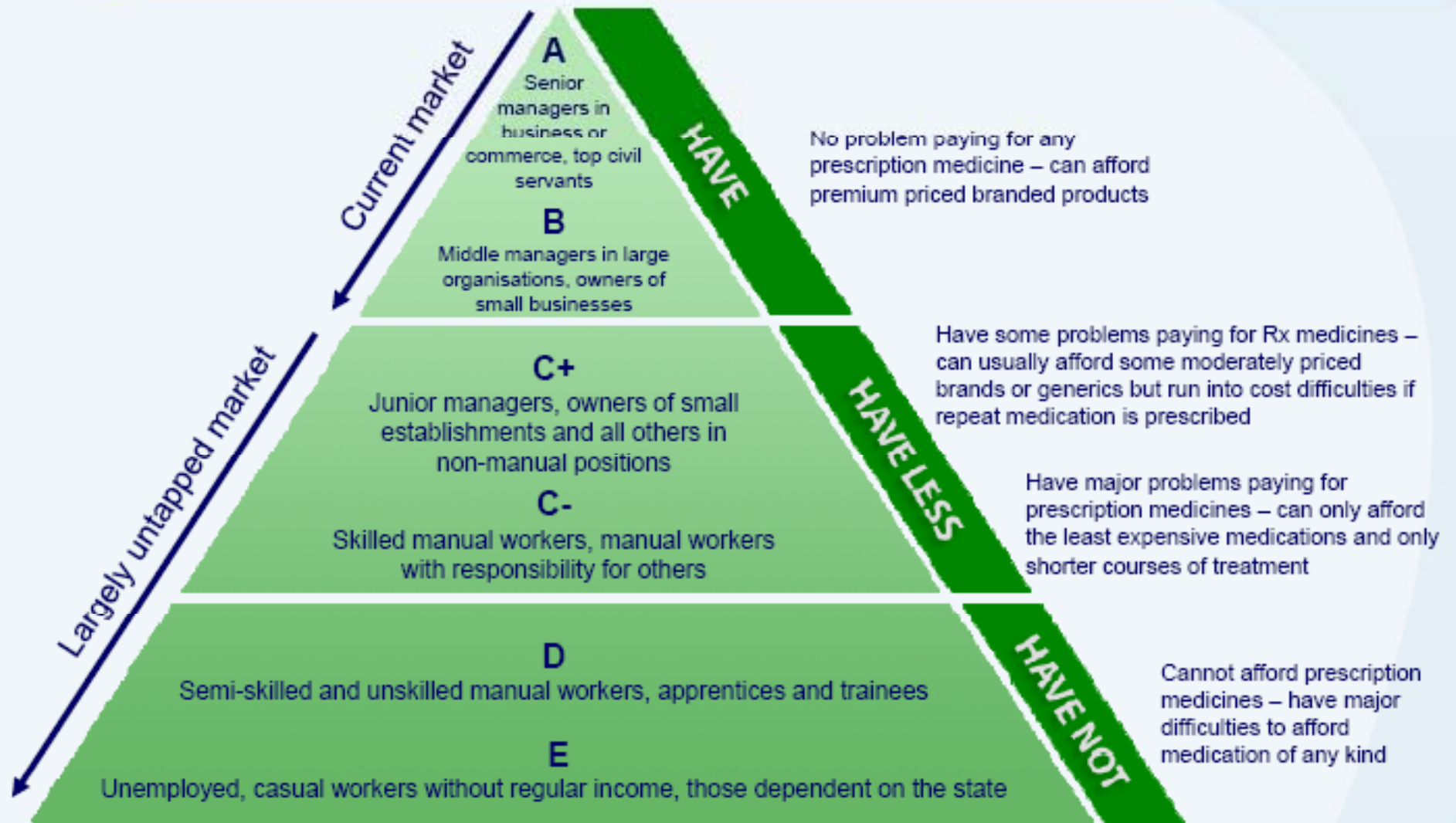
Pay out-of-pocket



Source: IMS

* China is an estimate.

