Biotechnology*: Introduction*

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ALTEOGEN Inc.

Biotechnology- *Application*

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Biotechnology products

➢ Recombinant Bio drug

- **Cytokines, Hormones, etc**

By use of recombinant technology, cytokines, hormones (hGH, EPO, etc) are artificially produced in Bacteria or Animal cells

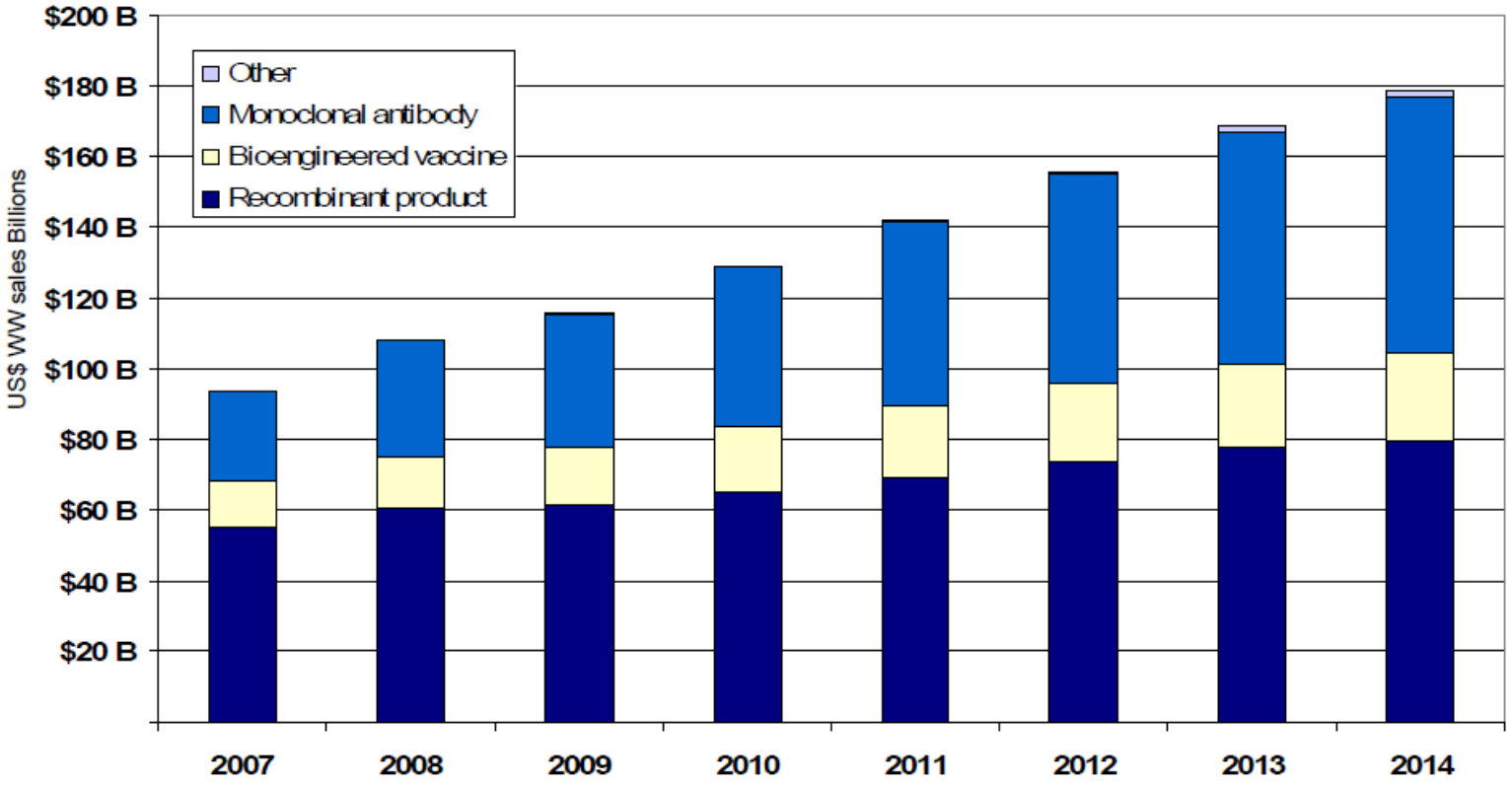
- **Monoclonal Antibody drug**

