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HEALTH CARE
Biotechnology

February 27, 2003
Industry Report
(03-010)

BGEN $34.88
Market Perform
Core Growth

BSTE $31.11
Outperform
Core Growth

CRA $8.22
Outperform
Aggressive Growth

DNA $35.15
Market Perform
Established Growth

IVGN $29.83
Market Perform
Core Growth

SGMO $2.86
Market Perform
Aggressive Growth

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Valuing Therapeutic Antibodies

In Our View, Market Valuations Are In Line With Modest Historical Success Rates—Upside Possible With Anticipated Improvements

Measurable value exists in the promising therapeutic antibody sector. Based on our valuation methodology and analysis of the therapeutic antibody (tAb)—specifically monoclonal antibody (mAb)—sector and the roughly 360 antibody programs in development, we believe that biotech companies with innovative platform technologies for generating mAbs plus mAbs in development represent a potential investment opportunity.

Current valuations look reasonable. Our valuation model suggests declining share prices over the past year among therapeutic antibody platform companies, and in the biotech sector in general, have brought market valuations of several platform companies (not under coverage) more in line with intrinsic values, including Cambridge Antibody Technology Group plc, Medarex, Inc., and Protein Design Labs, Inc.

Fundamental improvements could create additional value for risk-tolerant investors. We believe development, manufacturing, and regulatory improvements could lead to increased success rates and reduced development time lines, which would drive significant valuation growth in the mAb sector over the next several years. However, developmental-stage tAb platform companies currently are unprofitable and additional financing remains scarce. *Therefore, in our view investment is for risk-tolerant investors only.*

Less risk-tolerant investors may participate through established biotech companies. We believe more risk-averse investors can gain some exposure to the potential downstream value of mAbs by investing in established biotech companies such as Genentech, Inc., MedImmune, Inc. (not under coverage), and Biogen, Inc., which leverage the technology of the therapeutic antibody platform companies. Genentech generated 72% of its $2.2 billion in 2002 product sales from two mAbs (Rituxan and Herceptin for cancer), is awaiting clearance of two mAbs for which it recently filed BLAs (Xolair and Raptiva), and is currently conducting late-stage clinical trials for one additional mAb and an antibody fragment. Biogen has one mAb, Antegren for Multiple Sclerosis (MS) and Crohn's disease, in Phase III testing and several others in early-stage testing.

Investors also can gain exposure to the therapeutic antibody sector through companies that play ancillary roles. Celera Genomics Group is involved in target discovery, Biosite Incorporated is involved in antibody discovery and target validation, and Invitrogen Corporation and Sangamo BioSciences, Inc. are involved in antibody manufacturing.

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We wish to acknowledge Meredith Gonzales, who contributed to the research and preparation of this report.

Investment Conclusions

Therapeutic Antibodies as a Class Appear Quite Promising

We believe therapeutic antibodies (tAbs), and in particular monoclonal antibodies (mAbs), as a class may represent a more attractive investment opportunity relative to other therapeutic platforms due to several factors that could lead to increasingly strong levels of clinical and commercial success. Antibodies occur naturally in the body of humans and other organisms, which we believe can provide several safety and efficacy advantages in discovering, developing, and manufacturing tAbs. For example, an antibody's ability to attach to a particular target (specificity) naturally in an organism leads to both the generation of the potential therapeutic and the validation of its ability to bind the target in a one-step process, thereby condensing the amount of time and resources required at the early stages of tAb development. In contrast, combinatorial chemistry, which often is employed in the discovery of traditional small-molecule drugs, involves a two-step process in which synthesized molecules must be matched through a trial-and-error process to complementary drug targets.

In addition, typically various antibodies bind to several different regions of a particular target. Thus, by selecting an antibody that binds to a particular region of a target, one can increase both specificity and affinity (binding strength of an antibody to its target). Moreover, we believe the underlying mechanism of binding between an antibody and its target is generally better understood in many cases relative to other therapeutics, which may allow researchers to perform scientifically based modifications to an antibody to optimize its binding affinity, safety and/or efficacy profile.

Because antibodies exist naturally in the body, from a safety standpoint, we believe tAbs have an inherent advantage versus non-naturally occurring therapeutics such as small-molecule synthetic compounds and their metabolites which may exhibit unforeseen toxicity. However, antibodies in large doses, especially those that are not fully human, can invoke immune responses which may neutralize their effect. Since antibodies occur naturally across different mammalian species, the cells of small mammals such as mice can serve as factories for producing tAbs, and advances in recombinant DNA technology have made it possible to generate antibodies from a mouse that consist of 100% human protein and therefore are well-tolerated by patients relative to older mAbs that incorporated mouse DNA. Therefore, although the historical clinical success rates of mAbs as a class are lower than those of the drug industry in total, we believe improvements in the safety and efficacy profiles of mAbs should lead to increased success rates going forward.

Market Valuations Appear More Rational

Our valuation analysis of therapeutic antibodies suggests that declining share prices over the past year among therapeutic antibody platform companies and in the biotech sector in general have brought market valuations more in line with intrinsic values. We view valuation for biotech companies as a function of the clinical success rate (R) times the value of specific therapeutic programs (P) times the number of programs (N). Currently, tAb platform companies appear to be generating a high number of programs (N)—especially preclinically—more than offsetting what appears to be a lower success rate (R). Based on our experience, we assume that the value per program (P) is comparable to other developmental biotech companies.

Fundamental Improvements Are Possible

We believe that improvements in the specific antibodies, as well as the discovery, clinical development, manufacturing, and regulatory functions, could lead to increased success rates and reduced development time lines for mAbs, which would drive significant valuation growth in the sector over the next several years. Specifically, we believe investment upside could result from a combination of the following three factors: 1) improved success rates,

2) increased number of mAbs in development, and 3) improved financial terms from collaborations to originators of mAbs, each of which we discuss in more detail later in the report. For example, as discussed in detail later in the "Discussion of Valuation Analysis," if the success rate improves to industry norms, the valuation of the sector expected revenue increases 47%. In addition, if the number of antibodies in development grows at one-half the historical rate, the sector revenue valuation would grow at 6% annually. Lastly, platform company-specific valuations could increase or decrease $200 million to $300 million depending on early- or late-stage licensing strategies.

In terms of regulatory improvements, Mark McClellan was sworn in as commissioner of the FDA in November 2002. The post had been vacant for nearly two years, which had represented a source of uncertainty in the regulatory review process for new drugs. In addition, the regulatory review functions of the Centers for Biologics Evaluation & Research (CBER), which had previously managed FDA clearance of biological drugs (including mAbs) and often was criticized for being slow and inefficient, are being consolidated with the Center for Drug Evaluation and Research (CDER) to standardize the review process for all therapeutics. Although we believe this move could help expedite the regulatory process for mAbs, we believe it will take 18 to 36 months to complete the transition process and realize meaningful efficiencies that could favorably affect the process of reviewing new biological treatments such as mAbs.

Risks Tolerance Required

In our opinion, lack of investor interest in developmental companies represents the primary investment and fundamental risk. With access to capital thus potentially limited, availability of cash resources to fund product development creates a fundamental risk to tAb platform companies or other developmental-stage antibody companies, such as Abgenix, Applied Molecular Evolution, Cambridge Antibody Technology, Medarex, and Protein Design Labs.

Investment Exposure Through Less Risky Avenues Is Possible

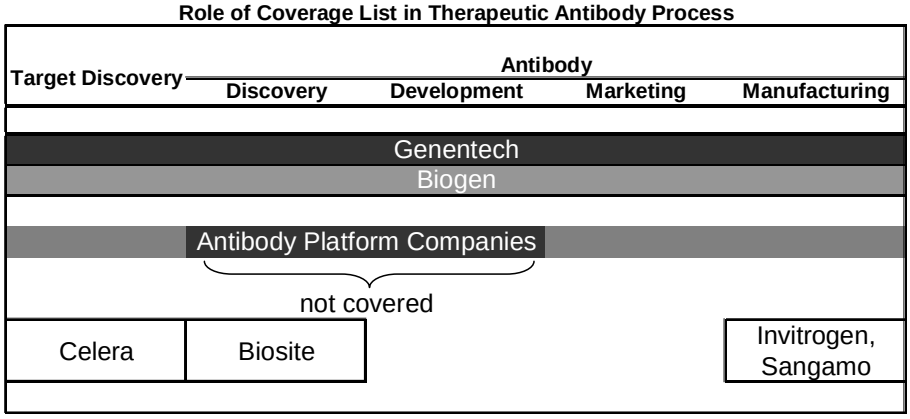
Genentech, Biogen, and Biosite represent less risky investment opportunities, in our opinion, and are poised to capture a significant portion of potential downstream value from tAb technology by taking part in the discovery, development, and commercialization of tAbs through collaborations with developmental-stage companies. For example, Genentech's top two revenue-generating products, Rituxan and Herceptin for cancer, are mAbs, and the company could gain FDA clearance for at least two more, Xolair for asthma and Raptiva for psoriasis, in 2003. Biogen, in collaboration with Elan, is conducting Phase III studies for Antegren, a mAb for treating MS and Crohn's disease; and Biosite is involved in the discovery and optimization of tAbs through several collaborations that potentially could yield significant downstream revenues.

Perspective

During the latter half of 2002, we developed a general method for valuing the pipelines of developmental-stage biotech companies. We applied our valuation model to the specific case of therapeutic antibodies, which, in our opinion, represent a promising class of potential drugs. In particular, we analyzed the pipelines of mAb platform companies that use proprietary technologies (platforms) to generate antibodies to various drug targets. These include Abgenix, Applied Molecular Evolution, Cambridge Antibody Technology, Protein Design Labs, and Medarex. As a result, we believe that tAb technology, a term that encompasses mAbs, mAb fragments, polyclonal antibodies, as well as other emerging therapeutic antibody technologies, should provide a good investment opportunity, given both its clinical and financial potential. The investment opportunity ranges from biotechnology companies that market therapeutic antibodies to platform companies that generate proprietary antibodies, to companies involved in other phases of the business process, such

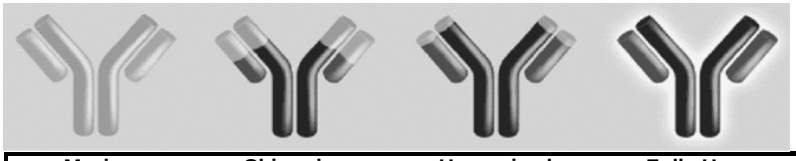
as manufacturing or identification of medically relevant targets for the antibodies, as illustrated in figure 1. Figure 2 categorizes the different classes of mAbs that have been launched or that currently are in development, as well as the different technologies employed by various antibody platform companies.

Figure 1
Role of Coverage List in Therapeutic Antibody Process



Source: William Blair & Company, L.L.C. analysis

Figure 2
Therapeutic Monoclonal Antibody Classes



	Murine	Chimeric	Humanized	Fully Human
	100% Mouse	*66% Human*	*90%-95% Human*	*100% Human*
FDA Approved:	**1**	**4**	**5**	**1**
In Pipeline:	**23**	◄—	**85** —►	**125**
Platforms:			SMART Technology / Directed Evolution	Transgenic Mouse Models / Phage Display
Companies			**PDLI** / **AMEV**	**ABGX, MEDX** / **CATG, MOR**

Note: Pipeline data excludes mAbs in development that have not yet been classified as murine, humanized, chimeric, or human.
Source: Nature Biotechnology; MEDX, PDLI, ABGX, CATG reports; Pharmaprojects; and William Blair & Company, L.L.C. estimates

Through year-end 2002, 11 therapeutic antibodies had been cleared by the FDA, with last-12-months' total revenue of $3 billion, as summarized in table 1 on the following page. While the first mAb was cleared in 1986, the FDA cleared 9 of the 11 antibodies since 1997, as highlighted in figure 3. Moreover, at least two more therapeutic antibodies could be cleared in 2003, both submitted by Genentech at the end of 2002: omalizumab (Xolair for asthma) and efalizumab (Raptiva for psoriasis). As table 1 also shows, two platform companies, Protein Design Labs (4) and Cambridge Antibody Technology (1), receive royalties for cleared and marketed antibodies that use their technology.

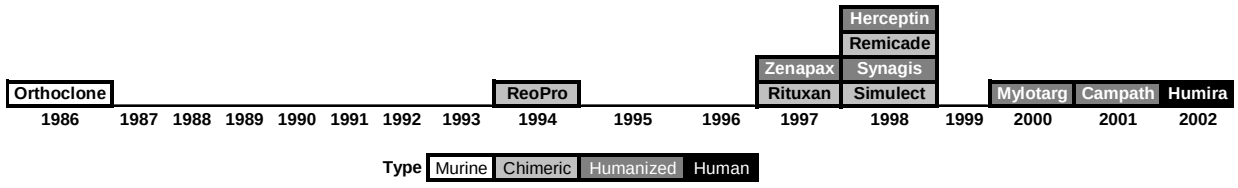
Table 1
Monoclonal Antibodies Approved by FDA
($ in millions)

Trade Name	Generic Name	Sponsor Company	Licensee	Type of mAb	Indication	Approval Date	LTM Revenue
Orthoclone	muronomab	J&J	Ortho Biotech	Murine	Immuno-suppressant	1986	NA
ReoPro	abciximab	J&J/Lilly	SUNY at Stony Brook	Chimeric	Anri-thrombotic	1994	$258
Rituxan	rituximab	Genentech/ Roche/IDEC	IDEC	Chimeric	NHL	1997	$1,163
Zenapax	daclizumab	Roche	***Protein Design Labs***	Humanized	Immuno-suppressant, MS, Cancer	1997	$20
Simulect	basiliximab	Novartis	Ligand (Seragen)	Chimeric	Immuno-suppressant	1998	$85
Synagis	palivizumab	MedImmune	***Protein Design Labs***	Humanized	Anti-infective	1998	$650
Remicade	infliximab	J&J/Schering-Plough	GTC Biotherapeutics	Chimeric	Rheumatoid Arthritis	1998	$379
Herceptin	trastuzumab	Genentech / Roche	***Protein Design Labs***	Humanized	Breast Cancer	1998	$385
Mylotarg	gemtuzumab ozogamicin	Wyeth	***Protein Design Labs***	Humanized	Leukemia	2000	$30
Campath	alemtuzumab	Ilex Oncology/ Schering/ Millennium	British Technology Group (BTG)	Humanized	Cancer, Leukemia, MS	2001	$44
Humira	adalimumab	Abbott	***Cambridge Antibody***	Human	Rheumatoid Arthritis	2001	NA

Total Revenue: $3,014
Average Revenue Per Product: $335
Median Revenue Per Product: $258