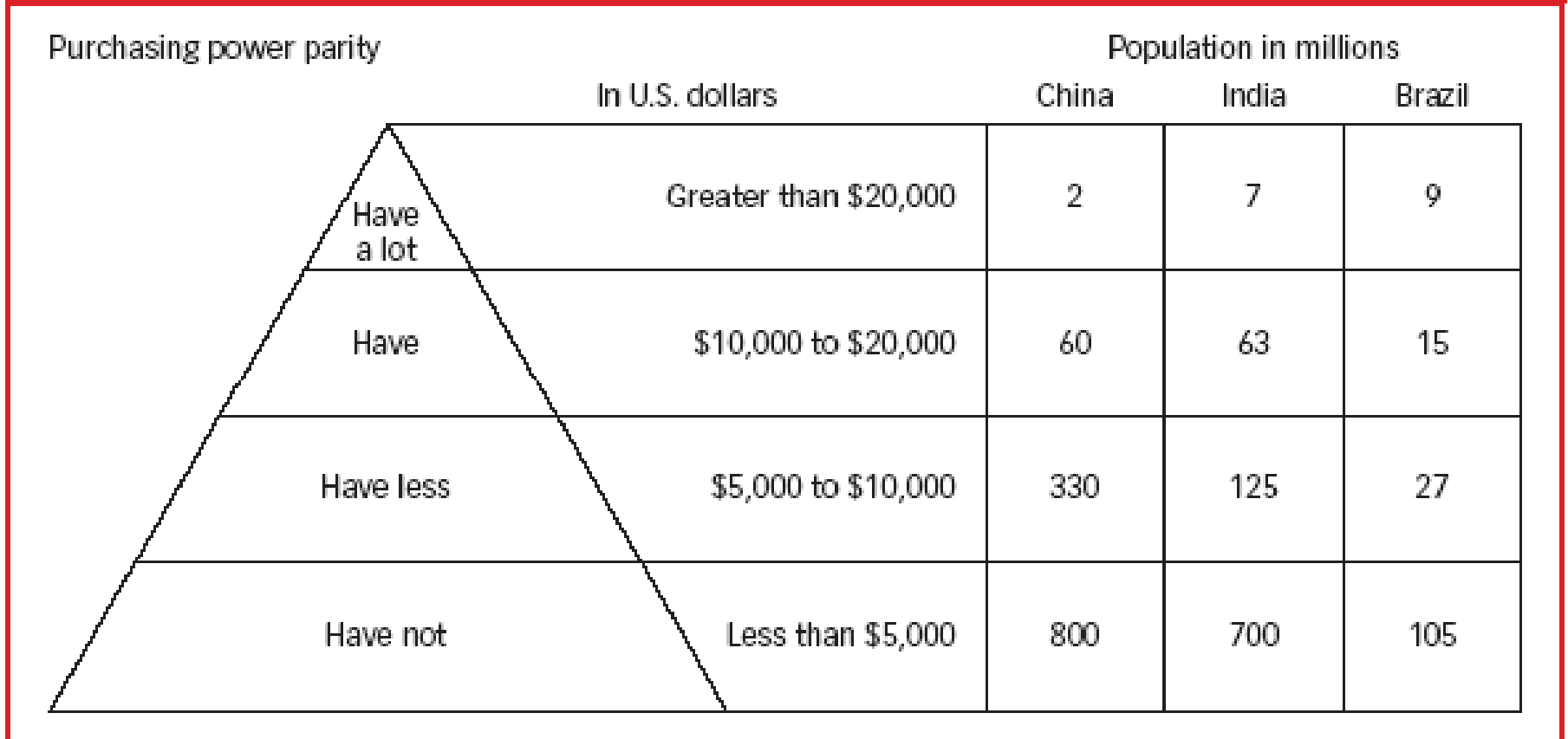
The Wealth Pyramid



Source: Segment categories are MRS Occupation Groupings. Descriptions and 'wealth pyramid' are GSK interpretation.

Distribution of wealth in key emerging markets

Figure 2: The Wealth Pyramid across the emerging markets (adapted from Prahalad and Lieberthal, 1998').



How do we get affordable healthcare to the 'Have nots'?