Man-made antibody is injected to block ligand-receptor interaction

➢ Vaccine

Antigen is injected in order to induce immune protection

The Market For Biologics…
Is Growing And Attractive



**Source: Biologics Insight Briefing | Defined Health | Feb. 2009*

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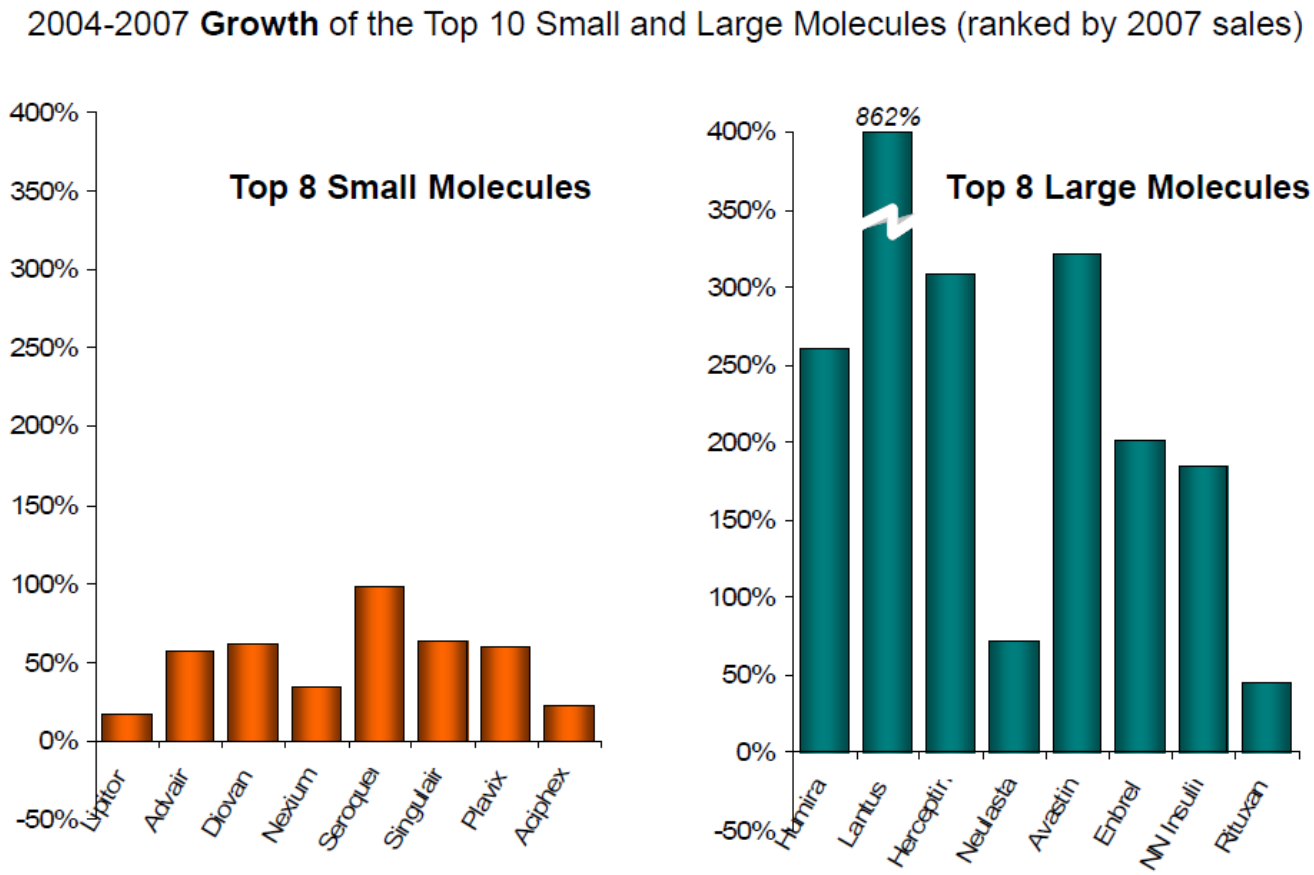
As That Is Where The Exponential Growth Is…



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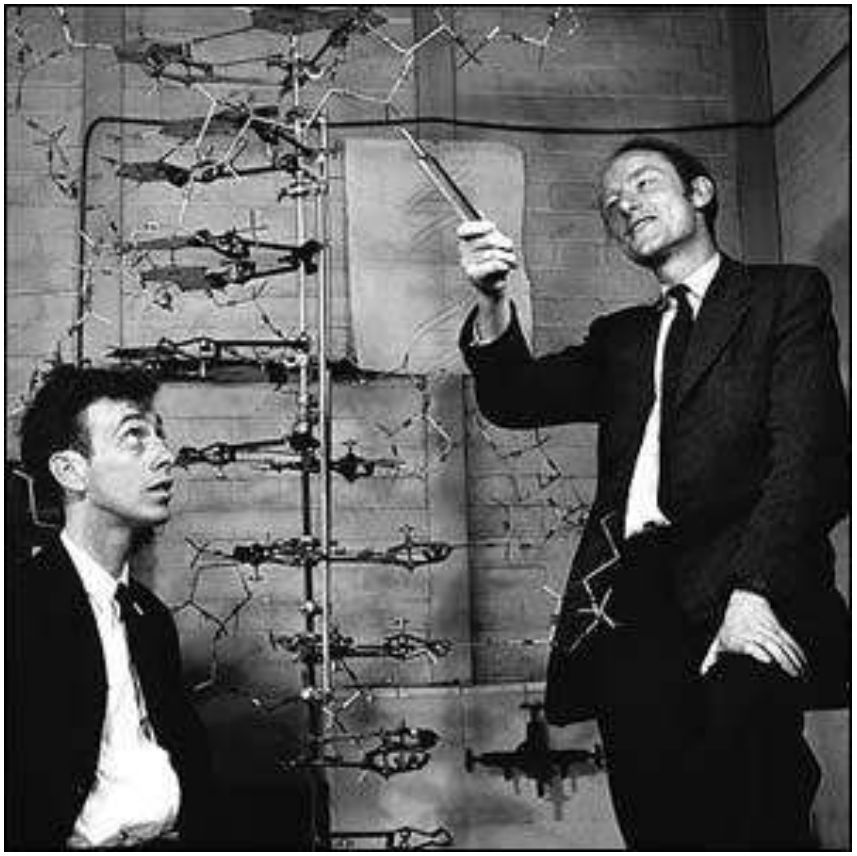
History Of Biotechnology

