

從國際觀點論台灣新藥創新研發策略及 產學合作機制:以 RSV Vaccine為例

顧曼芹博士 M. Sherry Ku, Ph.D., R.Pharm

Kus_98@yahoo.com

TWi Biotechnology Inc.

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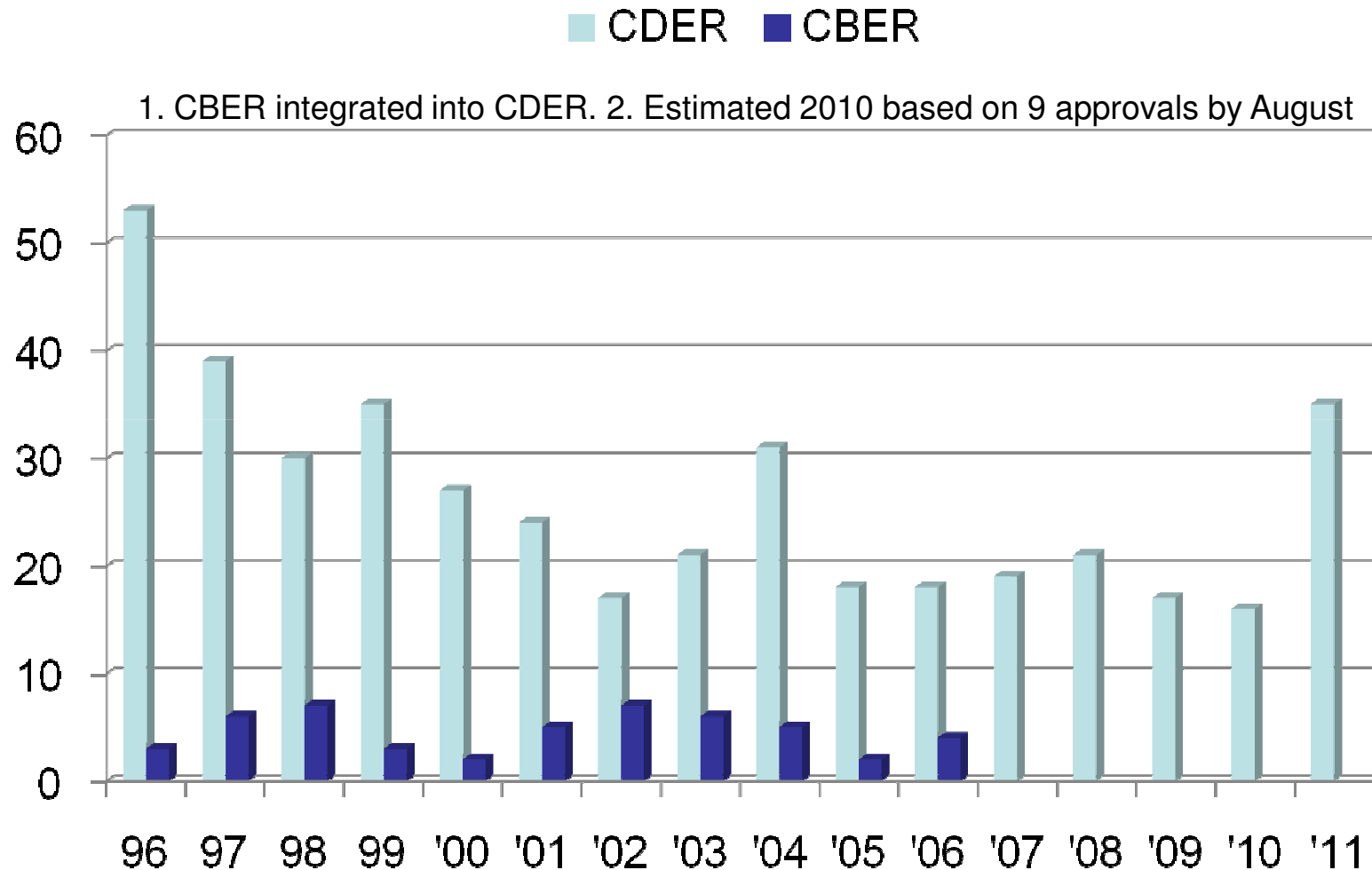
Presentation Outline