Source: Company reports and William Blair & Company, L.L.C. estimates

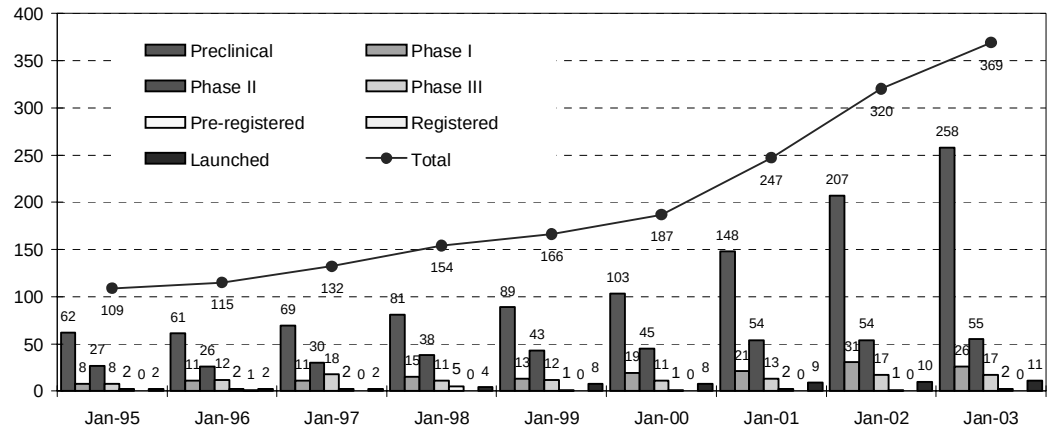
Figure 3
Timeline of Therapeutic Antibodies Approved by FDA



Source: Company reports and William Blair & Company, L.L.C. estimates

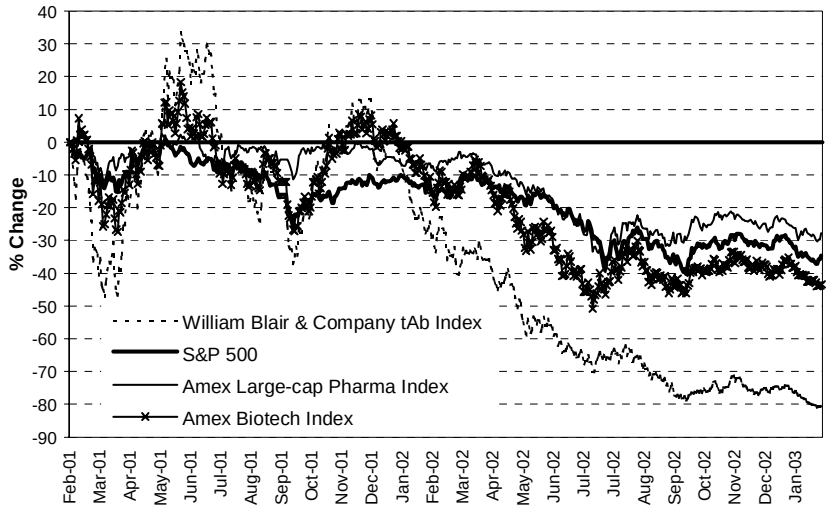
In addition to previous developmental and commercial successes related to tAb technology, three other factors prompted us to begin evaluating this opportunity. First, as shown in figure 3 and discussed in much more detail later, there has been an evolution of tAbs in development, from those that are 100% mouse (murine) to those that blend or change mouse with human components to tAbs that are 100% human, such as the newly approved adalimumab (Humira) from the collaboration between Cambridge Antibody Technology and Abbott Laboratories. As tAbs become more human, among other technological improvements, data suggests that clinical success should improve, as illustrated in an oft-cited *Nature Biotechnology* article from September 2001, "Monoclonal Antibodies in the Clinic." Second, as shown in figure 4, the number of tAbs in clinical development has nearly doubled in just the last three years. Lastly, in the past two years valuations have declined about 45% for biotechnology companies in general, and 80% for antibody platform companies in particular, as shown in figure 5. This valuation decline also is reflected in the private equity markets, where only two private antibody firms, Raven biotechnologies, inc. and TolerRx, Inc., have raised more than $15 million in any single round of financing since December 2001, according to Windhover's Strategic Transactions Database.

Figure 4
Therapeutic Antibodies by Stage of Development (Jan 1995 - Jan 2003)



Source: Pharmaprojects and William Blair & Company, L.L.C. estimates

Figure 5
Two-year Relative Share Price Movement



Source: Factset

In light of declining valuations, contrasted with recent successes and the likelihood for improvements in future success rates, we contemplated whether an investment opportunity was presenting itself. Consequently, we built a proprietary valuation model to test our emerging investment hypothesis that there could be an investment opportunity related to tAbs. We applied the valuation method to the entire tAb pipeline, as well as specific platform companies. Based on this analysis, as detailed in table 2, at historical clinical success rates for all antibodies, the platform companies now appear close to fairly valued. Figure 6 summarizes the net present value of revenue per mAb according to our valuation model, which can be applied to individual platform companies and other developmental-stage biotech companies that develop mAbs to determine the net present value of future revenue on the basis of the number of mAbs at each stage of development. Our valuation model relies on historical success rates for all mAbs that have entered development, which are one-half those seen by the drug industry and one-third of Genentech's, as illustrated in figure 7. Thus, if success rates advance as a result of improvements on the development, manufacturing, and

regulatory fronts, then an investment opportunity could exist. Moreover, the model calculates some differences in valuation among the platform companies—that is, Protein Design Labs appears most undervalued and Abgenix, Inc. appears most overvalued.

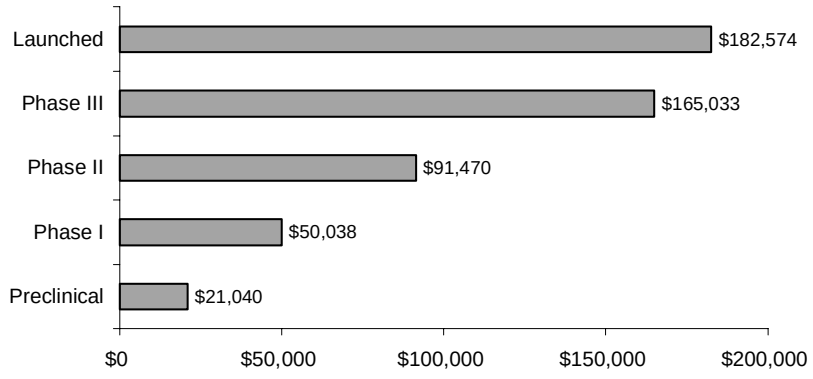
Table 2
Valuation of Antibody Platform Companies
($ in thousands)

Estimates of Franchise Value	Total	PDLI	CATG	MEDX	AMEV	ABGX
Cash	$1,723,000	$624,000	$210,000	$370,000	$55,000	$464,000
Portfolio value	$4,026,945	$1,159,295	$1,016,650	$957,830	$239,397	$653,774
Less Expense In Perpetuity	$4,430,930	$742,000	$761,930	$1,018,000	$266,000	$1,643,000
Franchise Value	**$1,319,015**	**$1,041,295**	**$464,720**	**$309,830**	**$28,397**	**($525,226)**
Market Capitalization	$1,673,000	$684,000	$292,000	$220,000	$44,000	$433,000
Market Cap Less Franchise Value	**$353,985**	**-$357,295**	**-$172,720**	**-$89,830**	**$15,603**	**$958,226**
Technology Platform		Humanized/ Chimeric	Fully Human- Phage Display	Fully Human- Transgenic	Directed Evolution	Fully Human- Transgenic

Last-12-month Expenses	Total	PDLI	CATG	MEDX	AMEV	ABGX
COGS	$130,428	$0	$128	$5,900	$0	$124,400
R&D	$223,691	$56,100	$50,091	$71,400	$14,000	$32,100
SG&A	$77,374	$18,100	$25,974	$24,500	$8,800	$0
Other	$11,600	$0	$0	$0	$3,800	$7,800
Total LTM Expenses	$443,093	$74,200	$76,193	$101,800	$26,600	$164,300
NPV of Expense In Perpetuity	$4,430,930	$742,000	$761,930	$1,018,000	$266,000	$1,643,000

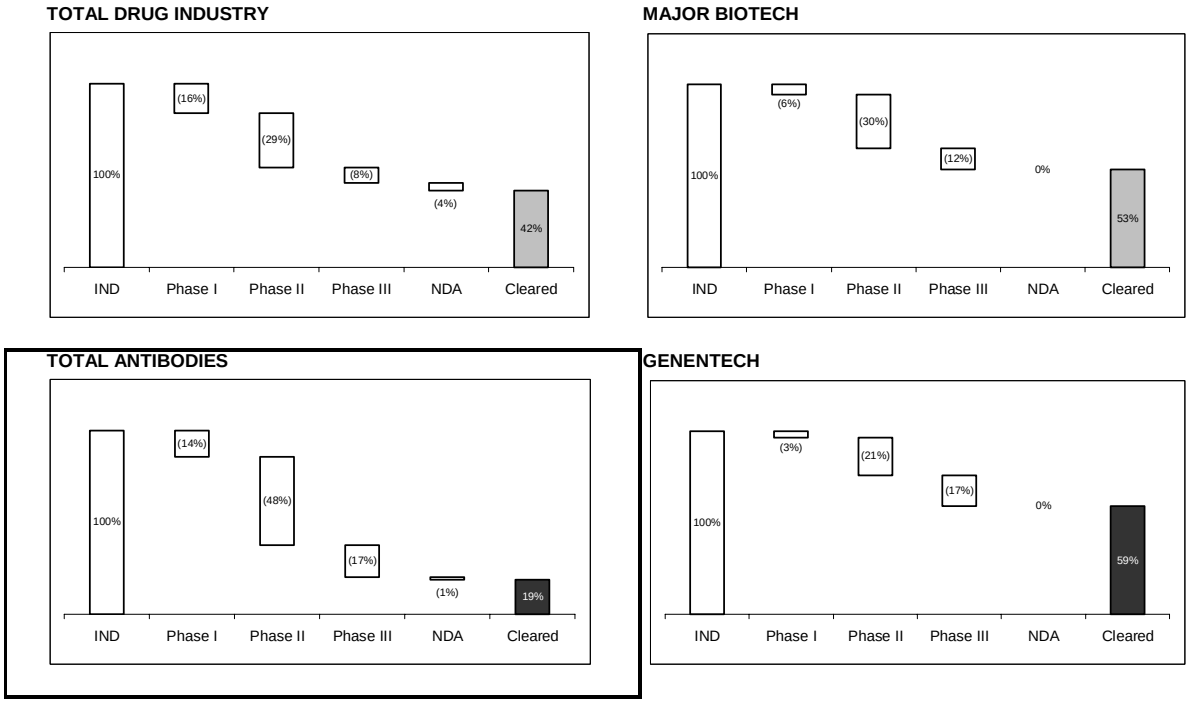
Source: PhRMA, Center for the Study of Drug Development - Tufts University, The McKinsey Quarterly, Pharmaprojects, IMS Health, and William Blair & Company, L.L.C. estimates

Figure 6
Net Present Value of Revenue per mAb



Source: PhRMA, Center for the Study of Drug Development - Tufts University, The McKinsey Quarterly, Pharmaprojects, IMS Health, and William Blair & Company, L.L.C. estimates

Figure 7
Historical Clinical Success Rates



Source: Pharmaprojects and William Blair & Company, L.L.C. estimates

As some of the assumptions to reach these tentative conclusions were not company specific and as we have not done an otherwise full analysis of each company, we consider our company-specific conclusions preliminary, but our general conclusions regarding the tAb sector more robust.

Table 3 summarizes our covered companies that participate in tAb technology and table 4 provides relative valuation information for several different subsectors within the biotech industry. We believe less risk tolerant investors can take part in the tAb investment opportunity without incurring the level of risk associated with developmental biotech companies by investing in established therapeutic and diagnostic companies such as Genentech, Biogen, and Biosite.

Table 3
Summary of Covered Companies Utilizing Therapeutic Antibody Technology

Company	Ticker	William Blair Rating	Price as of 2/26/2003	Market Cap.	Calendar EPS 2003E	Calendar EPS 2004E	L-T EPS Growth	PE 2003E	PE 2004E	PE to Growth 2002A	PE to Growth 2002E
Genentech	DNA	M	$35.15	$18,017	$1.10	$1.27	21%	32.0	27.7	1.5	1.3
Biogen	BGEN	M	$34.88	$5,199	$1.69	$1.98	17%	20.6	17.6	1.2	1.0
Invitrogen	IVGN	M	$29.83	$1,539	$2.09	$2.41	10%	14.3	12.4	1.4	1.2
Celera	CRA	O	$8.22	$586	($1.26)	($1.11)	NM	NM	NM	NM	NM
Biosite	BSTE	O	$31.11	$461	$1.40	$1.79	30%	22.2	17.4	0.7	0.6
Sangamo	SGMO	M	$2.86	$70	($0.33)	($0.31)	NM	NM	NM	NM	NM
Averages:								**22.3**	**18.8**	**1.2**	**1.0**

Source: First Call and William Blair & Company, L.L.C. estimates

Table 4
Sector Valuation Table
($ in millions)