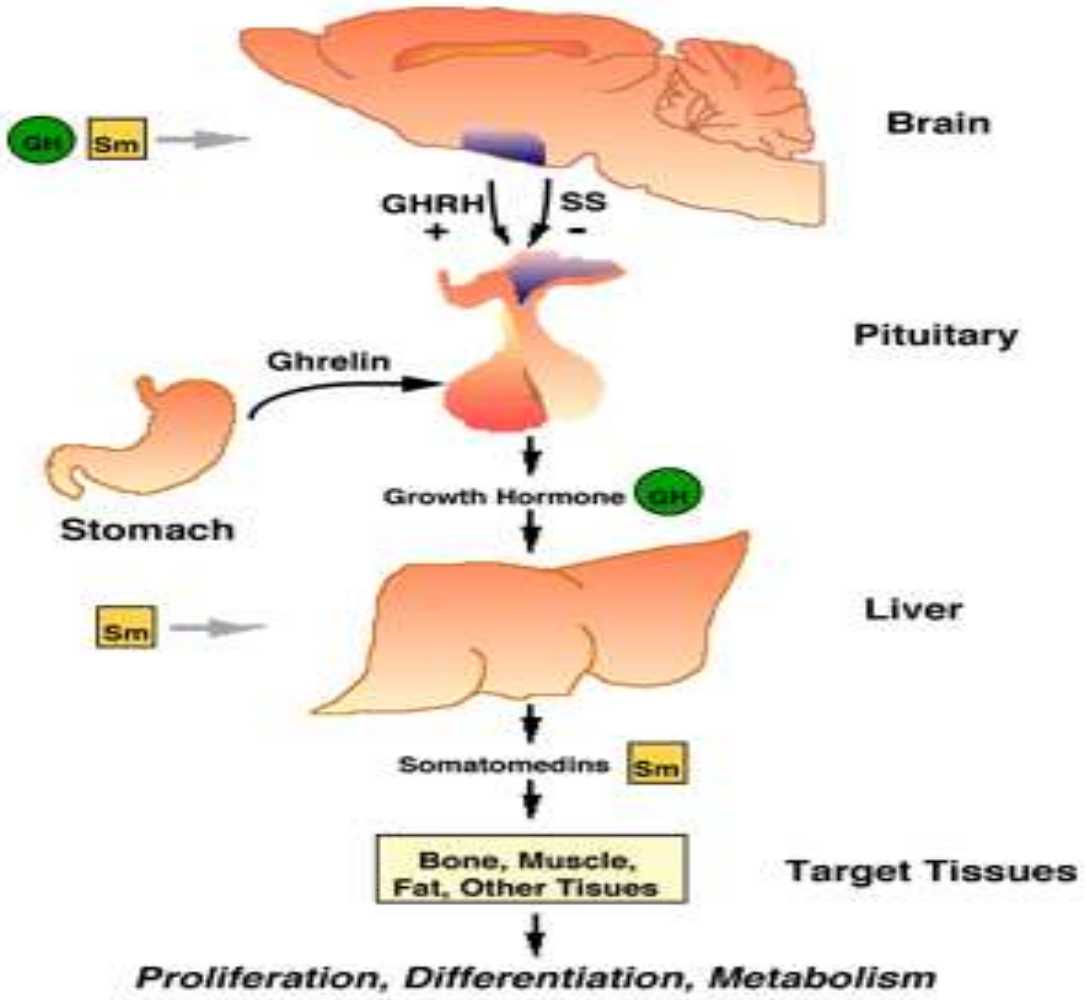


1953: James Watson & Francis Crick

1972: Stanley Cohen & Herbert Boyer

The Creation of Genentech - *1977*

Human Growth Hormone



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Two sides of growth hormone

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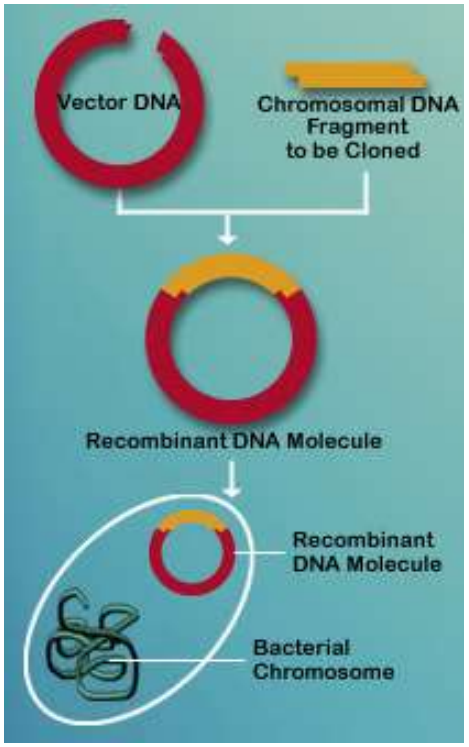
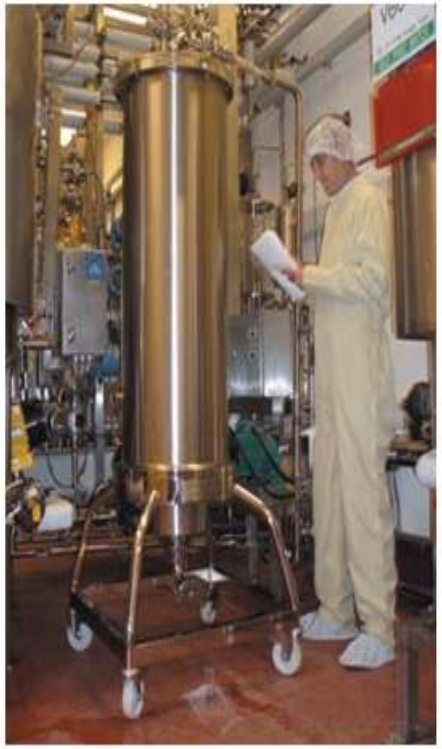
Production of Recombinant Bio drug





(Cloning) (Fermentation) (Purification) (Fill &Finish)

Value Chain of Bio Drug development

- Vector Selection
- MCB
- WCB

- Medium Selection
- Fermentation Optimization

- Purification Determination
- Protein Characterization
- Sugar Characterization
- Formulation
- Fill & finish Technology