- Introduction
- Current US New Drug Trend
- Open Innovation Model
- Unmet Medical Needs
- End-Game Based Project Selection Process
- High Barrier RSV Vaccine
- NHRI-Twi Biotech RSV Strategy
- Q&A

EvaluatePharma® World Preview 2016 Prediction

- ❑ Slower Worldwide Prescription Drug Sales
 - Total \$785bn in 2016;
 - 2.9% (CAGR) over 2009 - 2016;
 - Over \$267bn of Sales at Risk from Patent Expirations 2011-16;
- ❑ Slower Global Pharmaceutical R&D Growth
 - 2.3% CAGR to \$145bn by 2016
 - 2002-2008 10% CAGR,
 - 2009 down 0,9% to 124bn
- ❑ Biotech Products Fail to Overtake Small Molecule within Top 100 Drugs by 2016 partly due to Biosimilar entries

2011 US FDA in Review: A turning point from conservatism on Drug Safety to patient needs???



2011 US FDA 35 NME Approval Mostly from Specialty Pharma on Rare Diseases

- ❑ 13 from Large Pharma, 23 from smaller firms
- ❑ 10 orphan Drugs (patient population < 200,000)
- ❑ 16 Priority Review (Review in 6 Months)
- ❑ 13 Fast Track (Rolling review and Frequent FDA consultation)
- ❑ 3 Accelerated Approval (by pass clinical end point (survival) but surrogate (shrink tumor))
- ❑ 2 with companion diagnostic kits
 - Xalkari ALK NSCLC (Pfizer/Abbott)
 - Zelboraf Braf Melanoma (Genetech)

FDA Draft Guidance, In Vitro Companion Diagnostic Devices, issued on July 14, 2011

2011 US FDA 35 NME Approval Mostly Small Molecules but No nanoparticles

- 27 Small molecules, 7 biologicals, 1 polypeptide
- 7 Biologicals including 1 vaccines and 1 diagnostic
- 7 Cancer drugs (3 Kinase, 2 Mab, 2 NCE)
- 3 antiviral 2 antibiotics 1 head lice
- 2 imaging agent, 1 cosmetic agent
- 2 DPI 1 prodrug