Company	Ticker	William Blair Rating	Current FY	Price as of 26-Feb-03	% of Yr. High	Year High	Year Low	Shares Out.	Market Cap.	Cash	LT Debt	LTM Revenue	LTM R&D	Calendar EPS 2001	Calendar EPS 2002E	Calendar EPS 2003E	PE Ratio 2002E	PE Ratio 2003E	5-year Growth	3-Yr. EPS CAGR 2002E	3-Yr. EPS CAGR 2003E	Growth 2002E	Growth 2003E	Market Cap. to: Cash	Market Cap. to: LTM Rev.	Market Cap. to: LTM R&D
Biotech																										
Amgen	AMGN		Dec-03	$53.25	85%	$62.94	$30.57	1287	$68,536	$4,042	$3,040	$4,881	$3,974	$1.18	$1.39	A $1.75	38.3	30.4	21%	12%	18%	1.8	1.4	17.0	14.0	17.2
Genentech	DNA	M	Dec-03	$35.15	64%	$54.75	$25.10	513	$18,017	$1,124	$0	$2,431	$552	$0.76	$0.92	A $1.10	38.2	32.0	21%	25%	22%	1.8	1.5	16.0	7.4	32.6
MedImmune	MEDI		Dec-03	$28.28	63%	$44.89	$20.37	251	$7,099	$454	$218	$759	$1,311	$0.68	$0.42	A $0.88	67.3	32.1	26%	8%	10%	2.6	1.2	15.6	9.4	5.4
Chiron	CHIR		Dec-03	$35.36	72%	$49.16	$26.38	188	$6,652	$945	$415	$1,134	$393	$0.96	$1.29	A $1.46	27.4	24.2	20%	28%	18%	1.4	1.2	7.0	5.9	16.9
Genzyme	GENZ		Dec-03	$30.24	58%	$52.25	$15.64	215	$6,488	$399	$600	$1,047	$230	$1.17	$1.08	$1.31	28.0	23.1	18%	3%	5%	1.6	1.3	16.3	6.2	28.2
Gilead Sciences	GILD		Dec-03	$32.82	82%	$40.00	$26.08	197	$6,455	$625	$250	$396	$144	($0.54)	$0.43	A $0.71	76.3	46.2	38%	NM	NM	2.0	1.2	10.3	16.3	44.7
Biogen	BGEN	M	Dec-03	$34.88	60%	$57.76	$28.43	149	$5,199	$828	$39	$1,127	$360	$1.90	$1.59	A $1.69	21.9	20.6	17%	3%	-1%	1.3	1.2	6.3	4.6	14.4
Mean									$16,921	$1,203	$652	$1,682	$995				42.5	29.8	23%	13%	12%	1.8	1.3	12.6	9.1	22.8
Median									$6,652	$828	$250	$1,127	$393				38.2	30.4	21%	10%	14%	1.8	1.2	15.6	7.4	17.2
Developmental Biotech																										
Millennium	MLNM		Dec-03	$6.88	27%	$25.55	$6.24	288	$1,980	$1,822	$145	$311	$721	($0.57)	($0.92)	A ($1.04)	NM	NM	NM	NM	NM	NM	NM	1.1	6.4	2.7
Human Genome Sciences	HGSI		Dec-03	$6.45	25%	$25.77	$6.31	129	$830	$1,352	$504	$4	$183	($0.72)	($1.35)	A ($1.68)	NM	NM	NM	NM	NM	NM	NM	0.6	232.8	4.5
Celera Genomics	CRA	O	Jun-03	$8.22	35%	$23.55	$6.94	71	$586	$881	$18	$117	$236	($1.58)	($1.26)	A ($1.26)	NM	NM	NM	NM	NM	NM	NM	0.7	5.0	2.5
Exelixis	EXEL		Dec-03	$5.46	37%	$14.75	$2.95	57	$314	$154	$41	$45	$107	($1.06)	($1.50)	($1.66)	NM	NM	NM	NM	NM	NM	NM	2.0	7.0	2.9
Myriad Genetics	MYGN		Jun-03	$9.92	26%	$38.32	$9.47	27	$268	$59	$0	$56	$39	($0.31)	($0.93)	A ($0.90)	NM	NM	NM	NM	NM	NM	NM	4.6	4.8	6.9
Incyte	INCY		Dec-03	$3.49	26%	$13.24	$2.88	68	$237	$453	$172	$135	$179	($0.80)	($1.31)	($1.56)	NM	NM	NM	NM	NM	NM	NM	0.5	1.8	1.3
Sangamo	SGMO	M	Dec-03	$2.86	30%	$9.69	$1.21	25	$70	$52	$0	$4	$16	($0.36)	($0.39)	A ($0.33)	NM	NM	NM	NM	NM	NM	NM	1.4	17.4	4.5
Large Scale Biology	LSBC	M	Dec-03	$0.57	15%	$3.75	$0.52	25	$14	$27	$0	$2	$23	($0.84)	($1.29)	A ($0.84)	NM	NM	NM	NM	NM	NM	NM	0.5	6.2	0.6
Mean									$537	$600	$110	$84	$188				NM	NM	NM	NM	NM	NM	NM	1.4	35.2	3.3
Median									$291	$304	$30	$50	$143				NM	NM	NM	NM	NM	NM	NM	0.9	6.3	2.8
Monoclonal Antibody Companies																										
Protein Design Labs	PDLI		Dec-03	$7.47	36%	$20.60	$7.12	89	$665	$624	$159	$43	$56	$0.03	($0.17)	($0.25)	NM	NM	NM	NM	NM	NM	NM	1.1	15.6	11.9
Abgenix	ABGX		Dec-03	$5.34	22%	$24.25	$4.52	88	$468	$464	$200	$34	$129	($0.71)	($1.53)	($1.67)	NM	NM	NM	NM	NM	NM	NM	1.0	13.9	3.6
Cambridge Antibody (ADR)	CATG		Sep-03	$6.30	27%	$23.10	$6.20	36	$228	$210	$0	NA	NA	($0.58)	($1.11)	($1.46)	NM	NM	NM	NM	NM	NM	NM	1.1	NM	NM
Medarex	MEDX		Dec-03	$2.81	15%	$18.46	$2.55	76	$215	$370	$175	$47	$85	($0.04)	($0.95)	($1.13)	NM	NM	NM	NM	NM	NM	NM	0.6	4.5	2.5
Applied Molecular Evolution	AMEV		Dec-03	$2.27	26%	$8.89	$1.81	21	$47	$55	$10	$7	$15	($0.62)	($0.90)	($0.98)	NM	NM	NM	NM	NM	NM	NM	0.8	6.9	3.2
Mean									$324	$345	$109	$33	$71				NM	NM	NM	NM	NM	NM	NM	0.9	10.2	5.3
Median									$228	$370	$159	$38	$71				NM	NM	NM	NM	NM	NM	NM	1.0	10.4	3.4

Source: Factset, company reports, and William Blair & Company, L.L.C. research

Limitations and Risks

Standardized Approach

Although we believe our model is robust, the financial terms of individual deals between companies are difficult to capture within the scope of a homogenized valuation model. Our model assumes standard deal structures in terms of future cash flows from upfront payments, milestones, and royalties in determining the present value of a particular antibody. However, there is a difference in potential downstream value from licensing the technology for discovering and developing antibodies versus licensing the antibody itself. For example, Cambridge Antibody Technology and Morphosys cross-license certain patent rights for technology related to developing mAbs: if one company successfully commercializes a product that utilizes shared technology, the other is entitled to a small royalty on sales of that product. However, the potential value of a product to the recipient of royalties under this deal structure is significantly less than a deal in which a platform company licenses a mAb to a larger drug company during the late stages of clinical development. Financial subtleties such as this are nearly impossible to recognize in a valuation model.

No Adjustment for End-user Market Size and Structure in Our Valuation Model

Although our estimates of metrics such as average annual revenue and average time to market for the current crop of mAbs are based on historical information for the drug industry in total, these assumptions may prove to be incorrect over the long term. Because of the small number of mAbs that have reached the market (11), we standardized our assumptions for average annual revenue per mAb and number of years per phase of development to comply with historical drug industry trends. However, the end-user market size and structure for mAbs over the long term could prove to be meaningfully different, either negatively or positively. We believe average annual revenue for the drug industry may be skewed negatively by outdated products that represent a high proportion of the total number of products and generate minimal sales due to generic competition, low promotional efforts, and/or the availability of improved treatments. In contrast, mAbs are biological products and therefore are unlikely to face generic competition for the foreseeable future. Moreover, many mAbs represent treatment advancements for poorly managed diseases such as cancer and autoimmune disorders, which could translate into a different revenue profile relative to current drug industry averages.

Accuracy of the Pharmaprojects Database

Our valuation model relies largely on data from Pharmaprojects, a database that tracks drugs from early-stage development through commercialization. Although our validation tests suggest the database is quite reliable, it would be unrealistic to assume that the status and characteristics of all projects included in the database are properly represented. Therefore, a source of error in our model comes from the possibility that some recently canceled projects are incorrectly included in our sector valuation, while some recently added projects are not. In addition, we believe the categorization of mAbs by therapeutic class may not be 100% consistent within Pharmaprojects. Therefore, it is possible that some projects are either incorrectly classified as mAbs or incorrectly *not* classified as mAbs. However, on the basis of our validation tests, we do not believe the level of inaccuracies in Pharmaprojects significantly compromised the quality of our analysis.

Our Exclusion Criteria Represents a Potential Source of Subjectivity

We chose not to define immunoconjugates, nor traditional polyclonal mixtures, as therapeutic antibodies and therefore excluded them from our valuation analysis. Immunoconjugates, including immunotoxins, are molecules in which a therapeutic agent is attached to an antibody (usually a monoclonal antibody) and the antibody is used to deliver the agent to its intended target. Examples include IDEC's Zevalin and Corixa's Bexxar, which are radiolabeled mAbs designed to destroy cancer cells with radiation. In the case of most immunoconjugates, mAbs are used primarily as targeting and delivery vehicles as opposed to therapeutic agents, and therefore the financial value of an immunoconjugate

that is attributable to the mAb component is difficult to estimate. In addition, immunoconjugates such as Zevalin and Bexxar that employ highly toxic materials raise additional safety issues that can make the regulatory process much more complex and challenging relative to traditional therapeutic antibodies. Traditional polyclonal antibody mixtures are generated through purification as opposed to recombinant technologies and use a shotgun, unspecific approach that does not lend itself to addressing the challenging diseases addressed by mAbs.

Our Model Relies on History to Predict the Future

We cannot be certain that future success rates for advancing tAbs through development and regulatory clearance will resemble historical success rates. Moreover, the brief history of tAb development relative to small-molecule drug development suggests that an incrementally higher magnitude of error should be assumed when interpreting results from our valuation model for the tAb sector relative to a valuation analysis of the total drug industry.

Sample Sizes

Due to the relatively brief history of tAb technology, the sample set of data available to perform our valuation analysis is relatively small, which reduces the level of statistical significance in our tAb valuation model.

Likely Regulatory (FDA) Failures

The short history of therapeutic antibodies in the clinic predicts that roughly 8 in every 10 antibodies will fail after advancing to human trials. Although we believe success rates can improve going forward as antibody technology improves, there is significant risk of failure associated with the development of therapeutics. For example, Abgenix and its partner SangStat recently discontinued Phase III development of ABX-CBL, a mAb designed to treat graft versus host disease (GVHD), due to a lack of efficacy. Biotech or platform companies that choose to clinically develop monoclonal antibodies independently bear full financial risk of failure. Conversely, companies with strategies to partner—particularly those that do so during the early preclinical or clinical phases—likely lose out on a significant portion of the downstream value, assuming a product reaches the market.

Potential Need for Improved Drug Delivery Technology

Although tAb technology is advancing, there exists a need for complementary advances in drug delivery. Antibodies are proteins, so the current methods of drug delivery—intravenous, intramuscular, or subcutaneous injection—likely serve as a competitive disadvantage when orally administered small-molecule drug alternatives are available for the treatment of a specific disease.

Increasing Competition Among Platform Companies

The level of competition among antibody platform companies is increasing, with at least six major platform companies. Pharmaceutical companies with abundant cash resources have multiple platforms to choose from when in-licensing antibodies. Depending on the success of fully human antibodies that have reached the market or are in the late stages of clinical development, traditional technology (murine, chimeric, or humanizing) and the companies that employ this platform may become obsolete. If after widespread use the safety and/or efficacy profiles of certain types of antibodies prove to be inferior to others, this likely would reduce the value significantly of companies that employ obsolete technology.

Cash Position of Developmental Companies

While the therapeutic antibody sector in total is well capitalized, some antibody companies have limited cash resources, which effectively could cap the number of projects that can be funded or, in a worst-case scenario, lead to going concern issues. Therefore, investors should ensure that current cash levels for companies are sufficient to support expected burn rates associated with a specific company's business model prior to investing.

Background on Antibody Therapeutics

Antibodies are protein complexes made by the body's immune system that are intended to bind to specific foreign (non-self) entities, such as infectious organisms or transplanted tissues. While an organism can make many antibodies to various targets (antigens) on the surface of a non-self entity, monoclonal antibodies (mAbs), which are antibodies derived from a single specific source, most typically are used as drug therapies. For medical purposes, antibodies can be engineered to recognize molecular targets that are implicated in a variety of human diseases.

In most cases, therapeutic target discovery employs proteomics technology, in which diseased tissue samples are compared with normal samples to identify differences in protein expression levels that may lead to the identification of drug targets and/or diagnostic markers. In some cases, genomics technology also is utilized, whereby DNA sequences of diseased individuals are compared with healthy individuals to identify molecular activities that may contribute to disease and that potentially can be moderated by targeted therapies. Technological advancements such as high-throughput screening of tissue samples using mass spectrometry or gel electrophoresis, and automated sequencing of DNA samples are increasing the capacity of the target discovery process, thereby accelerating the rate at which new drug targets are identified. In addition, increased computing power has provided the ability to sort and apply algorithms to large amounts of biological data, which can further accelerate the target discovery process. For example, Celera is leveraging its proteomics, genomics, and bioinformatics capabilities to discover therapeutic targets and diagnostic markers for diseases such as Alzheimer's, cardiovascular disease, and several forms of cancer. Celera likely will pursue the development of mAbs to these targets through external partners.

Once a protein target that is implicated in a disease pathway is identified, small molecules and/or proteins can be tested for their ability to bind to the target. In some cases, molecules may be designed from scratch with structural properties that are complementary to the disease target, or they can be selected from an existing library of molecules that previously may have been tested against other targets. Molecules that bind to protein targets may be agonists, meaning they stimulate molecular activity at the binding site, or antagonists, which render proteins inactive upon binding.

Monoclonal antibody platform companies create mAbs using proprietary technology such as Medarex's UltiMAb Human Antibody Development System, which generates fully human monoclonal antibodies from mice by inactivating the mouse genes that make antibodies and replacing them with human antibody DNA. Newly discovered mAbs can be tested against protein targets internally, or through collaborations such as Medarex's partnership with Biosite, in which Biosite validates drug targets through the use of its Omniclonal phage display technology, which is a high-throughput system for testing the specificity (degree of recognition) and affinity (binding strength) of mAbs to targets. Monoclonal antibodies tend to be highly specific to proteins such as antigens on the surface of cells or other antibodies such as immunoglobulins, which are involved in the cascade of events leading to allergic reactions.

Once a mAb is demonstrated to be active against a specific target, it must be manufactured in sufficient quantities to support clinical studies in which the antibody is tested for safety and efficacy first in animals, then in humans. The manufacturing process for proteins such as mAbs is generally more complex, time consuming, and costly than the process for chemically synthesizing traditional small-molecule drugs. Mammalian cells must be fermented in stainless steel reactors with precise temperature controls and proper nutrient balances for successful batches of mAbs to be produced. As the number of clinical mAb candidates continues to grow, companies such as Invitrogen, which supplies media used for manufacturing mAbs and other biotherapeutics, stand to benefit. Moreover, mAbs consume

a large amount of media during production relative to other biologicals, and dosage strengths tend to be high and administration frequent, which bodes well for reagent companies such as Invitrogen.