- Toxicology
- PK, PD (Small animal Monkey)
- Pharmacology

- Clinical trial ph Ⅰ, Ph Ⅱ phⅢ

- Regulatory Affairs
- MKT & sales

6 ~ 8 years

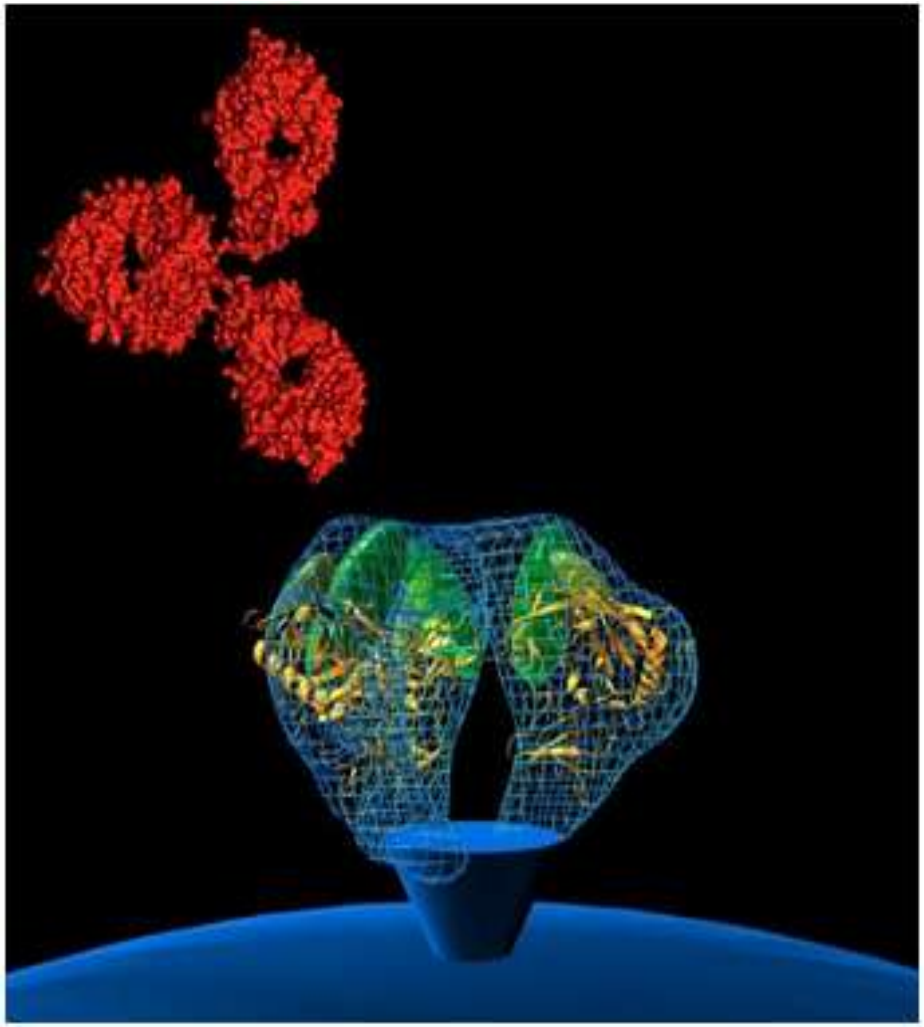
Approved Biopharmaceuticals

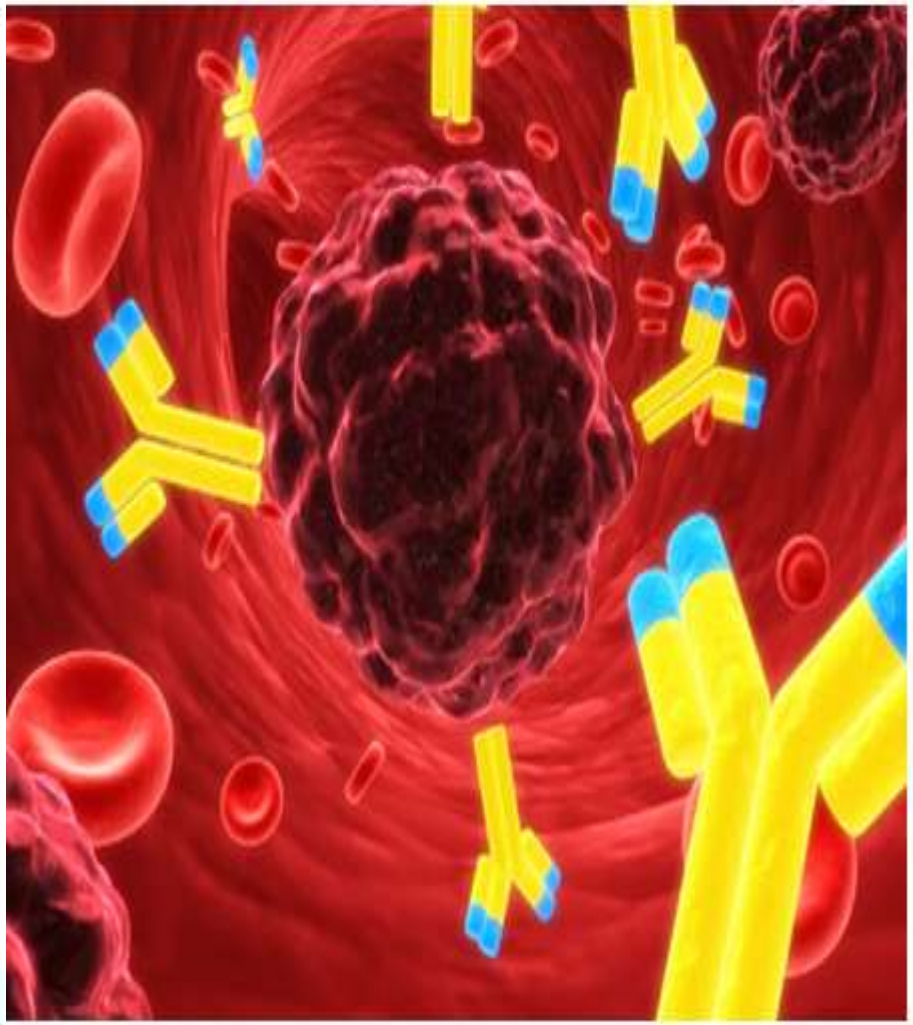
➢ Over 140 therapeutic proteins and peptides approved by FDA