Drug delivery



Why even the most efficacious therapy do not have 100% response rate

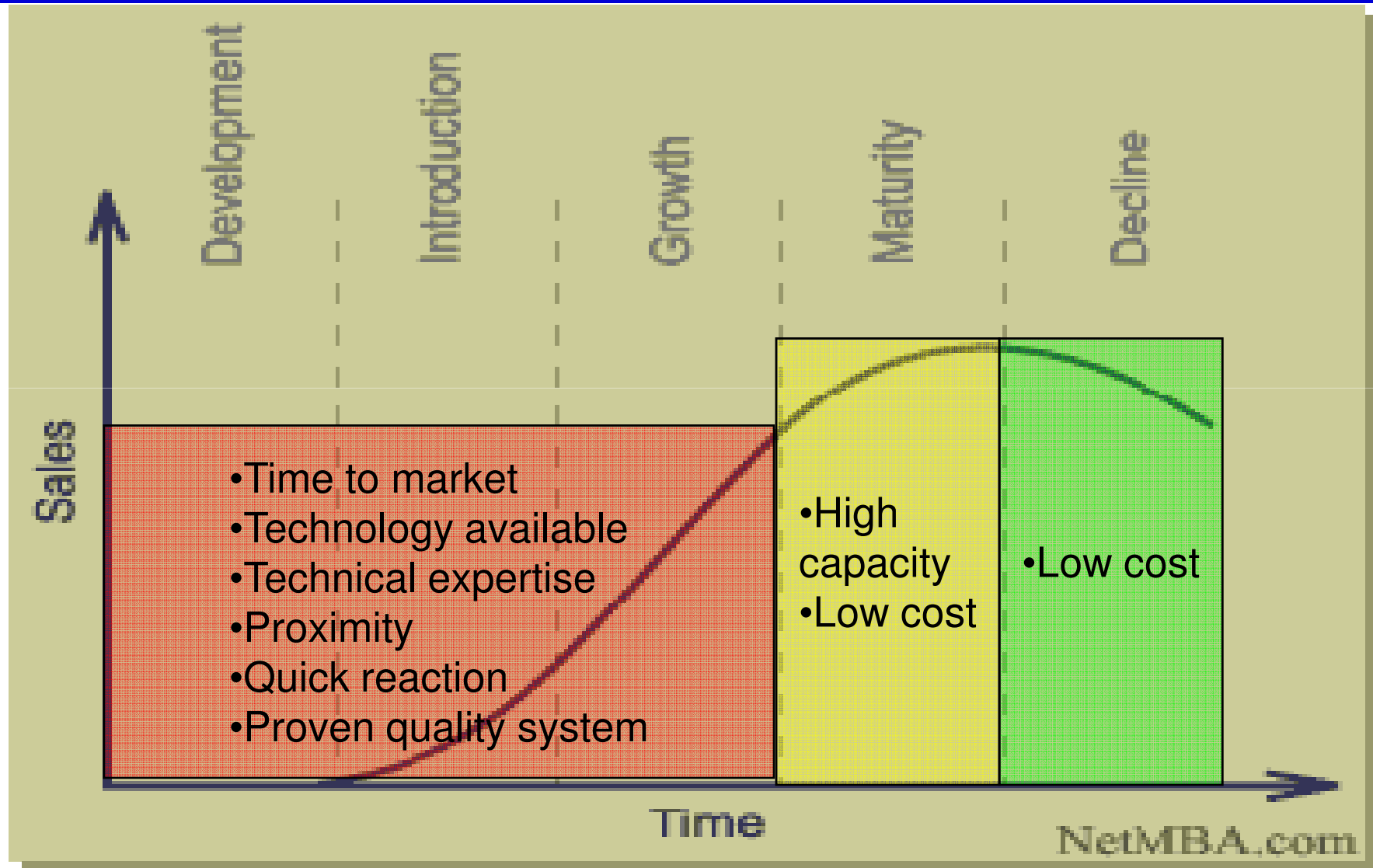
Ref: Spear et al Clinical applications of pharmacogenetics. Trends in Mol. Med. 7;201-204,2001

Therapeutic Area / Indication	Efficacy Rate (%)
Alzheimer's Disease	30
Analgesics (Cox-2 Inhibitors)	80
Asthma	60
Cardiac Arrhythmias	60
Depression (SSRI)	62
Diabetes	57
HCV	47
Incontinence	40
Migraine (acute)	52
Oncology	25
Osteoporosis	48
Rheumatoid Arthritis	50
Schizophrenia	60

