

A woman with blonde hair is looking intently at a molecular model she is holding in her hand. The model consists of black, white, blue, red, and purple spheres connected by white rods. The background is a soft, out-of-focus grey. A dark blue ribbon-like graphic element flows across the top and bottom of the image.

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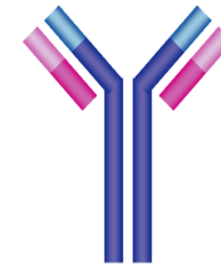
Biotech Concerto #4

Executive Primer on Monoclonal Antibodies

December 2008

- What are Monoclonal Antibodies
- Recent Monoclonal Antibody Deals
- Major Marketed Monoclonal Antibody Drugs
- CAGR of Monoclonal Antibody Market
- Monoclonal Antibodies' Insulation from Generic Competition Monoclonal Antibody Deals

- Antibodies are proteins which are found in blood or other body fluids and are used by the immune system to identify and neutralize “foreign objects”, such as bacteria and viruses.
- Antibodies contribute to immunity in three main ways:
 - they can prevent infectious agents from entering or damaging cells
 - they can stimulate removal of a infectious agents, and
 - they can trigger direct destruction of infectious agents.
- *Monoclonal antibodies (mAb) are antibodies that are identical because they are produced by one type of immune cell that are all clones (i.e. exact replicas) of a single parent cell.*
- Monoclonal antibody therapy is the use of monoclonal antibodies to specifically target cells. Monoclonal antibody therapy is employed to treat diseases such as rheumatoid arthritis, multiple sclerosis, psoriasis, and many forms of cancer.
- The main objective of monoclonal antibody therapy is stimulating the patient's immune system to attack, in case of cancer, the tumor cells and the prevention of tumor growth by blocking specific receptors (binding items).



Typical Structure

Source: Wikipedia, adapted

Recent mAb Deals (Examples)

Partner A	Partner B	Deal
AstraZeneca	Cambridge Antibody Technologies	Acquisition: USD 1.3 bn
AstraZeneca	MedImmune	Acquisition: USD 15.6 bn
AstraZeneca	Regeneron	Collaboration: USD 120 mn
Biogen Idec	Neurimmune	Collaboration: USD 380 mn
GlaxoSmithKline	Domantis	Acquisition: GBP 230 mn
Novartis	MorphoSys	Collaboration: USD 1 bn