> More than 20 MAb's
> Only 2 MAb's before 1997

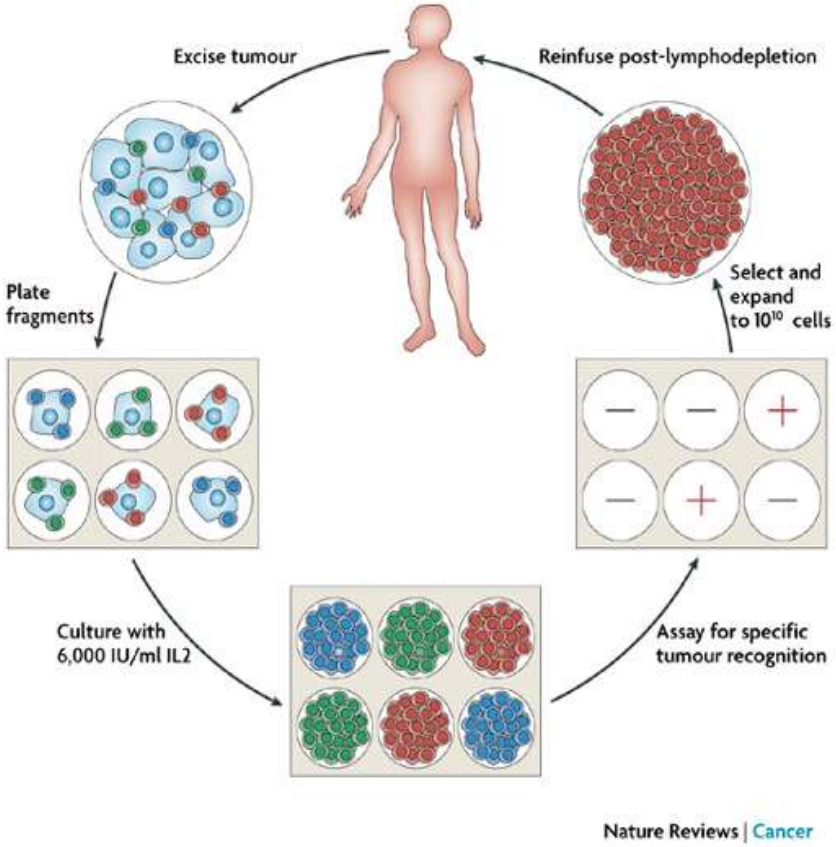
➢ 20 Top-selling Biopharmaceuticals
> EPO
> Insulin
> Interferons
> TNF blockers
> 6 MAb's