Open Innovation Model

Product Life Cycle Curve

Determination of Net Present Value



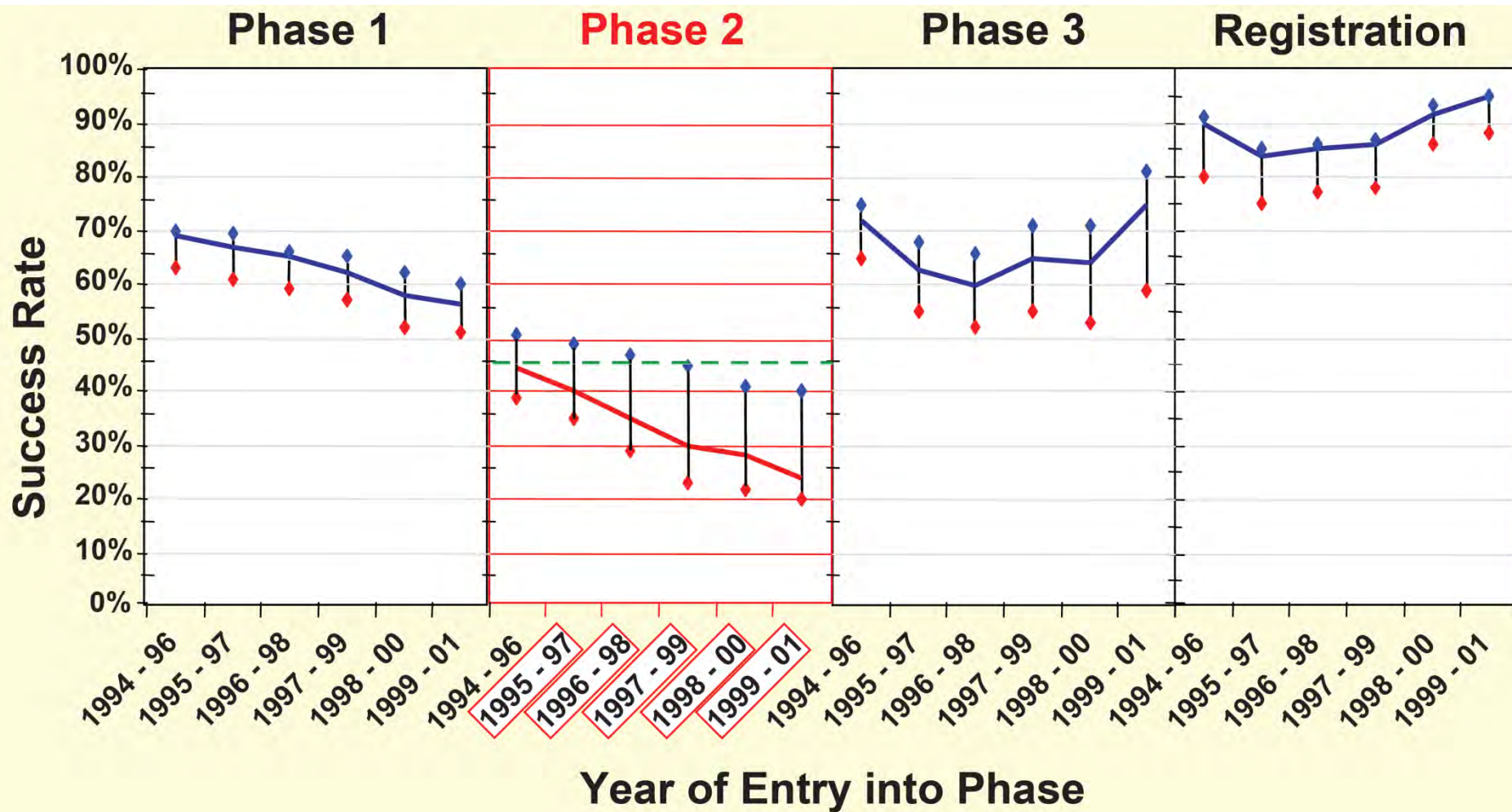
Product-related Deals by Stage of Development