Source: FierceBiotech

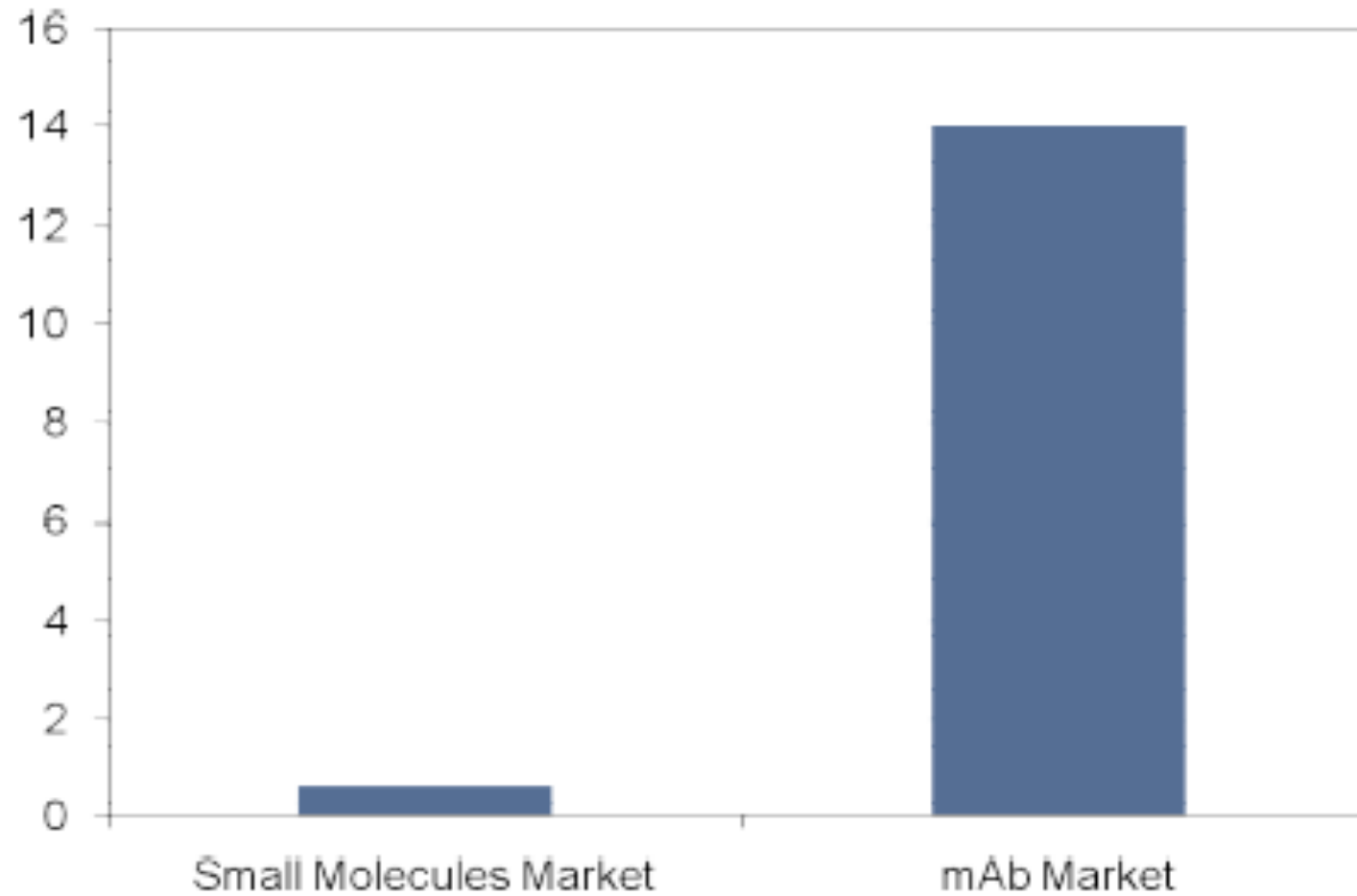
Major Marketed mAb Drugs (Examples)

Drug	Company	Indication (Examples)	Sales (2007)
Avastin	Genentech/Roche	<ul style="list-style-type: none">• Colorectal Cancer	3.4 bn
Erbix	Merck-Serono/BMS	<ul style="list-style-type: none">• Colorectal Cancer	1.3 bn
Herceptin	Genentech/Roche	<ul style="list-style-type: none">• Breast Cancer	4 bn
Humira	Abbot	<ul style="list-style-type: none">• Rheumatoid Arthritis• Crohn's Disease	3 bn
Remicade	J&J/Schering-Plough	<ul style="list-style-type: none">• Psoriasis• Crohn's Disease	4.9 bn
Rituxan	Genentech/Roche	<ul style="list-style-type: none">• Non-Hodgkin's Lymphoma	4.6 bn

Source: Nigel Darby, GE Healthcare Life Sciences

Compound Annual Growth Rate of mAb Market

CAGR (%)
2006 - 2012



Source: FierceBiotech / Datamonitor

- In terms of the wider pharmaceutical market, it is clear that the key factor influencing sales growth over the period 2006-2012 is generic competition.
- In contrast, mAb products will remain completely insulated from the threat of generic competition over 2012, a trend owed to robust patent protection and a lack of a regulatory pathway suitable to support biosimilar mAb approvals and launches.
- In addition to occupying a sector of the market that is insulated from generic competition, mAbs have the advantage of primarily addressing high unmet need therapy areas such as oncology and arthritis, inflammation and immune disorders.
- With their insulation from the negative force of generic competition combined with high exposure to the twin positive forces of high unmet need and novel target space, mAbs are expected to continue to be a fast growing product type.

Source: FierceBiotech / Datamonitor, adapted

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