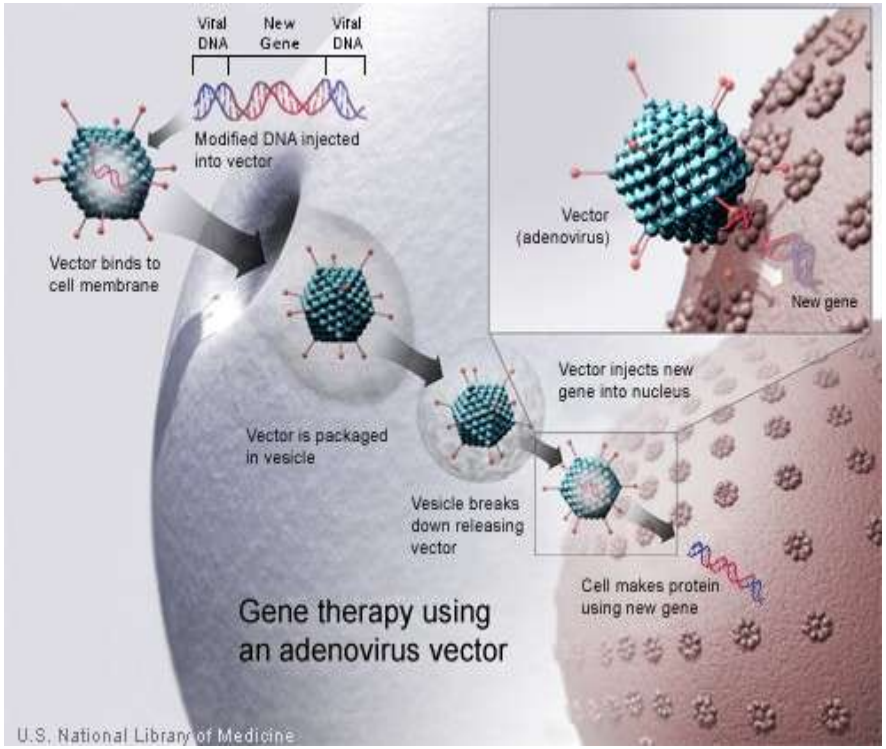
Monoclonal Antibody / Vaccine





Gene Therapy & Cell Therapy





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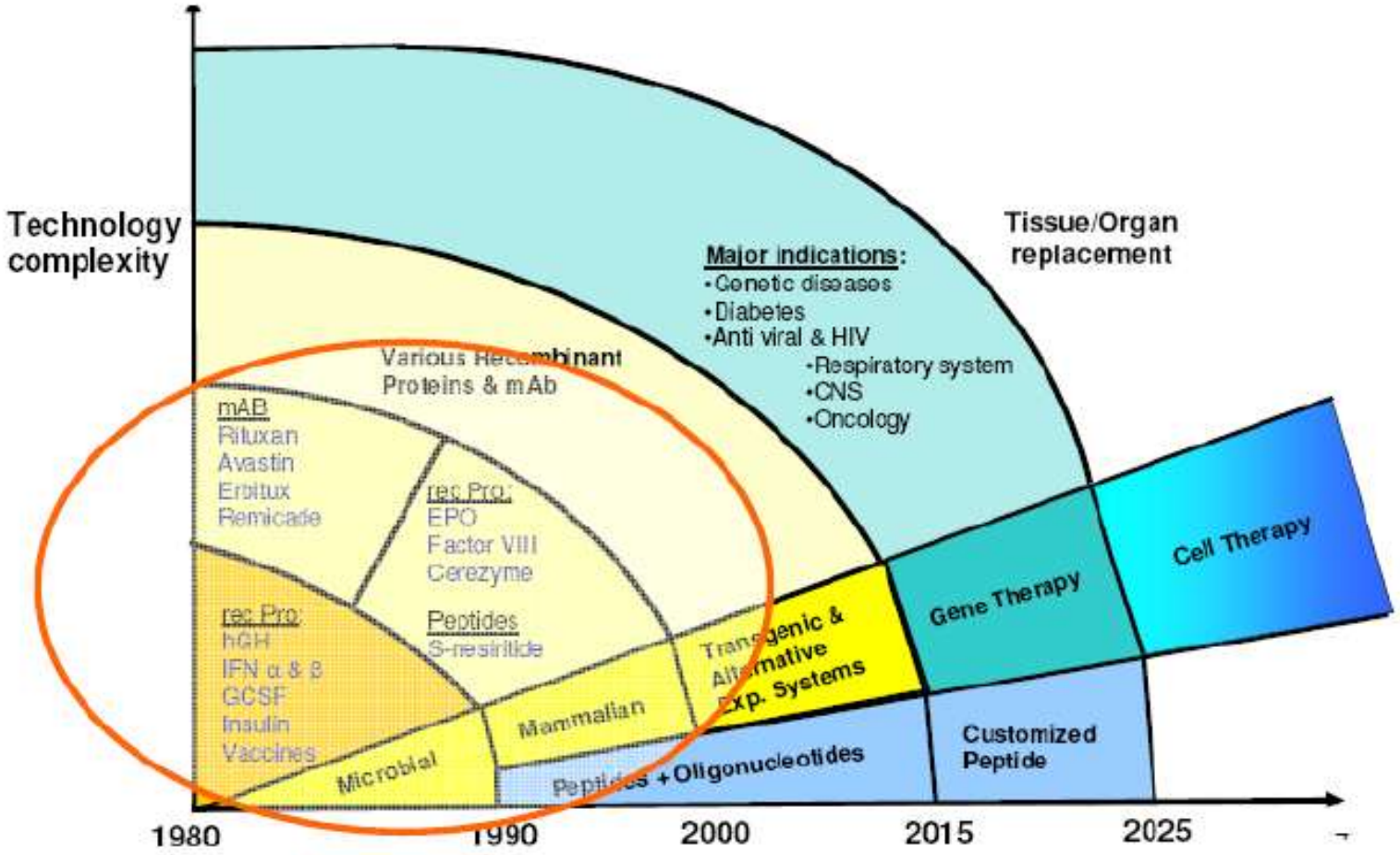
A Trend Towards Biological Pharmaceuticals



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Biosimilars (Follow-on Biologics)

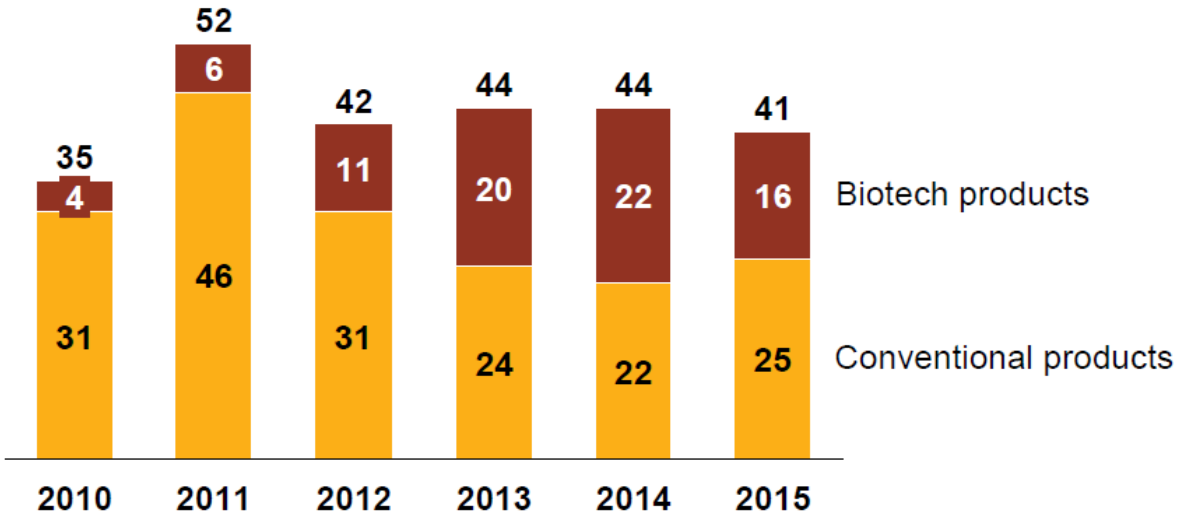
are new versions of existing biopharmaceuticals whose patents have expired. They are produced using the same core genetic material and are approved on the basis that they are equal to the reference product in terms of both *safety* and *efficacy*.