Source: MedTRACK, pulled 2/5, 2010

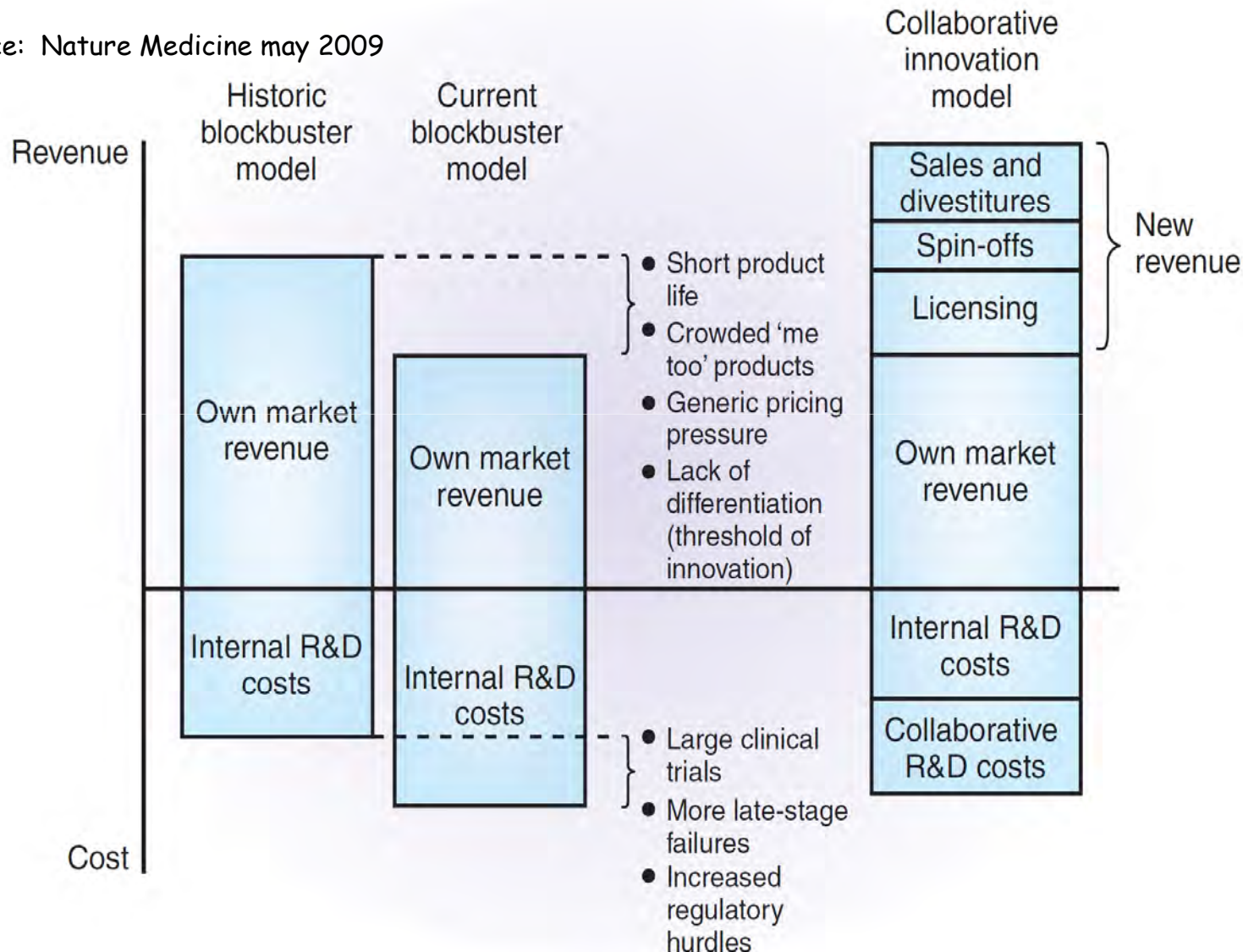
Phase 2 Attrition due to Lack of Efficacy