Source LG. Martini and S. Macrae (GSK): Pharm Tech 1 May 2010

Access to Medicines in Developing Markets

GSK recently made three pledges:

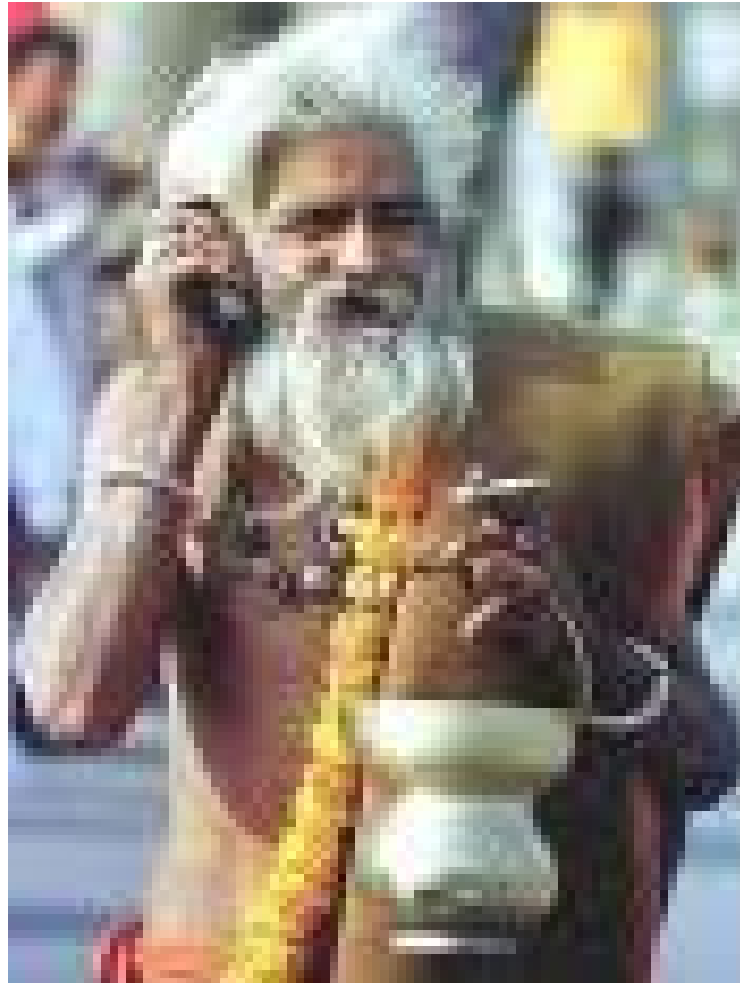
- 1. Reduce the price of medicines it sells in fifty least-developed countries (LDCs) to at most 25 percent of American and British prices;
- 2. Reinvest 20 percent of the profits it makes in those fifty poor countries into health-care infrastructure in those countries; and
- 3. Support a patent pool for neglected diseases

Source Andrew Witty GSK, CEO speaking in 2009

Dynamic Environments and the Dangers of Western Thinking consider the telecommunications industry




A picture tells a 1000 words!



Technology Leapfrogging is the norm!

So where am I going with this?




SCOTTISH HIGHLANDS
Lucky

NORTHERN VIETNAM
Lucky

Never underestimate the importance of local knowledge.

Flowers mean different things the world over and to understand those differences, it helps to be a local.
At HSBC, we have banks in more countries than anyone else. And each one is staffed by local people.
We have offices in 77 countries and territories; Europe, Asia-Pacific, the Americas, the Middle East, and Africa. Being local enables them to offer insights into financial opportunities and create service initiatives that would never occur to an outsider.
It means our customers get the kind of local knowledge and personal service that you'd expect of a local bank.
And a level of global knowledge and widely sourced expertise that you wouldn't.

HSBC 
The world's local bank

- Local knowledge is key and working locally is needed
- However, how does this knowledge spread to the rest of the organisation?
- You need Change Agents whose focus is simply Emerging Markets and you also need them in R&D!

Product Development of the Future

- Key areas of change is that Pharmacists will be dealing more with projects that are being developed across national borders
 - drug discovery in Europe with drug development conducted in India and registration executed in Europe or North America or
 - drug discovery occurring in China, developed in China, commercialised in China and then registered in Europe or
 - another scenario being drug discovery conducted in China, development conducted in India and commercialised in Europe.
- **Basic Formulation Development for small molecule will be continually developed in a virtual way i.e. outsourced to low cost countries whereas large molecules will be developed in the EU and North America.**