However, the high costs of manufacturing mAbs and other protein therapeutics, combined with limited access to capital given the current economic environment, have resulted in manufacturing capacity constraints in the biotech sector. Although several larger biotech companies such as Genentech, Biogen, and Amgen Inc. have built large facilities with the capability for producing thousands of kilograms of biologic product per year, several other companies are developing methods for optimizing manufacturing yields through process improvements. For example, Sangamo is using its zinc-finger protein (ZFP) technology, which has been demonstrated to moderate gene expression in animal cells, in a collaboration with Medarex. By stimulating the over-expression of targeted mouse genes responsible for the production of mAbs, the companies have achieved a doubling of mAb yields in early-stage testing. Over the long term, process improvements such as this could alleviate manufacturing capacity constraints for biological products while lowering manufacturing costs, which could allow biotech companies to price mAbs more competitively with small-molecule drugs.

The therapeutic potential of mAbs initially was introduced in the 1970s, using mAbs solely derived from mouse proteins, which are known as murine mAbs. However, as might be expected, in many cases murine mAbs invoke an immune response in humans, known as the human antibody against mouse antibody (HAMA) response, which can neutralize the murine antibody, making it ineffective, or which can result in side effects. Therefore, these factors caused low acceptance of murine mAbs as therapeutics. Major technological advances in the past decade have expanded the scope of potential monoclonal antibody types and uses.

To date, four major classes of mAbs have shown therapeutic potential: murine (0% human sequence), chimeric (66% human sequence), humanized (90% human sequence), and fully human (100% human sequence). There currently are a total of 358 mAbs in the pipeline, 256 of which are in the preclinical stage, 25 in Phase I, 60 in Phase II, 15 in Phase III, and 2 awaiting final clearance. Since 1986, 11 monoclonal antibodies have been launched (9 of which use humanizing or chimeric technology to modify the mAb for therapeutic use). The latest mAb to be launched, Humira, is the result of a collaboration between Abbott Laboratories and Cambridge Antibody Technologies. Humira is the first fully human monoclonal to reach the market. However, fully human monoclonals represent 35% of all mAbs currently in the pipeline, and chimeric/humanized antibodies account for 24% of the pipeline. For an illustration of the different classes of mAbs that have been launched or are currently in development, refer to figure 2 earlier in the report.

Protein Design Labs is a leader in humanizing capability with the SMART technology platform. This process has been used for modifying four of the mAb products that currently are marketed. The two most prominent platforms for fully human mAb engineering are phage display used by Cambridge Antibody Technology and MorphoSys, and the transgenic mouse models using either the Abgenix Xenomouse or the Medarex Ultimab system. The proven success of humanizing technology from Protein Design Labs and the accelerated FDA approval process of Humira suggest promise for platforms that improve upon the existing technology. The human antibody platforms employed by these companies represent technological advancements that could lead to improved success rates in the clinic compared with historical antibody success rates, which are based on less advanced technologies.

Discussion of Valuation Analysis

Based on our valuation analysis, the current net present value of the revenue from all mAbs that have either reached the market or currently are in development to developmental-stage biotech companies that develop mAbs is roughly $17 billion. Table 5 summarizes the results of our valuation analysis, which calculates the present value of the total potential payments and royalties associated with licensing mAbs by incorporating the probabilities for success at each stage of development and the estimated time required to advance mAbs through each stage of development.

Table 5
mAb Sector Valuation
($ in thousands)

	Number of mAbs	NPV	NPV of Revenue per mAb
Preclinical	256	5,386,196	21,040
Phase I	25	1,250,952	50,038
Phase II	60	5,488,187	91,470
Phase III	17	2,805,553	165,033
Launched	11	2,008,314	182,574
Total mAb Sector	369	$16,939,203	$45,906

Source: PhRMA, Center for the Study of Drug Development - Tufts University, The McKinsey Quarterly, Pharmaprojects, IMS Health, and William Blair & Company, L.L.C. estimates

Appendix A of this report describes in detail our approach for valuing all mAbs that have been launched or that are in development, as well as our valuation analysis of individual mAb platform companies. There are three primary inputs to our valuation model: 1) number of mAbs at each stage of development or that have been launched; 2) probabilities of mAbs advancing through each stage of development, which is based on historical success rates of mAbs in the clinic; and 3) value per mAb, which is a function of our assumed financial terms of collaborations between platform companies and larger, fully integrated drug companies. Our model assumes financial terms from mAb deals become increasingly favorable to the originator as the project advances internally into the later stages of clinical development. Therefore, although a company that develops projects internally past preclinical bears higher costs and therefore risks losing more if a project fails, our model suggests the incremental value gained by holding onto mAbs that eventually become commercialized outweighs these risks.

Given the inputs to our model, we believe upside to our current valuation estimate of $17 billion could result from a combination of the following three factors: 1) improved success rates, 2) increased number of mAbs in development, and 3) improved financial terms from collaborations to originators of mAbs.

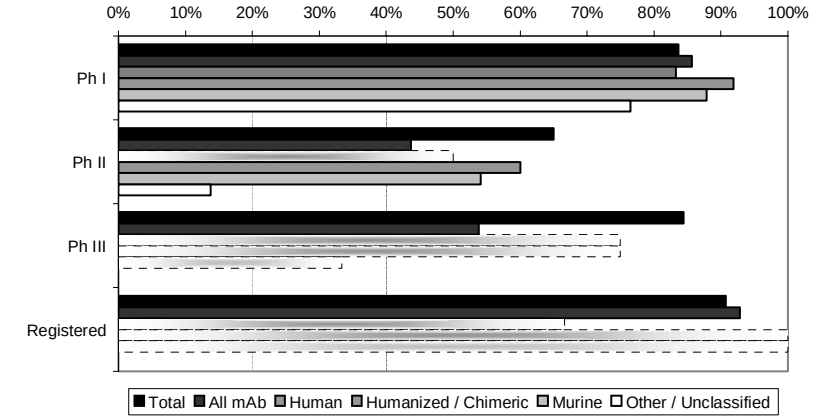
Valuation Impact From Improved Success Rates

Our valuation model incorporates historical success rates for mAbs in valuing the current pipeline of mAbs. For example, on the basis of historical data from roughly 210 mAbs, a mAb that has reached Phase I clinical development has a 19% chance of reaching the market. Referring to figure 7 earlier in the report, this is roughly half the success rate for the total drug industry and one-third that of Genentech, which we believe has one of the most productive and high-quality research and development franchises in the drug industry.

If we assume future success rates for mAbs are similar to those of the drug industry, our valuation estimate of revenue from mAbs to developmental-stage biotech companies increases to $25 billion, or 47%, from our current estimate of $17 billion. While it is impossible to forecast future success rates with certainty, we believe several trends suggest success rates could improve, perhaps approaching those of the drug industry and leading

to significant valuation upside to our current estimate. As shown in figures 8 and 9, clinical success rates for chimeric and humanized mAbs are significantly higher than other classes. We believe this reflects improved safety and efficacy profiles for mAbs that contain higher levels of human DNA sequences, as well as other technology improvements related to target discovery and validation, mAb screening against targets, and manufacturing. Although the data set for fully human mAbs is small given the brief history of the technology, going forward we expect success rates to match or surpass those of chimeric and humanized mAbs.

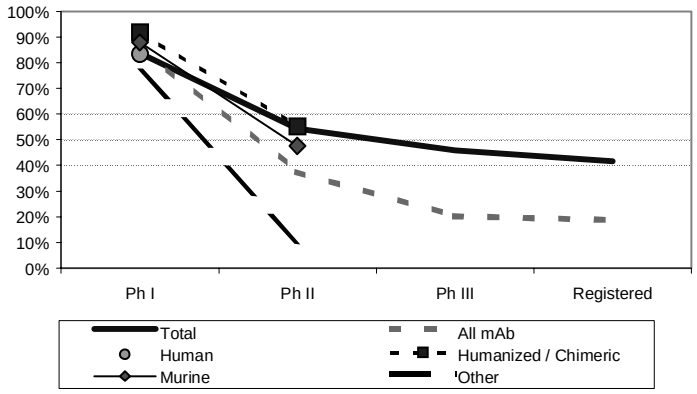
Figure 8
Clinical Success Rates



	Phase I	Phase II	Phase III	Registered
Total Rx	84%	65%	84%	91%
All Mab	86%	44%	54%	93%
Human	83%	50%	75%	67%
Humanized/ Chimeric	92%	60%	75%	100%
Murine	88%	54%	33%	100%
Other	76%	14%	0%	0%

Source: Pharmaprojects and William Blair & Company, L.L.C. estimates

Figure 9
Cumulative Probability of Success



	Phase I	Phase II	Phase III	Registered
Total Rx	84%	54%	46%	42%
All Mab	86%	38%	20%	19%
Human	83%	42%	31%	21%
Humanized/ Chimeric	92%	55%	41%	41%
Murine	88%	48%	16%	16%
Other/ unclassified	76%	11%	0%	0%

Source: Pharmaprojects and William Blair & Company, L.L.C. estimates

Assuming drug industry success rates are matched going forward, table 6 indicates that the current market valuations of four of the five mAb companies we assessed, with the exception of Abgenix, are below the franchise values calculated using our valuation model.

Table 6
Valuation of Antibody Platform Companies
($ in thousands)

Estimates of Franchise Value Assuming Historical Drug Industry Success Rates

	Total	PDLI	CATG	MEDX	AMEV	ABGX
Cash	$1,723,000	$624,000	$210,000	$370,000	$55,000	$464,000
Portfolio value	$5,803,056	$1,406,980	$1,463,794	$1,518,382	$380,132	$1,033,768
Less Expense In Perpetuity	$4,430,930	$742,000	$761,930	$1,018,000	$266,000	$1,643,000
Franchise Value	**$3,095,126**	**$1,288,980**	**$911,864**	**$870,382**	**$169,132**	**($145,232)**
Market Capitalization	$1,673,000	$684,000	$292,000	$220,000	$44,000	$433,000
Market Cap Less Franchise Value	**-$1,422,126**	**-$604,980**	**-$619,864**	**-$650,382**	**-$125,132**	**$578,232**
Technology Platform		Humanized/ Chimeric	Fully Human- Phage Display	Fully Human- Transgenic	Directed Evolution	Fully Human- Transgenic

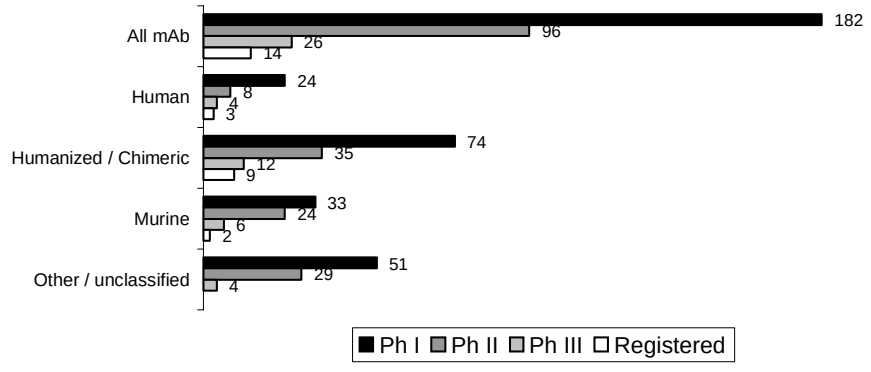
Estimates of Franchise Value Assuming Historical mAb Success Rates

	Total	PDLI	CATG	MEDX	AMEV	ABGX
Cash	$1,723,000	$624,000	$210,000	$370,000	$55,000	$464,000
Portfolio value	$4,191,977	$1,159,295	$1,016,650	$957,830	$239,397	$653,774
Less Expense In Perpetuity	$4,430,930	$742,000	$761,930	$1,018,000	$266,000	$1,643,000
Franchise Value	**$1,484,047**	**$1,041,295**	**$464,720**	**$309,830**	**$28,397**	**($525,226)**
Market Capitalization	$1,673,000	$684,000	$292,000	$220,000	$44,000	$433,000
Market Cap Less Franchise Value	**$188,953**	**-$357,295**	**-$172,720**	**-$89,830**	**$15,603**	**$958,226**
Technology Platform		Humanized/ Chimeric	Fully Human- Phage Display	Fully Human- Transgenic	Directed Evolution	Fully Human- Transgenic

Source: PhRMA, Center for the Study of Drug Development - Tufts University, The McKinsey Quarterly, Pharmaprojects, IMS Health, and William Blair & Company, L.L.C. estimates

Figure 10, which demonstrates the sample set of data used to calculate our mAb success rates, suggests the high proportion of less successful murine and other (unclassified) mAbs as a percentage of our total data set may have negatively skewed our findings regarding historical success rates. Going forward, we expect the number of murine mAbs to decrease steadily and the number of fully human mAbs to increase steadily as a percentage of total mAbs in development, which should result in improved success rates. In addition, we believe increased understanding and acceptance of mAb technology at the FDA could lead to improved regulatory outcomes going forward, which could lead to both a higher number of mAb approvals and quicker turnaround times for application reviews.

Figure 10
Sample Size



Source: Pharmaprojects and William Blair & Company, L.L.C. estimates

Valuation Impact From Increased Number of mAbs in Development

The total number of mAbs in development has nearly quadrupled since 1995, and we believe the number of mAbs in development should continue to increase going forward, due to improvements in the discovery process for mAbs, as well as the demonstrated success of commercialized mAbs such as Rituxan, Herceptin, Synagis, and Remicade. Our analysis suggests that the value of mAbs has increased roughly $1.5 billion, or 10%, in the past year alone from the increased number of mAbs that have entered development during this time (369 at the beginning of 2003, versus 319 at the beginning of 2002). Holding all other factors constant, if we assume the number of mAbs in development increases during 2003 at 8% (one-half the 10-year average rate of 16% and one-half the 10-year compounded annual growth rate of 15%), our valuation estimate increases by roughly $1 billion, or 6%.

Valuation Impact From Improved Financial Terms From Collaborations—Implications to mAb Platform Companies

Our valuation analysis suggests that declining share prices over the past year in the biotech sector in general, and particularly among mAb companies, have brought market valuations for mAb companies more in line with intrinsic values. In addition to possibility for upside for the sector as well as individual companies from improved success rates and an increased number of mAbs moving into the clinic, we believe individual mAb platform companies and other developmental-stage biotech companies that license mAbs could gain incremental value by advancing products past preclinical and Phase I development before signing development and commercialization deals with larger drug companies.

As described in detail in appendix A, our standard deal structure for licensing mAbs, which we incorporate into our valuation model, reflects the fact that by advancing a molecule into clinical development internally, a mAb platform company can gain negotiating leverage leading to more favorable financial terms for its deals with larger drug companies. For example, table 7 summarizes the pipelines of five mAb platform companies: Protein Design Labs, Abgenix, Cambridge Antibody Technology, Medarex, and Applied Molecular Evolution, Inc.