Global Players on Biosimilars

Good News for Biosimilars

Patent expiries will drive growth of biosimilars

Annual sales[1] of expiring products in year of US patent expiry, in USD bn



- Among key biotech products losing exclusivity: Recombinant insulins, beta interferons, trastuzumab, rituximab, infliximab and etanercept
- Biotech products approaching 50% of FDA approvals

[1] *Source: worldwide sales of expiries based on Evaluate Pharma and internal estimates 2007*

**Source: Sandoz Day | Hannes Teissl | Sep. 2008*

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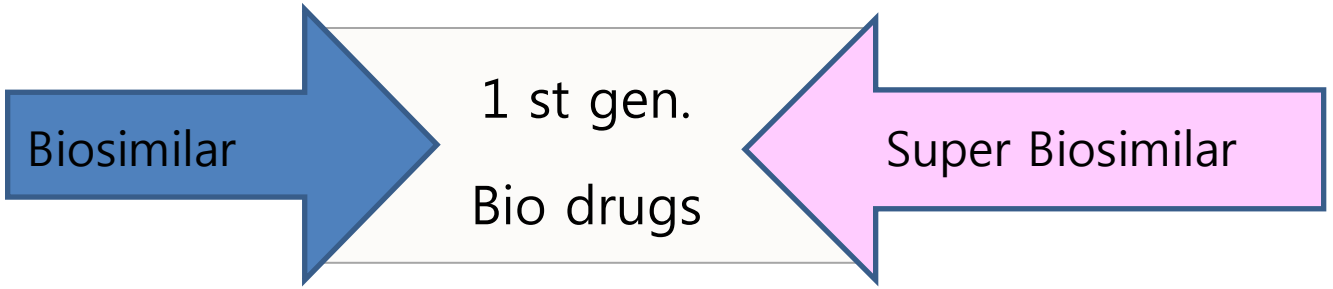
Super-Biosimilar (Bio better)



<Long acting technology>

Increased in vivo half life
Maintaining activity
Low immunogenicity

Less frequent injection
Low side effect

Aranesp (darbepoetin alfa) AMGEN	Neulasta (pegfilgrastim) AMGEN	LANTUS insulin glargine [rDNA origin] injection sanofi aventis	PEGASYS (Peginterferon alfa-2a) Roche
$4.1 B	$2.7 B	$1.8 B	$1.2 B
2001	2002	2000	2002

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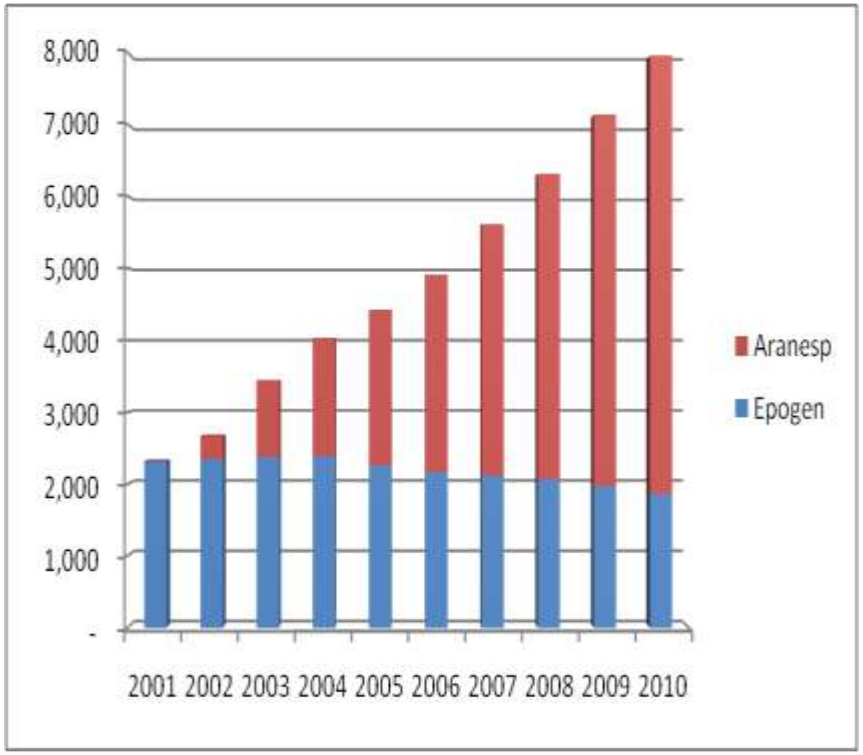
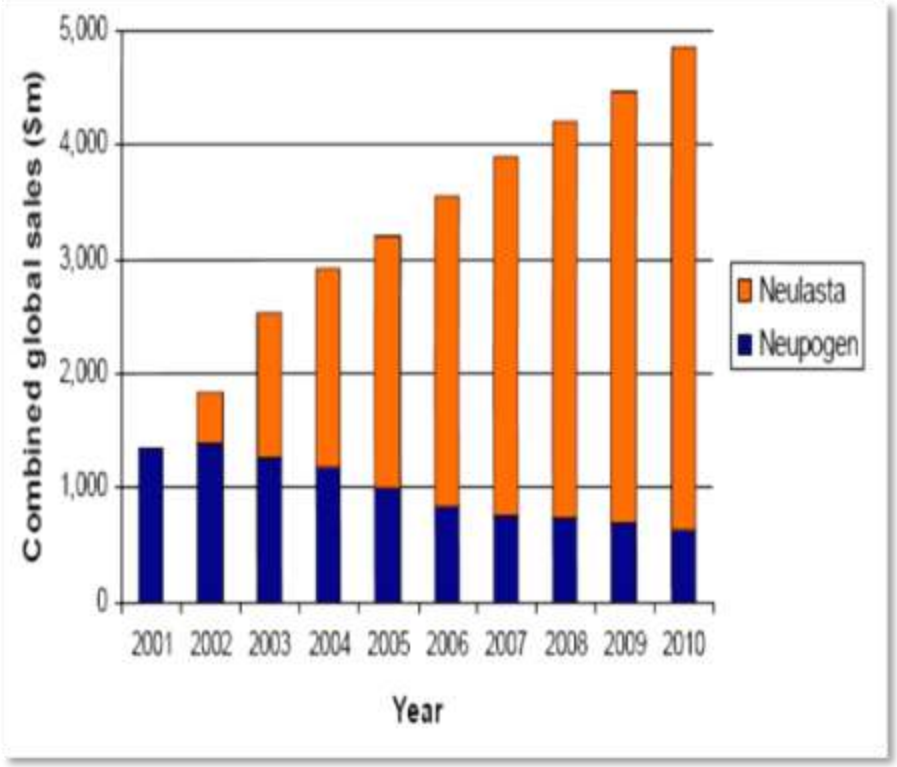
Market is moving toward to Bio-better