Seven Skill Sets with Great Future Value

Seven Skill Sets Necessary to Operate in the Pharmaceutical Industry of the Future	
1)	Ability to Manage Decentralized Intellectual Capital Resources
2)	Ability to Work In Joint Ventures and Across Divisions, Cultures and Countries
3)	Ability to Integrate an Understanding of Intellectual Property Laws, Scientific Expertise and Business Strategy
4)	Ability to Spur Creativity While Managing Commercially
5)	Knowledge and Insight on the Decision-Making Dynamics of Payers
6)	Expertise In the Functioning and Decision-Making of Regulatory Agencies
7)	Human Resource Skills to Help Transform Pharmaceutical Companies



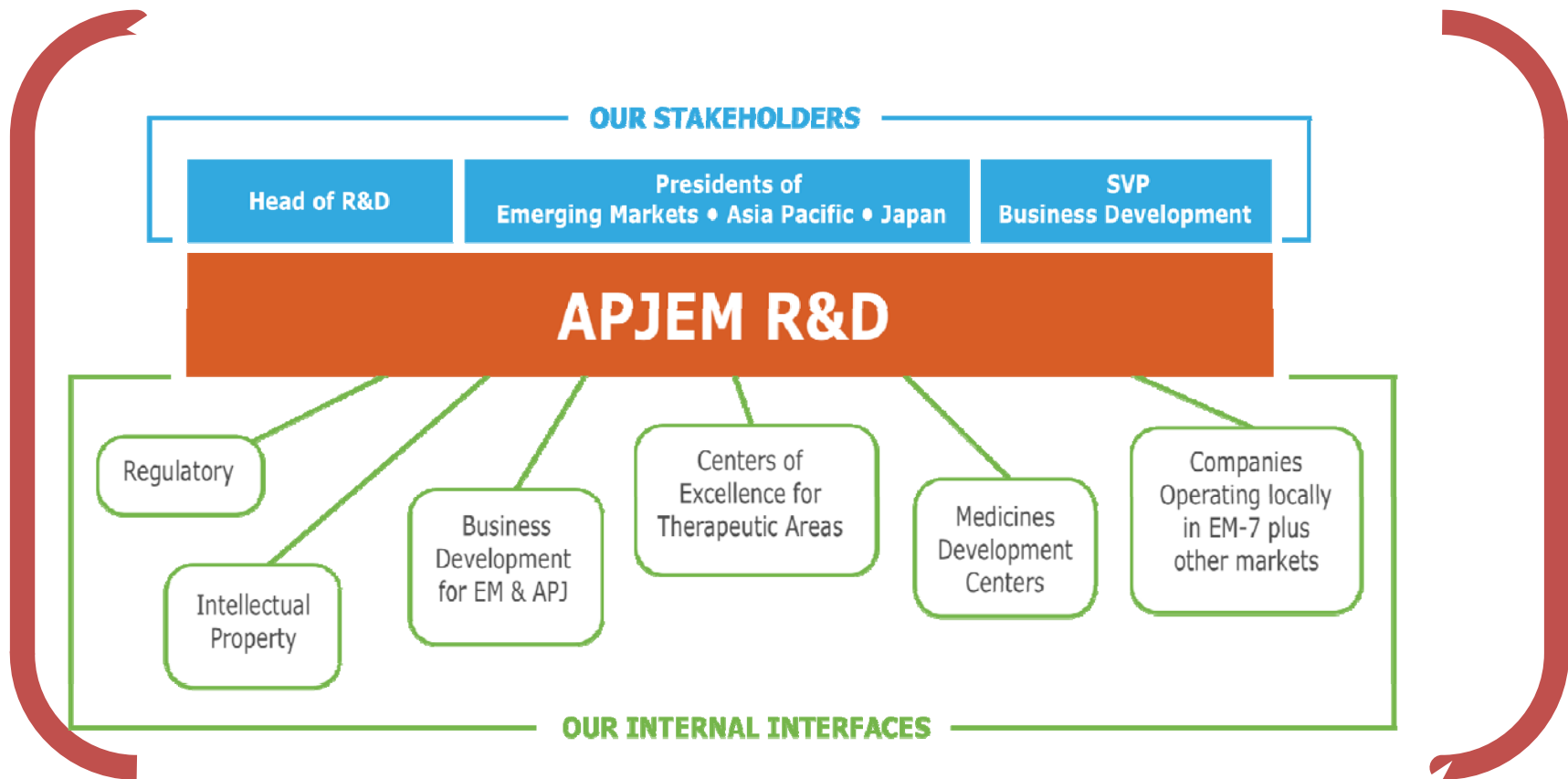
The EM R&D Approach

The EM R&D Approach

- EM R&D vision:
- To bring the world's best knowledge and expertise together to develop valued medicines for patients in emerging markets.