Create Opportunity for In-Licensing of Phase 2 POC Compounds



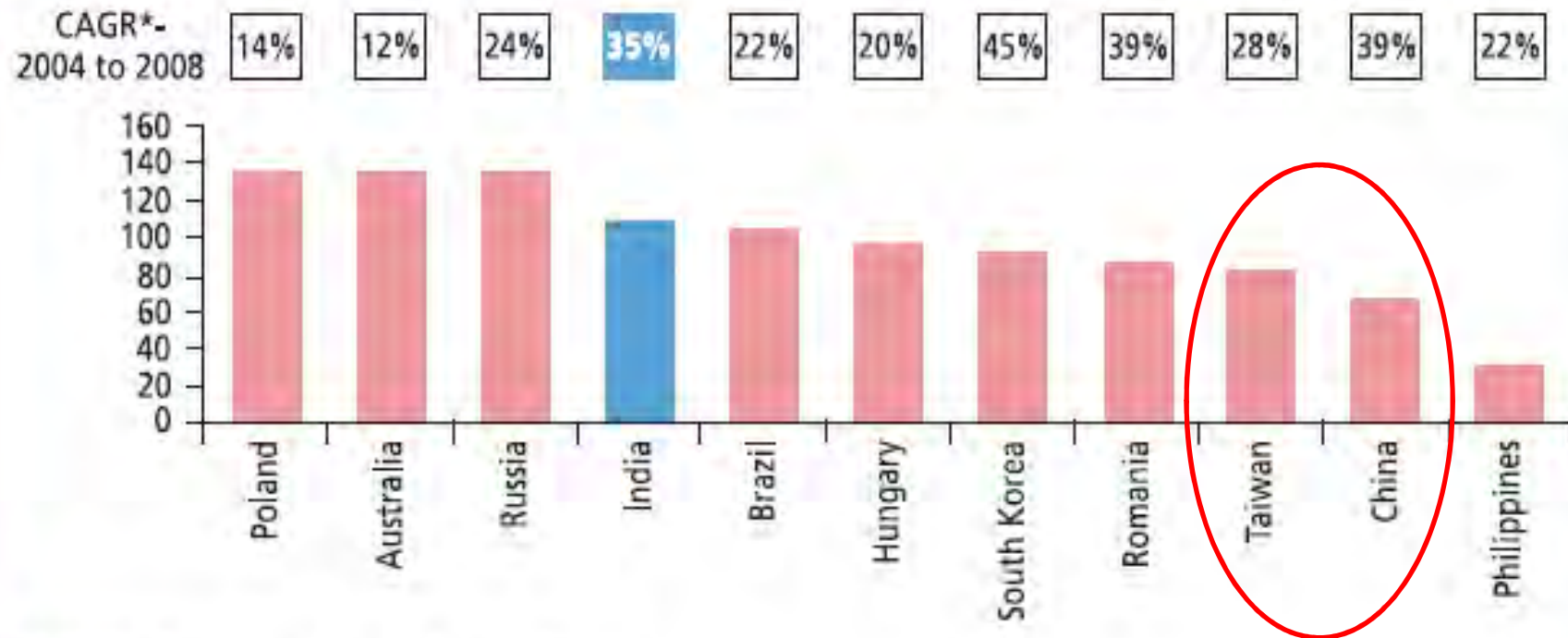
Big Pharma's Collaborative Open Innovation Model

Source: Nature Medicine may 2009



Principal Investigators in US IND are 41% from foreign countries in 2007

Number of Phase III Trials Started in 2008



*CAGR=Compound annual growth rate

Source: www.clinicaltrials.gov.

Murray M. Lumpkin, FDA Deputy Commissioner of international Programs "Within the next 3 years, upto 65% of clinical studies will be conducted outside the US." 35% remains in US.

Project Selection based on Unmet Medical Needs

Cardiovascular disease has been treated successfully and few options remain wanted.

Unmet needs

1. Heart Failure drugs
2. Atrial Fibrillation
3. Anti-coagulants
4. Anti-platelet agents

No interest

1. Fibrates
2. PPAR
3. ACE inhibitors
4. B-blockers
5. Adrenergic agents
6. Heparins
7. Treatment of acute Myocardial Infarction
8. Treatment of restenosis

Why Diabetic Mellitus has many treatment options but remains an area of interest???

Merck is interested in:

1. Liver targeting insulin
2. Non injectable insulin
3. Best in class GLP-1
4. Non-PPAR insulin sensitizer
5. Glucose dependent insulin secretagogue (GDIS)
6. B-cell protection
7. Combine c/Metformin

Merck has no interest in:

1. B-cell transplant
2. Non-GDIS
3. PPAR
4. Any lead with unknown molecular target
5. Neutraceutical

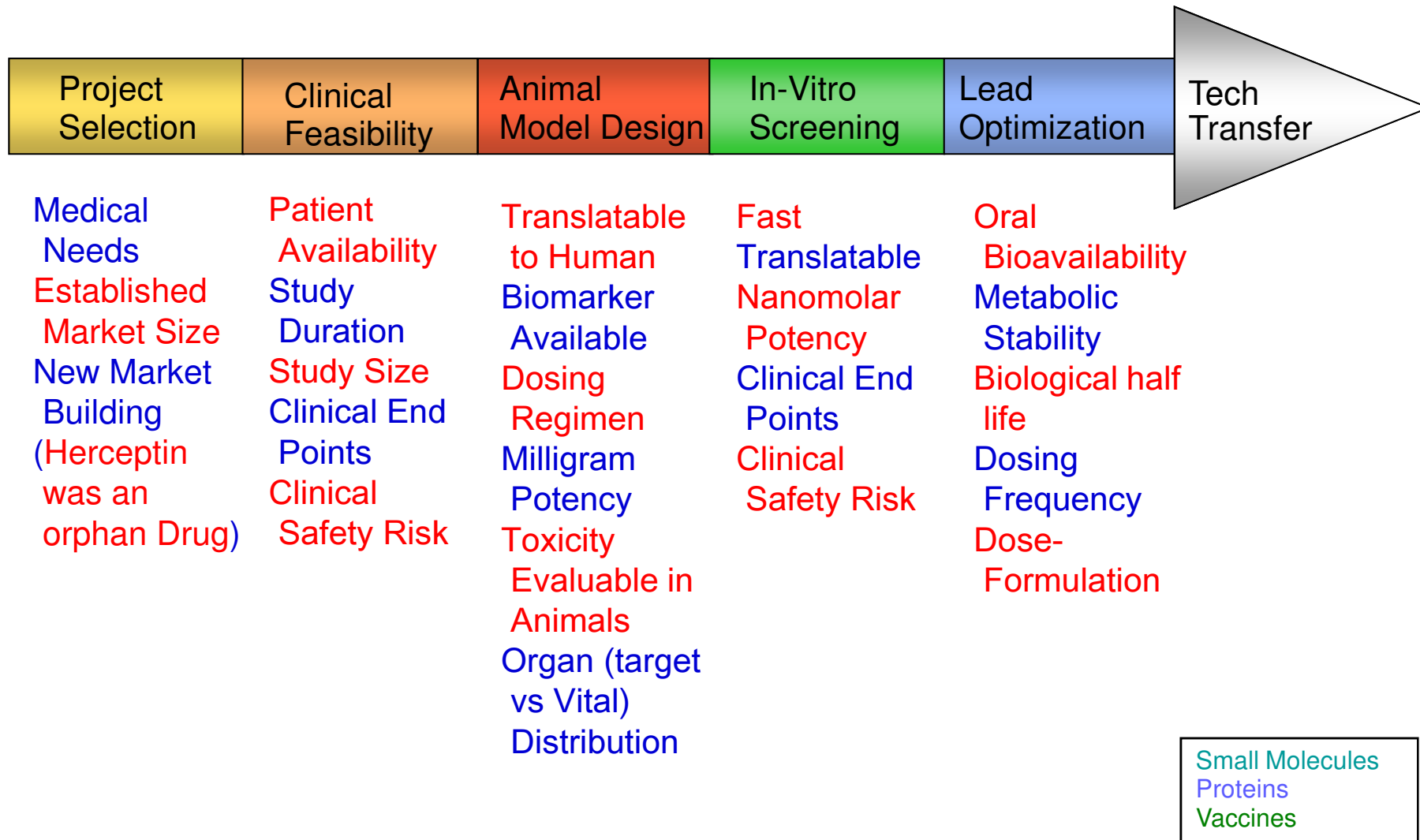
TWi AC-201 meet 4 criteria¹⁶

Project/Target Selection Process

Project Selection Due Diligence

- End Game based
 - Marketable
 - Approvable
 - Clinical Study Feasible
- Animal Model based on Medical Practice
- Market protection by IP or Trade secret or Contracts
- Move toward Individualized Medicine for a subset of population

End-Game Project Selection Process



RSV Vaccine Story