Table 7
Platform Company Pipelines

Company	PDLI	ABGX	CATG	MEDX	AMEV	Other	Total mAb Space
Preclinical	3	20	14	21	9	189	256
Phase I	0	1	2	3	1	18	25
Phase II	4	2	3	4	0	47	60
Phase III	0	0	1	0	0	16	17
Launched	4	0	1	0	0	6	11
Total	11	23	21	28	10	276	369

Source: Company reports, Pharmaprojects, and William Blair & Company, L.L.C. estimates

To illustrate our theory, we focus on Medarex, which has employed a strategy for advancing projects internally through Phase II before establishing partnerships, and Abgenix, which chooses to license its mAbs early in the development process. Our research suggests that roughly 51% of all pharmaceutical out-licensing deals occur during the preclinical stage, with the remaining 49% spread out across Phase I, II, and III development. Assuming historical industry trends for licensing drugs, our model suggests that Abgenix currently is overvalued, which reflects the company's high expenditures relative to our calculated value for its pipeline. In contrast, our model suggests Medarex's operating expenses are more aligned with the value of the company's portfolio of mAbs. We believe this suggests, under the current scenario, that Medarex will be able to fund its development efforts for the foreseeable future, assuming its spending levels continue to be managed, while Abgenix will need to consider cutting back its expenditures, which could imply project delays or cancellations.

If we take our analysis a step further and assume Medarex's partnering strategy leads to a higher proportion of projects licensed later in development relative to historical industry trends, versus a higher proportion licensed earlier for Abgenix, the valuation differences between the two companies increase significantly. For example, table 8 demonstrates that if Medarex chooses to partner 25% of its projects during preclinical and the remainder during clinical development, its franchise value increases by more than $300 million, implying that the company currently is significantly undervalued. In contrast, if we assume Abgenix follows its early-stage out-licensing strategy and partners 75% of its projects during preclinical development, its franchise value drops by more than $200 million, which could mean the company's current market cap may exceed its intrinsic value by an even greater amount than our original analysis suggests.

Table 8
Valuation of Antibody Platform Companies
($ in thousands)

Estimates of Franchise Value Under New Assumptions for Deals

	MEDX	ABGX
Cash	$370,000	$464,000
Portfolio value	$1,278,778	$426,741
Less Expense In Perpetuity	$1,018,000	$1,643,000
Franchise Value	**$630,778**	**($752,259)**
Market Capitalization	$220,000	$433,000
Market Cap Less Franchise Value	**-$410,778**	**$1,185,259**
Technology Platform	Fully Human-Transgenic	Fully Human-Transgenic

Estimates of Franchise Value Assuming Historical Distribution of Deals

	MEDX	ABGX
Cash	$370,000	$464,000
Portfolio value	$957,830	$653,774
Less Expense In Perpetuity	$1,018,000	$1,643,000
Franchise Value	**$309,830**	**($525,226)**
Market Capitalization	$220,000	$433,000
Market Cap Less Franchise Value	**-$89,830**	**$958,226**
Technology Platform	Fully Human-Transgenic	Fully Human-Transgenic

Source: PhRMA, Center for the Study of Drug Development - Tufts University, The McKinsey Quarterly, Pharmaprojects, IMS Health, and William Blair & Company, L.L.C. estimates

Conclusions

We believe the strong presence of mAbs in the pipelines of large biotech companies such as Genentech and MedImmune reflects the strong medical and commercial success of mAbs that have reached the market, such as Rituxan and Synagis. Table 16 in appendix B summarizes mAbs in development for several biotech and mAb platform companies. However, despite the vote of confidence for mAb technology by large biotech companies, share prices of developmental-stage antibody-platform companies have declined substantially over the past two years. We believe this has brought market valuations of mAb platform companies with balanced cost structures roughly in line with franchise values, according to our valuation analysis.

In the future, we believe fundamental improvements in discovery, development, manufacturing, and regulatory success could potentially drive significant upside to the value of therapeutic antibodies, and antibody platform companies. Moreover, it appears that those willing to incur the risks of advancing projects internally through clinical development are poised to capture a significantly higher proportion of any potential upside relative to those that choose to partner early. In addition, we believe companies that license mAbs, such

as Genentech, and those that play an ancillary role in bringing mAbs to market, such as Biosite and Invitrogen, represent an opportunity for more risk-averse investors to gain exposure to the potential investment upside that could result from growth in the market for therapeutic antibodies.

Additional information is available upon request.

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DJIA:	7806.98
S&P 500:	827.55
NASDAQ:	1303.68

The prices of the common stock of other public companies mentioned in this report follow:

Abbott Laboratories	$34.70
Aventis	$45.65
Corixa	$5.58
Elan	$3.05
GlaxoSmithKline	$34.96
IDEC Pharmaceuticals	$28.57
Johnson & Johnson	$51.82
Merck	$52.10
Novartis	$36.04
Pfizer	$28.90
Pharmacia	$39.84
Roche	$60.50
SangStat	$7.85
Schering-Plough	$17.22
Serono	$11.04
Tanox	$8.50
XOMA	$3.33

Appendix A: Description of Proprietary Valuation Model

We employed current and historical mAb development data obtained from the Pharmaprojects database to derive product failure rates based on historical trends at each stage of development. By determining 1) the total number of mAbs that have entered preclinical or clinical development, 2) the number of mAbs that have been discontinued prior to gaining regulatory clearance, and 3) the number of mAbs currently in development or on the market, we calculated the probability of advancement in each stage of development for mAbs. Table 9 (line 1) shows the historical probability of advancement for a mAb (from 702 mAb projects) at each stage of development from preclinical through regulatory clearance and launch. The cumulative probabilities of succeeding through each phase are indicated in line 2 of table 9. For example, based on historical information, a mAb that has entered preclinical development has a 46.4% probability of advancing to Phase I clinical trials and an 8.7% probability of being launched. Intuitively, cumulative probabilities for success increase as each phase of development is passed. For example, our analysis suggests a mAb in Phase II clinical development has a 43.8% chance of advancing to Phase III and a 21.9% chance of reaching the market.

Table 9
Monoclonal Antibody Success Rates

	Preclinical	I	II	III	Registration	Launch
Per phase of development	46.4%	85.7%	43.8%	53.8%	92.9%	NA
Cumulative from preclinical		46.4%	39.8%	17.4%	9.4%	8.7%
Cumulative from Phase I			85.7%	37.5%	20.2%	18.8%
Cumulative from Phase II				43.8%	23.6%	21.9%
Cumulative from Phase III					53.8%	50.0%

Source: Pharmaprojects and William Blair & Company, L.L.C. estimates

Our standard deal structure model, which we apply when calculating the value of mAbs at each stage of development, is summarized in table 10. Royalty payments of 7%, 10%, 20%, and 25% are expected at the preclinical stage, Phase I, Phase II, and Phase III, respectively. For example, if a company forms an alliance for a mAb in Phase II clinical development, our model assumes the company will receive an upfront payment of $10 million, potential milestone payments of $15 million for reaching Phase III development and $20 million upon product launch, and a 20% royalty on sales of the mAb.

Table 10
Standard Deal Structure
($ in thousands)

	Preclinical	I	II	III
Royalty	7%	10%	20%	25%
Milestones	$15,000	$25,000	$35,000	$50,000
Upfront	$2,000	$5,000	$10,000	$15,000

Flow of Payments from Standard Deal Structure in Terms of Upfront and Milestone Payments

	Preclinical	IND	I	II	III	Launch
Preclinical	$2,000	$1,000	$3,000	$3,000	$3,000	$5,000
Phase I			$5,000	$5,000	$7,500	$12,500
Phase II				$10,000	$15,000	$20,000
Phase III					$15,000	$50,000

Source: William Blair & Company, L.L.C. estimates

Cumulative success rates from table 9 were applied to the deal structure in table 10 to determine the expected value of milestones for deals made at each stage, which is illustrated in table 11. The present value of milestone payments was determined using a discounted cash flow model assuming preclinical to launch takes a total of 9 years (3 years in

preclinical, 2 years in Phase I, 2 years in Phase II, and 2 years in Phase III). The values were discounted using a required rate of return of 12.5%, which we believe is appropriate given the high-risk, high-return profile of developmental-stage biotech companies. For example, by discounting our upfront and milestone payment assumptions according to the time line for developing mAbs and the probability for failure at each stage of development, the present value of milestone payments for a mAb partnered during preclinical development is $2.4 million, as presented in line 5 of table 11.

Table 11
Present Value of Milestone Payments Based on Probability of Clinical Advancement
($ in thousands)

Future Value of Milestone Payments

	IND	I	II	III	Launch	Sum
Preclinical	$464	$1,392	$1,193	$523	$435	$4,007
Phase I			$4,285	$2,815	$2,345	$9,445
Phase II				$6,570	$4,378	$10,948
Phase III					$24,990	$24,990

Present Value of Milestone Payments

	IND	I	II	III	Launch	Sum
Preclinical (assume 9 years to launch)	$367	$978	$662	$229	$151	$2,386
Phase I (assume 6 years to launch)			$3,386	$1,758	$1,157	$6,300
Phase II (assume 4 years to launch)				$5,191	$2,733	$7,924
Phase III (assume 2 years to launch)					$19,745	$19,745

Source: Pharmaprojects and William Blair & Company, L.L.C. estimates

Table 12 summarizes the present value of future royalty payments based on our estimate for average drug sales in perpetuity and the cumulative probability of successful launch of mAbs at each development stage. The average annual sales per drug was estimated using total worldwide sales for all drugs from IMS Health for the latest available 12 months ending September 2002, divided by the number of drugs currently generating revenue, which we estimate using Pharmaprojects as the total number of drugs launched from 1980 to 2002 minus the number of drugs withdrawn or discontinued during this time period. Our $147 million average annual sales estimate then was calculated in perpetuity, assuming 12.5% required rate of return and a 2.5% annual growth rate, to yield a value of $1,470 million for the average revenue per drug in perpetuity. The royalty rates from our deal structure in table 10 were applied at each stage of development and discounted by probability of achieving a successful launch and the estimated number of years required for a product to reach the market to determine the present value of royalties for mAbs at each stage of development. We note that our estimate for average annual revenue per drug is based on historical data from the drug industry in total. However, as illustrated in table 1 of this report, the average revenue per mAb for the last 12 months is $335 million—significantly higher than the drug industry average of $147 million. We believe this may reflect the fact that most of the mAbs that have reached the market target therapeutic categories for which there is high demand for improved treatments, and we expect this trend to continue going forward. Although we chose to use the average annual revenue per drug for the total drug industry, given the small sample set of launched mAbs, we believe average annual sale per mAb could prove to be significantly higher, which suggests our valuation for the sector could be on the conservative side.

The expected value of the royalty payments for launched mAbs, which is illustrated in table 13, was determined using a weighted average of the expected royalty percentages at each stage of development (12%) and applying this to the average sales per drug in perpetuity, which we calculated in table 12.

Table 12
Present Value of Royalty Payments for mAbs in Development
($ in thousands)

Total Drugs Launched (1980 - 2002):	2,642
Total Drugs Withdrawn (1980 - 2002):	67
Total Drugs Currently Marketed (1980 - 2002):	2,575
Average Annual Revenue Per Drug:	**$147,000**

Required rate of return:	12.5%
Estimated growth rate:	2.5%
Average Revenue Per Drug in Perpetuity	**$1,470,000**

	Preclinical	I	II	III
Expected royalty rate	7%	10%	20%	25%
Estimated royalty payments per mAb	$102,900	$147,000	$294,000	$367,500
Present value of royalties per mAb	$35,649	$72,511	$183,543	$290,370
Probability of launch	9%	19%	22%	50%
Present value of royalties adjusted for probability of launch	$3,103	$13,604	$40,180	$145,128
Present value of royalties from all mAbs in pipeline	$794,426	$340,091	$2,410,797	$2,467,171

Sources: IMS Heath, Pharmaprojects, and William Blair & Company, L.L.C. estimates

Table 13
Total Present Value of Royalties from Launched mAbs
($ in thousands)

Phase of Development	Preclinical	I	II	III	Launched	Total
Expected royalty rate	7%	10%	20%	25%	40%	
Estimated distribution of deals per phase of development	51%	23%	14%	7%	5%	100%
Cumulative royalty rate	4%	2%	3%	2%	2%	12%

Required rate of return:	12.5%
Estimated growth rate:	2.5%
Total average drug sales in perpetuity:	$1,470,000
Present value of royalties per launched mAb:	**$182,574**

Sources: IMS Health, McKinsey, and William Blair & Company, L.L.C. estimates

Table 14 summarizes our findings and calculates the net present value of all payments (upfront, milestones, and royalties) for the total number of mAbs currently in development or marketed, assuming each mAb is out-licensed at its current stage of development. On the basis of this assumption, the total net present value of all 369 mAbs currently in development or marketed is roughly $11 billion.

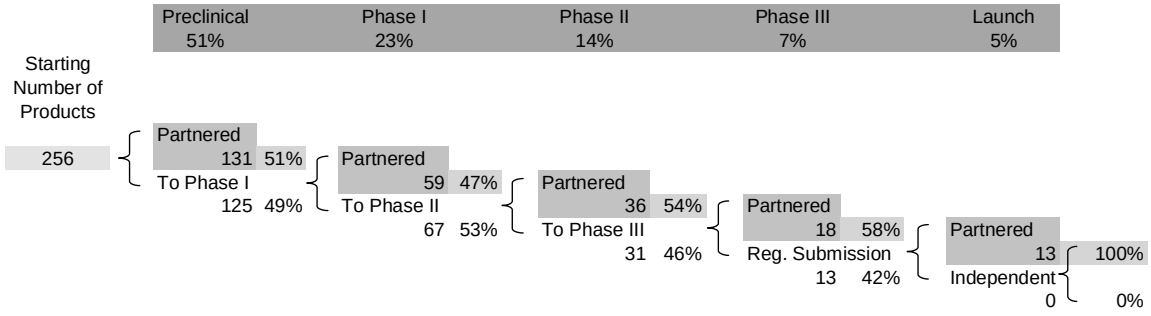
Table 14
Present Value From Upfront and Milestone Payments for All mAbs
($ in thousands)

	Upfront Payments	Present Value of Milestones	Present Value of Royalties	Total Present Value Upon Deal Signing	Number of mAbs at Each Stage	Present Value of All mAbs by Stage
Preclinical	$2,000	$2,386	$3,103	$7,489	256	$1,917,281
Phase I	$5,000	$6,300	$13,604	$24,904	25	$622,591
Phase II	$10,000	$7,924	$40,180	$58,104	60	$3,486,263
Phase III	$15,000	$19,745	$145,128	$179,873	17	$3,057,840
Launched	NA	NA	$182,574	$182,574	11	$2,008,314
				NPV of mAb Pipeline and Launched Products:		**$11,092,289**

Source: PhRMA, Center for the Study of Drug Development - Tufts University, The McKinsey Quarterly, Pharmaprojects, IMS Health, and William Blair & Company, L.L.C. estimates

However, in reality companies form alliances for products at all stages of development. Therefore, we took our analysis a step further by applying probabilities of partnering compounds at each stage of development and recalculating the net present value of the total mAb sector based on our revised findings. Figure 11 summarizes our assumptions for the distribution of partnering deals by stage of development, which is based on a McKinsey study and our own analysis of pharmaceutical alliances; table 15 provides an example of our calculation of the net present value for the 256 mAbs currently in preclinical development. We repeated our analysis for Phase I, Phase II, Phase III, and marketed mAbs, and added our subtotals to arrive at a net present value of roughly $17 billion for the revenue to developmental-stage biotech companies from mAbs, which is illustrated earlier in the report in table 5.