The EM R&D Approach

- A focused approach at the intersection of R&D and commercial.

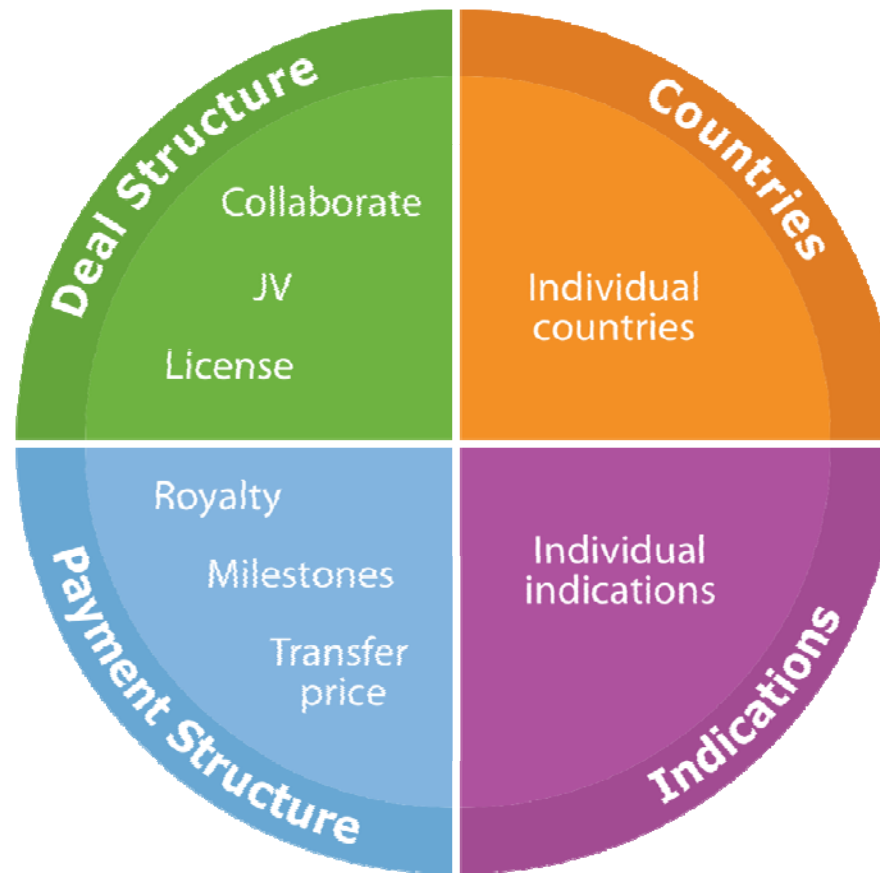


The EM R&D Team

- Truly a Multi-Disciplinary Team, consists of:
 - Senior Business Development Leaders
 - Senior Clinical Development Leaders
 - Senior Product Development Leaders
 - Senior Commercial Leaders
 - Senior Regulatory Experts
 - Senior Physicians
- One stop shop of Development Experts with one focus: Develop an Emerging Markets Pipeline and just focus on these markets –NOT USA or Europe
- Fluid organisation, allows the ‘gospel to be spread’