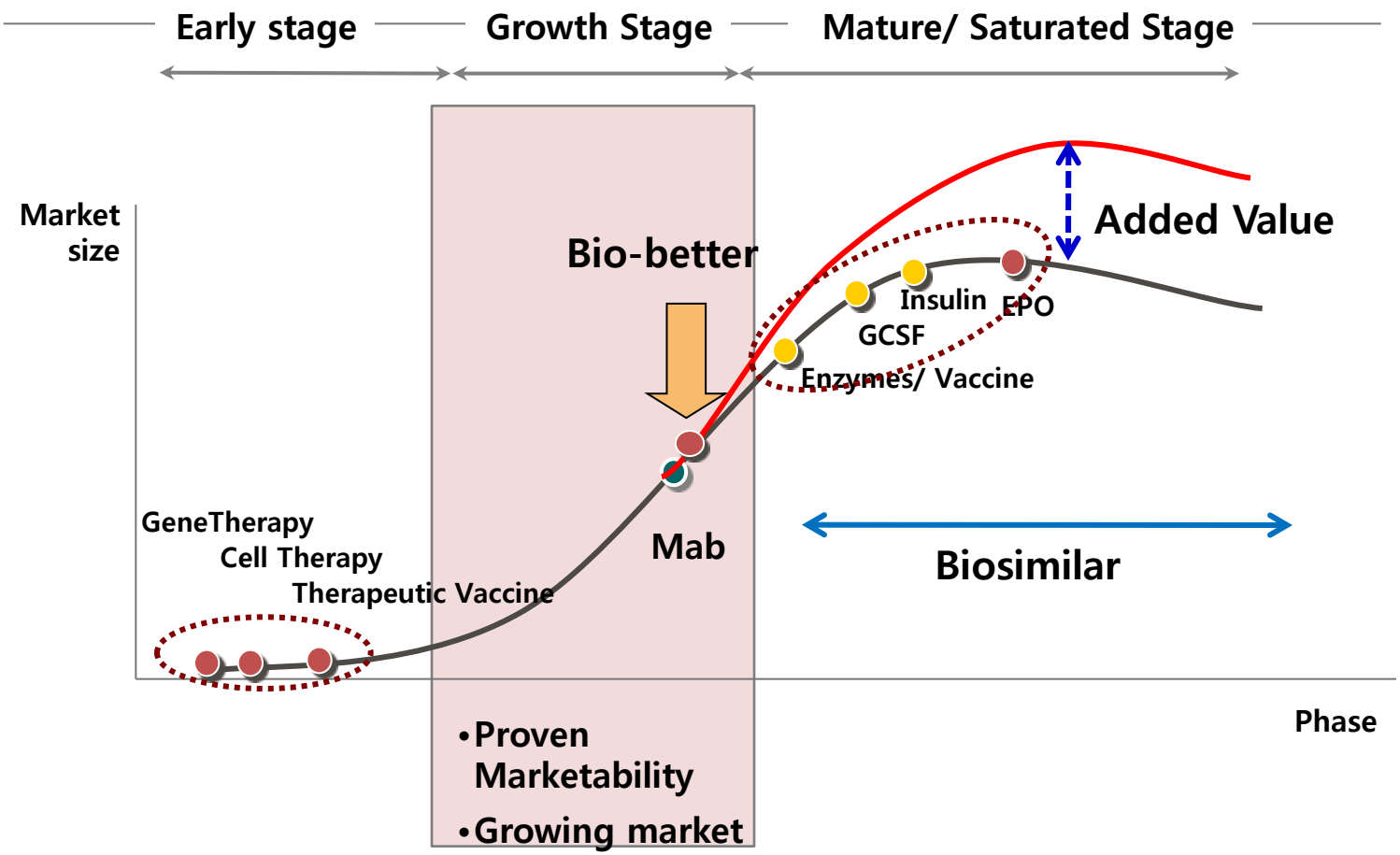


Aranesp (Glyco-EPO; long acting EPO)
Epogen (EPO, 1st generation)

Neulasta (PEG-GCSF; long-acting GCSF)
Neupogen (GCSF, 1st generation)

Source: Datamonitor 2008

Life Cycle of Bio Drugs – *as of today -*



Thank you !

Alteogen Inc – *Biosimilar & Biobetter*