Figure 11
Distribution of Products Partnered by Phase of Development



Source: Pharmaprojects, McKinsey Quarterly, and William Blair & Company, L.L.C. analysis

Table 15
Net Present Value of mAbs in Preclinical Development
($ in thousands)

	Preclinical	I	II	III	Launched
Distribution of Deals	51%	23%	14%	7%	5%
Cumulative Distribution of Deals	51%	47%	54%	58%	100%
Total Molecules at Each Stage	256	125	67	31	13
Partnered	131	59	36	18	13
Advanced	125	67	31	13	-
Expected Value per Preclinical Molecule	$7,489	$24,904	$58,104	$179,873	$182,574
Year	0	3	5	7	9
Present Value of all Preclinical Molecules	$977,813	$1,029,848	$1,155,618	$1,413,306	$809,611
				Cumulative Preclinical Pipeline Value	$5,386,196
				Cumulative Preclinical Pipeline Value per mAb	$21,040

Source: PhRMA, Center for the Study of Drug Development - Tufts Universiy, The McKinsey Quarterly, Pharmaprojects, IMS Health, and William Blair & Company, L.L.C. estimates

Our model assumes 1) every mAb in each company's pipeline will be licensed, 2) deals occur according to our assumed distribution of partnerships by stage of development, and 3) all mAbs in the pipeline are currently unlicensed.

Appendix B: Overview of Select Company Pipelines

Table 16
Antibody Pipelines

		Known Preclinical	I	II	III	Filed	Launched
Major Biotech	Amgen			ABX-EGF	Epratuzumab		
	Biogen	VLA-1 mAb anti-CRIPTO mAb LTBR mAb			Antegren		
	Chiron	**********		[NONE]	**********		
	Genentech	Anti-tissue Factor Ab	2C4 Ab	MLN-02 Ab RhuFab V2	Avastin	Xolair Raptiva	Rituxan Herceptin
	Genzyme			CAT-192			
	Gilead	**********		[NONE]	**********		
	MedImmune	Numax anti-IL-9 anti-EphA2 anti-hMPV	Vitaxin	MEDI-507			Synagis
Platform	Abgenix		ABX-MA1	ABX-EGF ABX-IL8			
	AMEV	Numax anti-IL-9 anti-CD40 hBR96 HUI77 HUIV26 LILLY-1/2 AME-527 AME-359 AME-133	Vitaxin				
	Cambridge Antibody Technology	TRAIL-R2 mAb	LymphoStat-B TRAIL-R1 mAb	J695 CAT-192 CAT-213	CAT-152		Humira
	Medarex	MDX-018 MDX-070	CNTO 148 CNTO 1275 NVS Antibody	MDX-010 (anti-CTLA4) MDX-060 HuMax-CD4 HuMax-IL15			
	PDL			Humanized anti-IL-4 Nuvion (anti-CD3) anti-Gamma Interferon anti-IL-12			Zenapax Synagis Herceptin Mylotarg

Source: Company reports, Pharmaprojects, and William Blair & Company, L.L.C estimates

Appendix C: Specifics of Genentech's Antibody Pipeline

Xolair for Allergic Asthma and Allergic Rhinitis

Xolair currently is approved in Australia for treating adults and adolescents with moderate asthma. Genentech and its partners completed a biologic license application (BLA) for Xolair with the FDA in December 2002. Genentech believes FDA clearance could occur by mid-2003; and assuming clearance is granted, we expect Xolair's initial indication in the United States to be for moderate to severe forms of adult allergic asthma. Genentech will share worldwide Xolair profits under undisclosed terms with its partners Tanox and Novartis.

In our view, Xolair is Genentech's most difficult-to-model, late-stage product candidate in terms of sales potential. We believe the product's novel treatment approach could help Genentech and its partners win a small but meaningful share of the lucrative, albeit competitive, market for allergy and asthma treatments. However, given that Xolair is different from any other asthma or allergy treatment currently marketed, physician and patient adoption of the drug is difficult to predict.

Xolair, a humanized mAb, is administered once or twice monthly, depending on a combination of the patient's body size and immunoglobulin E (IgE) level, via subcutaneous injection. Although the market for allergic asthma sufferers is large (roughly 20 million Americans), given Xolair's less convenient administration route relative to traditional inhalation devices, we expect the product initially will target only those with severe and/or difficult to manage forms of the disease. Xolair inhibits allergic responses by binding to IgE antibodies. IgE is a naturally occurring antibody that activates the immune system upon exposure to allergens. By binding circulating IgE antibodies, Xolair blocks the cascade of events that leads to the symptoms of allergies and asthma, which include respiratory inflammation, runny nose, and watery eyes. Xolair is different from currently available allergy and asthma medications in that it is the first treatment to target the underlying cause of allergies, rather than the symptoms of the disease, leading to a longer duration of clinical benefit relative to existing therapies. This is the key factor that we believe could lead to adoption of the product for treating moderate to severe asthma and allergy sufferers.

Because Xolair targets IgE antibodies, which are common to all forms of allergies and allergic asthma, the drug has the potential to be used for treating a broad set of conditions. Strong results from several additional studies should support expanded off-label use in treating severe or refractory forms of seasonal allergic rhinitis, perennial allergic rhinitis, as well as pediatric versions of allergies and asthma. Assuming the product continues to be demonstrated as safe and effective as its patient base expands, we believe Xolair has the potential to evolve into a franchise with enduring sales growth trends.

Phase III trial results support Xolair's safety and efficacy in treating asthma and allergic rhinitis, and a BLA was submitted in June 2000. However, given the breadth of the patient population addressed in Xolair's application, the FDA in July 2001 issued a response letter requesting additional safety data. Genentech subsequently determined that sufficient data was available from completed or ongoing trials to address some of the FDA's concerns.

While we are confident that a viable market for Xolair exists among patients with severe or refractory forms of allergies and asthma, we caution against overly optimistic sales expectations that are based on the broader market for allergy and asthma medications. Due to Xolair's anticipated high price relative to existing treatments, we expect physicians to prescribe the drug conservatively to avoid reimbursement challenges from insurance companies. Xolair's mode of administration (subcutaneous injection once every two to four weeks) represents an additional obstacle to broad penetration, given that the majority of asthma and allergy sufferers are accustomed to more convenient modes of administration such as inhalers and tablets. However, patients with severe forms of asthma and allergies consume

a disproportionate share of the total costs and resources associated with these diseases, and a significant portion of the costs could be avoided through a treatment program that targets the underlying cause of the symptoms that trigger patients to seek care. We expect the product to be used in combination with existing therapies and as a single treatment.

We also note that the market for allergy and asthma medications is different from any in which Genentech has operated thus far, both clinically and from the standpoint of scale. While we are confident that Genentech, with the help of Novartis, can overcome these challenges, we believe setbacks are possible as the companies work together to develop an efficient infrastructure for manufacturing, marketing, and distributing Xolair.

The allergy and asthma markets. Of the roughly 17 million asthmatics in the United States, about 10% have been diagnosed with a severe or refractory form of the disease, approximately 80% of whom have an allergic component. We conservatively estimate the core addressable market size for Xolair's anticipated initial indication of adult allergic asthma at roughly 1 million patients, which excludes the subset of patients under the age of 12. However, with estimates of as many as 4 million to 5 million Americans with severe or refractory forms of allergies, obtaining approval of Xolair for allergic rhinitis is an important precursor to realizing the product's full commercial potential.

Asthma and allergy—The diseases and treatments. Asthma is characterized by inflammation in the bronchial air passages that causes a narrowing of the airways and, if untreated, a gradual loss of lung function. In many cases, asthma attacks may be triggered or exacerbated by exposure to allergens. Current treatments for asthma are broken into two groups: preventers and relievers. Preventers primarily comprise inhaled forms of anti-inflammatory corticosteroids that control inflammation in the airways. While side effects generally are not an issue for mild to moderate asthma sufferers, patients with severe forms may take a tablet form of a corticosteriod that gets absorbed systemically and may lead to weight gain and/or osteoporosis over an extended period of time. An exception is Merck's Singulair, a once-a-day non-steroidal tablet currently approved for the chronic treatment of asthma and seasonal allergic rhinitis. Relievers, or rescue treatments, primarily comprise inhaled forms of beta-agonists such as albuterol, which are muscle relaxants that provide quick relief from asthma attacks. GlaxoSmithKline's Advair Diskus, which received FDA approval in 2000, has won market acceptance given its status as the only available treatment that combines the anti-inflammation properties of a corticosteroid with the muscle relaxation properties of a beta-agonist in one inhalation device.

Allergy treatments primarily consist of antihistamine tablets such as Aventis' Allegra, Pfizer's Zyrtec, and Schering Plough's Clarinex. These products work by binding histamine receptors, which reduces the symptoms associated with allergies.

Competition and differentiation. While Xolair will compete in a highly saturated market with several well-known brands and plenty of marketing muscle, the product is differentiated by its novel mechanism and increased duration of action. Xolair reduces the sensitivity of the body's immune system to allergens and, if approved, would provide physicians with an additional option for treating moderate to severe patients who have demonstrated an insufficient response to previous treatment attempts. This is an important distinction that will enable Genentech and Novartis to differentiate Xolair from the large and expanding selection of therapies that treat the symptoms of allergies and asthma.

Raptiva for Psoriasis

Raptiva is an anti-CD11a humanized mAb designed for the treatment of moderate to severe psoriasis. Genentech and its co-development partner XOMA filed a BLA with the FDA for Raptiva in December 2002, and the companies believe regulatory clearance in the United States is possible by year-end 2003. In August, Genentech announced that Serono would

market Raptiva globally, excluding the United States, Japan, and certain other Asian countries. Development and marketing rights in the United States remain with Genentech and XOMA, while Genentech retains marketing rights in Japan and certain other Asian countries. Although financial terms of the agreement have not been disclosed, we expect Genentech initially to manufacture and sell Raptiva to Serono at a modest markup to cost for sale outside the United States. We believe Genentech will receive a share of profits on Serono's sales of Raptiva. Serono recently announced that it plans to file for regulatory clearance of Raptiva in Europe in the first quarter of 2003 and expects the product to be launched in 2004.

However, Biogen, which filed for European regulatory clearance for its psoriasis treatment Amevive in August 2001, recently announced that approval in Europe could be delayed for several years due to a request from the review body of the European Agency for the Evaluation of Medicinal Products (EMEA) for additional safety and efficacy data. Amevive's setback in Europe prompted speculation that Genentech and Serono would face similar challenges in seeking regulatory clearance for Raptiva in Europe. However, since Raptiva treatment was not linked to memory T-cell depletion, as was Amevive, in Phase III studies, we believe it is possible the European agency may not address Raptiva's application in the same manner as Amevive's.

Raptiva also is being tested for treating rheumatoid arthritis and organ transplant recipients. Raptiva's mechanism of action stems from its ability to inhibit the binding of T-cells to antigen presenting cells (APC), thereby blocking the cascade of events involved in the autoimmune response that is characteristic of psoriasis. Raptiva does not appear to destroy or inactivate T-cells, as is the case with other biological treatments including Biogen's recently FDA-approved Amevive. Therefore, the risk of opportunistic infection in patients receiving Raptiva over an extended period of time generally is perceived to be lower than with other treatments. Indeed, T-cell counts increased slightly during pivotal Phase III trials with the drug. We note, however, that no correlation has been established between Amevive therapy and the incidence of opportunistic infections in patients receiving as many as six courses of therapy over a four-year period. Our conclusion regarding T-cell depletion and its relation to different mechanisms of action among psoriasis treatments is that it is an area that is not yet clearly understood. To our knowledge, no conclusive evidence has been presented that establishes the superiority of one biological psoriasis treatment over another in terms of its safety profile.

In two 12-week, placebo-controlled, double-blind Phase III studies involving 1,095 patients, 29% and 28% of patients receiving 1 or 2 mg/kg of Raptiva weekly, respectively, reached the primary endpoint of the study, which was defined as a Psoriasis Area Severity Index (PASI) score improvement of 75% or greater. Three percent of patients receiving placebo reached the primary endpoint. PASI is a measure of overall psoriasis severity and coverage on a patient's body and is the standard endpoint used to measure the efficacy of psoriasis treatments. In each study, Raptiva was generally well tolerated, with the most common side effects being headache, chills, upper respiratory infection (common cold), and pain. Side effects subsided with subsequent treatments and after several doses were comparable to placebo. Most patients demonstrated notable improvements in their conditions within two weeks, which represents a very quick onset of action relative to other psoriasis treatments. However, many patients returned to their baseline condition soon after treatment was stopped (within 67 days), and some experienced a "rebound" effect in which conditions worsened subsequent to treatment with Raptiva. This finding suggests that patients using Raptiva will be placed on recurring maintenance regimens to achieve long-term control of the disease. This could lead to higher annual treatment costs, which could trigger reimbursement challenges from insurers. An alternative scenario is that Raptiva could carve out a niche market as a front-line treatment employed by physicians to quickly achieve a clinical benefit in psoriasis patients, while longer-term maintenance therapy would be reserved for treatments with a longer duration of action than Raptiva, such as Amevive.

While Phase III clinical trial results demonstrated Raptiva's safety and efficacy in treating moderate to severe psoriasis, two setbacks caused a significant delay in the product's filing date with the FDA, which finally came in December 2002. The first came about as a result of the agreement between Genentech and XOMA, which called for XOMA to supply product for Phase II clinical trials, and for Genentech to assume manufacturing responsibilities for Phase III studies and for commercial purposes. In the interest of moving clinical trials forward while the manufacturing transfer took place, the two companies chose to conduct initial Phase III studies using XOMA-produced material. However, an October 2001 FDA request for a pharmacokinetic study confirming the comparability of material sourced from the two different manufacturing sites forced the companies to push back Raptiva's anticipated BLA filing date from late 2001 to mid-2002. In early April 2002, the companies announced that the BLA would be delayed further because the pharmacokinetic study had failed to demonstrate comparability as defined by the endpoints agreed upon with the FDA. Specifically, the study found higher serum levels of Raptiva in patients receiving material produced by Genentech compared with those receiving XOMA's material. While the setbacks have hurt Genentech's competitive position in the near term by providing Biogen with an increased period of market exclusivity, we believe the product can compete effectively with other treatments, given its favorable safety profile and quick onset of action.