The EM R&D Approach

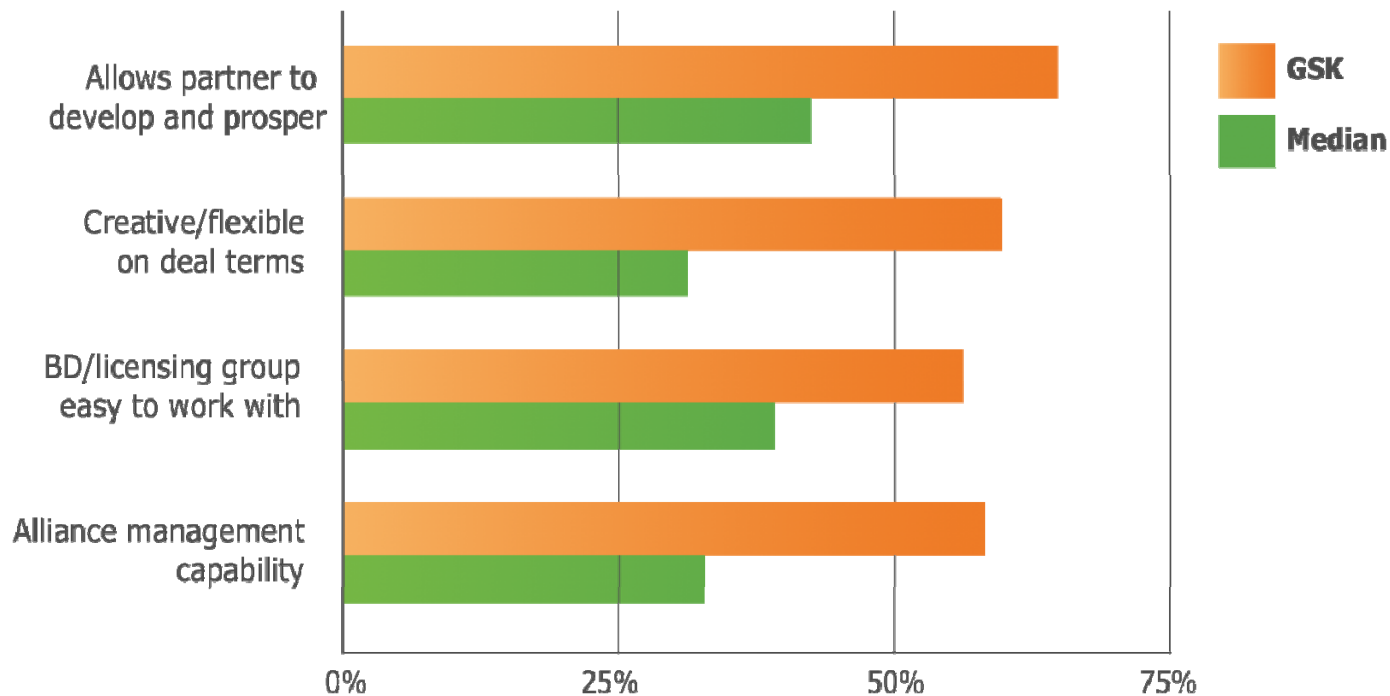
- A flexible approach to fostering new opportunities.
- In house development AND external business development



Looking at Partnership Opportunities

- GSK leads in important partnering attributes.

Best-in-Class Attributes from BCG Licensing Survey



Source: BCG Survey 2008. Note: scores calculated as % respondents who agree with statements associated with each company; Median, high and low scores calculated across core set of companies only

The Partnership Advantage

- Current partners in emerging markets and Japan.

AMGEN[®]

 **DR. REDDY'S**

KISSEI


Mitsubishi Tanabe Pharma

sanofi aventis
Because health matters.

JT

 **astellas**
Leading Light for Life


Emerging markets

 **Bristol-Myers Squibb**

 **aspen**
HOLDINGS

 **SHIONOGI & CO., LTD.**

 **BIOVAIL**

Unlocking Growth

- An innovative deal structure.
 - GSK
 - Partner with Amgen to sell *denosumab* for the PMO indication in Europe, Australia, New Zealand and Mexico
 - Rights to fully commercialize *denosumab* for all indications (both postmenopausal osteoporosis and oncology) in emerging market territories
 - Amgen
 - Ability to provide *denosumab* to patients in countries where Amgen currently has no presence
 - Ability to choose where and with which indication to partner and where to pursue alone
 - Retaining the flexibility to enter new, emerging markets in the future

Conclusions

- The Emerging Markets are here to stay and they will be important players for many companies and sectors, as will the US and Northern Europe
- However, treating these markets as an 'afterthought' is long gone and in many ways needs to be treated as standalone regions and markets
- Requires new ways of working and 'thinking' as we have spent the last 30 years thinking US than Europe and than the Rest of the World
- Change takes time

Jugaad



Jugaad literally means an arrangement or a work around, which has to be used because of lack of resources.

Jugaad



Jugaad literally means an arrangement or a work around, which has to be used because of lack of resources.