Although highly underserved, the market for moderate to severe psoriasis treatments proves increasingly competitive. In addition to Biogen's Amevive, Amgen's Enbrel, Johnson & Johnson's Remicade, and Abbott Laboratories' Humira are three biological products currently approved for treating rheumatoid arthritis and other autoimmune disorders, which could gain additional FDA clearances for moderate to severe psoriasis treatment within the next two years. However, given the underserved nature of the market and the wide range of responses to treatments among patients, we believe the psoriasis market opportunity is sufficient to support the success of several biological agents. Assuming Raptiva is the second biologic to reach the market, we believe it can win a large enough share of the psoriasis market to support peak sales of roughly $1 billion.

The profit-sharing arrangement with XOMA implies that strong sales are necessary for Raptiva to affect Genentech's value significantly. Genentech and XOMA will split profits generated from U.S. sales of Raptiva on a 75/25 basis, respectively. While a small bottom-line impact would be meaningful to a company of XOMA's size, we estimate that Raptiva's peak sales in the United States must reach a minimum of $500 million (we assume roughly $800 million in our forecasts) for the project to be judged an economic success to Genentech. This conclusion takes into account the company's investment to date as well as additional costs that will be incurred subsequent to the product's launch.

Additional indications for Raptiva could expand the product's market opportunity significantly. Genentech and XOMA currently are conducting a 240-patient Phase II study investigating Raptiva's safety and efficacy in treating patients with moderate to severe rheumatoid arthritis. This represents the third indication for which Raptiva is being studied. In addition to psoriasis and rheumatoid arthritis, XOMA and Genentech are conducting a Phase I/II clinical trial studying Raptiva's use in treating organ transplant recipients.

The psoriasis market—The disease and treatments. Psoriasis is a chronic skin disorder that researchers believe is related to the immune system, although the exact cause remains unknown. The implication of the immune system makes this disease broadly related to Multiple Sclerosis and other autoimmune response diseases such as Crohn's and rheumatoid arthritis. Researchers believe that some type of biochemical stimulus triggers the immune system (in the form of T-cells), which in turn activates the abnormal skin growth that characterizes psoriasis.

The most common form of the disease is known as plaque psoriasis and is characterized by raised, inflamed (red) lesions covered by a silvery white buildup called scale. A normal skin cell matures in about 30 days and is shed from the skin's surface unnoticed. In psoriasis, skin cells mature and move to the surface in three or four days, causing them to heap up and form the elevated red plaques. The redness of the plaques comes from the increased blood supply necessary to feed the rapidly dividing skin cells. The most severe forms of the disease are highly debilitating and require therapeutic intervention.

Studies suggest that psoriasis affects 2.6% of the U.S. population, which translates into more than 7 million individuals. About 550,000 of these individuals have severe psoriasis, a condition that warrants systemic drug treatment. There is roughly the same number of severe psoriatics in Europe.

Furthermore, the psoriasis market appears to be highly underserved. Based on a survey conducted by the National Psoriasis Foundation (NPF), psoriatics experience serious physical limitations and suffer emotionally on a daily basis. Of the 17,000 members responding to the survey: 20% regularly have trouble sleeping, 25% have problems connected to sexual activities, 16% have difficulty using their hands, and 12% have difficulty walking. These limitations affect the ability to hold a job and take care of children. Emotional and psychological stress linked to public discrimination also is prevalent. Twenty-four percent of the survey responders have been refused treatment at hair salons, and 20% have been asked to leave public swimming pools. One in 10 has been clinically diagnosed with depression. One in 20 has contemplated suicide specifically because of his or her skin disease.

Psoriasis patients spend an average of 25 minutes a day treating their skin with lotions, bathing routines, oils, and/or topical treatments, and are in a dermatologist's office between 5 and 10 times per year. Forty percent of all psoriatics responding to the NPF survey are most bothered by the fact that currently available treatments simply do not work. Ninety percent believe that a product that offered 50% lesion clearance with few or no side effects would be of value. Efficacy is quantified as the percentage reduction in psoriatic lesion surface area.

The target audience for Raptiva in the United States is relatively concentrated, which makes it ideal for Genentech's marketing infrastructure, which has been focused on addressing relatively small patient populations. In the United States, 100 treatment centers and the top 1,700 prescribing dermatologists represent 80% of the prescriptions written for psoriasis. In Europe, where dermatologists treat 85% of targeted patients and tend to use more advanced therapy than their U.S. counterparts, a similar level of concentration exists.

Currently available treatments for psoriasis can be divided into three basic categories: sunlight and topical agents (external therapies); phototherapy (artificial ultraviolet light or a combination of UV light and medications); and systemic (internal) medications administered by pill or injection. All these treatments have significant safety or efficacy limitations. Raptiva is a new systemic treatment that likely will compete against the following existing treatments.

Methotrexate (generic) is the most commonly prescribed systemic medication for severe and disabling psoriasis and yet it has garnered only a modest comfort level from dermatologists. It is taken orally or given by injection once per week, in a single or split dose. Methotrexate has a long history of proven effectiveness in clearing or greatly improving psoriasis, including the most severe forms of the disease. However, due to the safety risks associated with the drug, careful monitoring is required. Short-term side effects include nausea, fatigue, loss of appetite, and mouth sores. Long-term issues include liver,

lung, and bone marrow toxicities. Liver biopsies usually are necessary to verify that the drug is not damaging the organ. Methotrexate costs between $900 and $2,200 per patient year, not including the cost of liver biopsies.

Cyclosporine (Novartis) is a drug that suppresses the immune system and, as such, originally was marketed to prevent the rejection of transplanted organs (an indication for which Raptiva is being tested). The drug also is approved for treating severe psoriasis in those patients who cannot take or have not responded to other systemic therapies. Cyclosporine is available in either capsule or liquid form and generally works very well at improving or clearing psoriasis. However, the drug causes high blood pressure and is toxic to the kidneys over the long term. This medication is not approved for continuous treatment of more than one year. A one-year course of treatment costs between $4,700 and $6,600.

Acitretin (prescribed under the brand name Soriatane by Roche in the United States) is related to vitamin A and is the only approved retinoid for treating severe cases of psoriasis. The drug demonstrates only modest efficacy as a single initiating agent and can lead to elevated blood lipids and liver toxicity. Acitretin has won a moderate comfort level among dermatologists and costs between $2,000 and $3,000 per patient year.

Phototherapy involves exposing the skin to a particular wavelength of ultraviolet light. While it is effective in a majority of patients, it is highly time-consuming and carries risks when used for extended periods. Long-term phototherapy can lead to premature aging of the skin and increases the risk of skin cancer. The level of risk is related to several factors, including the patient's skin type, the number of treatments received, and the cumulative dose of light administered to the skin. The annual cost of phototherapy generally ranges between $2,500 and $3,500.

New psoriasis therapy competition and differentiation. The promise of new biologic drugs to treat psoriasis recently has stirred up a great deal of enthusiasm within the dermatologist community. There are several biological candidates currently in development for the treatment of moderate to severe psoriasis. The most promising of these treatments have garnered renewed hope among physicians and patients that psoriasis can be managed safely and effectively even in its most severe manifestations. Below is a brief comparison of Raptiva and other lead biological candidates for moderate to severe psoriasis. It is important to note that the clinical trial data for each of the biologicals are not directly comparable since they were collected from separate studies, involving different sets of parameters. We are not aware of any ongoing head-to-head trials between the new psoriasis treatments at this time.

In January 2003, *Amevive* (Biogen) became the first biologic agent to win FDA clearance for treating moderate to severe psoriasis. The drug appears to work by blocking what medical researchers call "memory" T-cells from coordinating the immune response that leads to the rapid growth of skin cells and lesions on the skin. Memory T-cells already have played a role in triggering at least one prior psoriasis episode and are likely to trigger future episodes. However, another category of T-cells, called "naïve" T-cells, has yet to activate any immune response and as such remains "on call" to attack foreign elements the body deems threatening on a cellular level. Amevive does not appear to block the action of these naïve T-cells. This distinction is important. The fact that Amevive affects memory T-cells but not naïve T-cells suggests that psoriasis can be immunologically addressed without compromising an important biological defense mechanism. If this were not the case, Amevive patients likely would experience a higher incidence of opportunistic infection. However, Amevive patients have not demonstrated higher rates of infection in any of the clinical studies conducted. Nevertheless, because the interplay of memory and naïve T-cells is not understood precisely yet, there certainly is a risk that the long-term use of Amevive could lead to a reduction in the body's ability to ward off infection.

Biogen enrolled roughly 1,100 patients at 100 sites in the United States, Canada, and Europe in two 12-week Phase III studies. One study, involving 553 patients, investigated Amevive's safety and efficacy when the product is administered intravenously (IV) on a weekly basis, while a second 507-patient study examined weekly intramuscular (IM) administration of Amevive. In the IV group, after 12-weekly 7.5 mg doses of Amevive treatment, 14% of patients receiving Amevive reached the primary endpoint of the study (PASI score improvement of 75% or greater), compared with 4% in the placebo group. In the IM group, after 12 weeks, 21% of patients receiving weekly 15 mg doses achieved PASI score improvements of 75% or greater, compared with 5% of patients receiving placebo. The duration of efficacy was about seven months and the most common side effects were upper respiratory infections (common cold), headache, and chills.

Enbrel (Amgen) and *Remicade* (Johnson & Johnson) are marketed biologic products that have received FDA approval to treat rheumatoid arthritis (both), psoriatic arthritis (Enbrel), and Crohn's Disease (Remicade), and also are being tested as psoriasis treatments. Both these products inhibit what is called TNF-alpha (tumor necrosis factor-alpha), an immune system molecule that, when produced at elevated levels, leads to bone and tissue damage in and around the joints. In January 2003, Amgen announced favorable Phase III study results in the treatment of moderate to severe psoriasis. Although complete study results from the Phase III Enbrel study will be presented in March 2003 at the 61st Annual American Academy of Dermatology (AAD) Meeting, initial efficacy data looks strong, with 60% of patients receiving Enbrel achieving a 75% improvement in their condition after 24 weeks of therapy. We believe both Enbrel and Remicade could gain FDA clearance for a psoriasis indication by year-end 2004.

Additional potential biological treatments for psoriasis include Abbott and Cambridge Antibody Technology's fully human monoclonal antibody Humira, which was recently approved for rheumatoid arthritis in the United States, and MedImmune's Siplizumab (MEDI-507), which is a humanized mAb currently in Phase II development that has exhibited efficacy in a small group of psoriasis patients.

Avastin for Cancer

Antiangiogenesis cancer treatment. Avastin is a humanized monoclonal antibody designed to bind to and inhibit vascular endothelial growth factor (VEGF), a protein that plays an important role in tumor angiogenesis (the formation of new blood vessels to the tumor) and maintenance of established tumor blood vessels. We expect results from a 200-patient Phase III colorectal cancer study for Avastin in combination with chemotherapy to be announced during mid-2003. We note that Genentech announced in September that Avastin failed to meet its primary endpoint of progression-free survival in a Phase III metastatic breast cancer study in combination with Roche's Xeloda. While there are several additional studies ongoing for Avastin in various tumor types, we believe unfavorable efficacy and/or safety results in the ongoing colorectal cancer study would represent a significant setback to Avastin's outlook. Moreover, our field research indicates that Avastin may demonstrate more success in earlier, rather than later, stages of cancer.

From a valuation standpoint, we believe Avastin is Genentech's most important late-stage candidate. Unlike Xolair, Raptiva, and Tarceva, a small-molecule cancer drug, Genentech does not have to give up a share of Avastin's U.S. profits to partners. If approved, we expect future cash flows from Avastin to exceed those of Genentech's other late-stage candidates, leading to a significantly greater impact to Genentech's intrinsic value. By the same token, our estimate of Genentech's intrinsic value would decrease significantly if Genentech fails in its efforts to bring Avastin to market.

Angiogenesis refers to the formation of new blood vessels, an important natural process that occurs in the body during cell reproduction and for healing injured tissue. Blood vessels, which are made up of endothelial cells, deliver oxygen and nutrients to all tissues in the body. However, cancer cells essentially take control of the angiogenesis process to commandeer a blood supply. Once adequate blood flow has been established, the tumor is able to grow rapidly in size, while cancer cells escape through blood vessels and circulate throughout the body, spreading to other organs (a process known as metastasis).

New blood vessel growth occurs when hypoxic (oxygen starved) cells, including cancer cells, secrete VEGF, a protein that binds to nearby blood vessels and stimulates extensions, similar to branches on a tree. Avastin, a so-called anti-VEGF agent, is an antibody that binds to VEGF and thereby renders it inactive. This process blocks the blood supply to tumors, thereby killing cancerous cells by depriving them of essential oxygen and nutrients.

Avastin is the forerunner among this relatively new class of oncology treatments known as angiogenesis inhibitors. If Avastin's safety and efficacy profile proves robust during ongoing Phase III clinical trials, it has the potential to penetrate multiple cancer markets. The product currently is being investigated for the treatment of colorectal (colon) cancer, metastatic breast cancer, non-small cell lung cancer (NSCLC), and renal cell carcinoma (RCC). We note that Genentech's strong background in marketing bio-oncology products should help ensure that Avastin achieves its sales potential, assuming regulatory clearance is achieved. Importantly, we do not believe Avastin will cannibalize sales significantly in Genentech's existing oncology franchise, given that its therapeutic indications will differ from those of Rituxan and Herceptin.

Antiangiogenesis therapy—Competition and differentiation. Antiangiogenesis therapy in the treatment of cancer has generated considerable excitement. By some estimates, more than 300 angiogenesis inhibitor molecules have been discovered thus far, with about 50 currently under development. Until recently, a close competitor to Avastin was Pharmacia's SU5416, which was being tested in a Phase III study targeting colorectal cancer. However, Pharmacia closed the SU5416 program prior to the trial's completion when the drug failed to meet its pre-specified interim-study efficacy endpoint. Although SU5416 also is an angiogenesis inhibitor, we do not believe its failure necessarily foreshadows the clinical path of Avastin. The Pharmacia drug is a small-molecule synthetic compound, while Genentech's is a mAb. Moreover, while both target the VEGF protein, their binding mechanisms are not the same. However, Pharmacia's clinical failure certainly underscores the risks attached to any novel treatment such as Avastin. In addition, Entremed is in the early stages of human testing for Endostatin and Angiostatin, two proteins that were shown to shrink tumors in mice by inhibiting angiogenesis. While the drugs appear to be relatively safe, efficacy results have been disappointing thus far.

rhuFab V2. rhuFab V2 is a mAb fragment with angiogenesis inhibitor properties that currently is being evaluated in a Phase III study for the treatment of the wet form of age-related macular degeneration (AMD). AMD is a leading cause of blindness in the elderly, occurring in 20% of individuals over the age of 65. In the wet form of the disease, new blood vessels grow beneath the retina and leak blood and fluid, which prevents the retina from functioning properly. Although the dry form of AMD accounts for 80%-90% of all cases, we believe that the population of roughly 2 million wet-AMD sufferers represents a largely underserved market in terms of current treatment options. Genentech recently announced plans to advance rhuFab V2 for the wet form of AMD into Phase III clinical trials during first quarter 2003, on the basis of favorable Phase Ib/II study results. The market for AMD treatments, while quite large, is growing increasingly competitive, with several treatments currently in the late stages of development. We believe products that halt or reverse the loss of vision that occurs in patients with the wet form of AMD will emerge as the leaders in this market. The rhuFab data thus far suggests that the product may achieve this clinical outcome.

2C4 antibody. Genentech and Roche are collaborating on the development of 2C4, a humanized antibody that may be effective in treating several types of solid tumors by targeting the HER2 signaling pathway. Specifically, 2C4 appears to prevent the HER3 protein from attaching to the HER2 protein on the surface of cells, which interrupts the cascade of events that occurs during the proliferation of cancer cells. On the basis of favorable results from a Phase I study, Genentech has chosen to advance 2C4, and will initiate Phase II studies in 2003.

Appendix D: Detail of Biogen's Antibody Pipeline

Antegren for MS and Crohn's Disease

Antegren is a *humanized* monoclonal antibody that is being developed for the treatment of MS and Crohn's disease in a 50/50 joint venture between Biogen and Elan Pharmaceuticals. The two companies will share equally in all costs and revenue associated with developing and marketing the drug and will co-promote it worldwide. Biogen is leading the research effort in MS, and Elan is spearheading efforts in Crohn's. While our financial model assumes Antegren will begin contributing to Biogen's top line in 2006, enrollment of roughly 3,000 patients in four Phase III studies has been completed—two in MS and two in Crohn's—and Biogen believes interim study results could be available in late 2003 or early 2004, which potentially could lead to an accelerated time line to Antegren's regulatory approval.

One trial is testing Antegren as a monotherapy in 900 MS patients with the relapsing-remitting form of the disease and will seek to demonstrate a positive effect on the rate of MS disability and clinical relapses. The second trial will compare the combination of Antegren and Avonex with Avonex alone in slowing the rate of MS disability and reducing the rate of clinical relapses in more than 1,000 patients with relapsing-remitting MS. Biogen will be the lead researcher for both studies.

In terms of Phase III Crohn's studies, one will be a double-blinded, placebo-controlled 850-patient study to measure therapeutic response and ability to induce remission at week 10. The second pivotal trial will measure duration of response and remission in a smaller 300-patient, double-blinded, placebo-controlled study. These two studies in Crohn's disease also are expected to be two years in duration.

The most important aspect of Antegren is that it is different: its mechanism of action is unlike that of the beta-interferons (Avonex, Betaseron, and Rebif) or Copaxone. Although still theory, it is believed that Avonex and the competing beta-interferons slow the progression of MS by "fooling" T-cells into releasing agents that are not specifically programmed for myelin destruction, instead of those that are. Nevertheless, a migration of agents (cytokines) still occurs. Antegren seems to halt the migration altogether, which may prevent the passage of cytokines across the blood brain barrier into the central nervous system, which is a primary part of the cascade of events that triggers inflammation and eventually myelin breakdown in MS patients. Antegren is being studied as a single agent and in combination with Avonex; assuming Phase III study results are favorable, we believe Antegren has the potential to generate peak annual sales in excess of $1 billion, by targeting patients with conditions that are poorly managed by existing MS treatments.

In a Phase II MS study, 213 patients received monthly intravenous infusions of one or two Antegren doses or placebo over a six-month period. Antegren patients showed a 90% reduction in brain lesions compared with those given a placebo. These lesions are believed to be a primary cause of MS, although this has yet to be definitively proved. These are encouraging data, given what is known about the impact of Avonex and other beta-interferons on brain lesions. Beta-interferons have been shown to reduce lesions by about 70% after

one year of treatment and about 75% after two years. Antegren also showed reduced exacerbation relapse rates—reductions of between 41% and 64% depending on dosing—over the six-month period of treatment. For beta-interferons the corresponding rate is about 30%. The drug generally was well tolerated and only required a once-per-month IV infusion in a physician's office.

In the Crohn's study, 244 patients with moderate to severe forms of the disease received one or two Antegren IV infusions, or placebo, on a four-week interval. Patients were followed for a total of 12 weeks. The primary endpoint was the percentage of patients who achieved a CDAI (Crohn's Disease Activity Index) of less than 150 (remission) at week six. Results demonstrated that 46% of patients receiving two infusions of the lowest dose experienced remission at week six, compared with 38% of placebo-treated patients. This same dosage arm showed a disease response in 74% of patients, as opposed to 38% in the placebo group. These results, while promising, are not as strong as those generated in Phase II studies for Remicade, a Johnson & Johnson product approved for the treatment of refractory Crohn's disease. In that study, Remicade drove a disease response in 81% of patients treated, compared with 17% of placebo, and caused remission in 48% of patients, compared with 4% of placebo. We assume the market opportunity of Antegren in Crohn's disease will be significantly smaller than that for MS.

Biogen's Early-stage mAb Candidates

Biogen recently announced a co-development agreement with IDEC Pharmaceuticals for three of its oncology candidates, two of which are anti-tumor mAbs currently in preclinical development. Under terms of the agreement, IDEC will assume development responsibilities and incur all expenses related to the development of the products for a maximum of four years. Biogen has the option to re-establish a share of ownership in the products at any time over the four-year period, thereby gaining an opportunity to share in potential profits if one or more of the products is commercialized. There are no upfront payments or milestones to be paid by either company under the current deal structure.

We view Biogen's strategy for outsourcing the early-stage development of its oncology platform favorably, in that the company is minimizing its investment in the products during the early—and most risky—stages of development, while maintaining the opportunity to make an informed decision regarding whether to participate in the development and commercialization of the products after initial safety and efficacy studies are completed. In addition, we believe IDEC's experience in developing and marketing oncology treatments provides a value-added resource to Biogen in designing clinical studies, preparing regulatory submissions, and planning a commercialization strategy for its oncology platform. Recall that IDEC and Genentech co-developed and co-market Rituxan for non-Hodgkin's lymphoma, which was the first monoclonal antibody approved for the treatment of cancer. In addition, IDEC developed and markets Zevalin, which is a radiolabeled version of Rituxan. Moreover, we are pleased that Biogen is taking measures to potentially accelerate the development of its oncology franchise while also expanding its presence in the mAb sector.

Appendix E: Covered Company Descriptions and Models

Biogen, Inc. (Market Perform, Core Growth)

Biogen is a fully integrated biotechnology company that discovers, manufactures, and markets biological drug products. The company currently derives about 90% of its revenues from Avonex, a highly successful treatment for MS approved by the FDA in 1996. However, two new products—Amevive for psoriasis, which gained FDA clearance in January 2003, and Antegren for MS and Crohn's disease, which is in Phase III testing—should contribute to earnings growth between 2003 and 2006. We believe Biogen's recent FDA clearance for Amevive represents a risk-reducing event rarely seen in the drug industry. However, we continue to rate Biogen's shares Market Perform with a company profile of Core Growth until we gain additional visibility regarding Amevive's adoption in the U.S. psoriasis market, the timing of its regulatory approval in Europe, and the impact of increased competition in the MS market on Avonex's market share in 2003.

Table 17
Biogen, Inc.
Quarterly Earnings Statement
($ in millions, except per share amounts)

Fiscal Year Ends December	1Q02A	2Q02A	3Q02A	4Q02A	2002A	1Q03E	2Q03E	3Q03E	4Q03E	2003E	2004E
Avonex	266.0	250.5	261.6	256.3	1,034.4	263.6	266.9	267.1	265.5	1,063.1	1,067.4
Amevive						0.3	8.2	25.6	34.2	68.3	176.0
Royalties	22.4	18.7	26.8	46.2	114.0	30.0	35.0	35.0	25.0	125.0	100.0
Total Revenues	288.3	269.3	288.3	302.4	1,148.4	294.0	310.1	327.8	324.6	1,256.5	1,343.4
Cost of Goods Sold	39.3	36.2	42.1	42.6	160.2	43.8	45.0	45.9	45.5	180.1	188.1
Gross Profit	249.0	233.1	246.3	259.8	988.2	250.2	265.1	281.9	279.2	1,076.4	1,155.3
Research and Development	82.5	83.5	104.6	91.2	361.8	95.5	99.2	101.6	97.4	393.8	416.4
Selling, General, and Administrative	73.4	91.6	72.6	86.4	324.0	88.2	91.5	93.4	89.3	362.4	369.4
Operating Expenses	155.9	175.1	177.2	177.6	685.8	183.7	190.7	195.0	186.7	756.1	785.9
Operating Income	93.2	57.9	69.1	82.2	302.4	66.4	74.4	86.9	92.5	320.2	369.4
Interest and Other, Net	9.2	8.1	8.0	8.0	33.4	9.0	9.5	10.1	10.8	39.3	50.8
Income Before Taxes	102.4	66.0	77.1	90.3	335.8	75.4	83.9	96.9	103.4	359.6	420.3
Taxes	28.7	18.5	21.6	25.3	94.0	21.1	23.5	27.1	28.9	100.7	117.7
Net Income	73.7	47.6	55.5	65.0	241.8	54.3	60.4	69.8	74.4	258.9	302.6
Diluted Shares Outstanding	152.2	152.0	151.4	152.1	151.9	153.0	153.0	153.0	153.0	153.0	153.0
Diluted Earnings Per Share	0.48	0.31	0.37	0.43	1.59	0.35	0.39	0.46	0.49	1.69	1.98
EPS (Excl. Special Items)	**0.48**	**0.31**	**0.37**	**0.43**	**1.59**	**0.35**	**0.39**	**0.46**	**0.49**	**1.69**	**1.98**

As a Percentage of Revenue:	1Q02A	2Q02A	3Q02A	4Q02A	Full Year	1Q03E	2Q03E	3Q03E	4Q03E	Full Year	Full Year
Total Revenues	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Cost of Goods Sold	13.6%	13.4%	14.6%	14.1%	13.9%	14.9%	14.5%	14.0%	14.0%	14.3%	14.0%
Gross Profit	86.4%	86.6%	85.4%	85.9%	86.1%	85.1%	85.5%	86.0%	86.0%	85.7%	86.0%
Research and Development	28.6%	31.0%	36.3%	30.2%	31.5%	32.5%	32.0%	31.0%	30.0%	31.3%	31.0%
Selling, General, and Administrative	25.5%	34.0%	25.2%	28.6%	28.2%	30.0%	29.5%	28.5%	27.5%	28.8%	27.5%
Operating Income	32.3%	21.5%	24.0%	27.2%	26.3%	22.6%	24.0%	26.5%	28.5%	25.5%	27.5%
Net Income	25.6%	17.7%	19.3%	21.5%	21.1%	18.5%	19.5%	21.3%	22.9%	20.6%	22.5%

Year-Over-Year Growth (%)	1Q02A	2Q02A	3Q02A	4Q02A	Full Year	1Q03E	2Q03E	3Q03E	4Q03E	Full Year	Full Year
Total Revenues	21.6%	3.3%	8.7%	7.8%	10.1%	2.0%	15.2%	13.7%	7.3%	9.4%	6.9%
Cost of Goods Sold	34.9%	2.9%	15.3%	19.3%	17.3%	11.4%	24.2%	9.1%	6.7%	12.5%	4.4%
Gross Profit	19.8%	3.4%	7.7%	6.2%	9.0%	0.5%	13.8%	14.5%	7.4%	8.9%	7.3%
Research and Development	13.3%	5.6%	47.5%	8.9%	18.0%	15.9%	18.8%	-2.8%	6.8%	8.8%	5.8%
Selling, General, and Administrative	51.1%	65.7%	20.6%	27.0%	39.6%	20.2%	-0.1%	28.6%	3.3%	11.8%	2.0%
Operating Income	7.6%	-36.4%	-29.2%	-11.5%	-17.9%	-28.7%	28.4%	25.7%	12.5%	5.9%	15.4%
Net Income	4.8%	-33.8%	-26.4%	-10.9%	-16.8%	-26.3%	27.0%	25.7%	14.5%	7.1%	16.9%
EPS (Excl. Special Items)	5.7%	-33.3%	-25.8%	-10.8%	-16.3%	-26.7%	26.2%	24.4%	13.8%	6.3%	16.9%

Biosite, Inc. (Outperform, Core Growth)

Biosite is a leading company supplying rapid assays to the more than $2 billion immunodiagnostic market. We believe the prospects for Biosite are promising, based on strong sales of Triage BNP (B-type Natriuretic Peptide), the potential of Biosite Discovery, and key products that should launch by 2004. We estimate that 2003 Triage BNP revenues will more than double to nearly $75 million (54% of revenues), which will more than compensate for the slower growth of Triage Cardiac, in our opinion. Although the recent FDA clearance of Roche's test for NT-proBNP will be the first competitive product to BNP, we do not expect this competition to be either an immediate or significant risk to Biosite's sales, although the launch could affect investor sentiment negatively. We estimate that Biosite's BNP market share will peak at 50% by mid-2004, with revenues exceeding $100 million. This revenue estimate may prove conservative, given that the potential of the BNP market could reach more than $500 million.

Table 18
Biosite, Inc.
Quarterly Earnings Statement
($ in millions, except per share amounts)

	1Q02	2Q02	3Q02	4Q02	2002	1Q03E	2Q03E	3Q03E	4Q03E	2003E	2004E
Net Sales	$ 18,648	$ 24,955	$ 28,926	$ 32,697	$ 105,226	$ 33,321	$ 36,705	$ 39,235	$ 41,575	$ 150,836	$ 186,161
Diagnostics	17,794	23,117	28,103	31,816	100,830	32,446	35,755	38,210	40,475	146,886	181,011
Discovery	854	1,838	823	881	4,396	875	950	1,025	1,100	3,950	5,150
COGS	5,702	7,165	8,794	9,888	31,549	10,058	11,084	11,845	12,547	45,535	56,113
Gross Profit	12,946	17,790	20,132	22,809	73,677	23,263	25,621	27,390	29,028	105,301	130,047
SG&A	6,064	7,851	8,983	11,337	34,235	10,663	11,394	11,878	12,807	46,742	56,987
R&D	3,577	3,876	4,636	4,259	16,348	5,313	5,534	6,157	6,546	23,550	27,738
Other (Legal, ETC)	1,317	1,498	1,228	-	4,043	250	250	250	250	1,000	1,000
Total Operating Expense	10,958	13,225	14,847	15,596	54,626	16,226	17,178	18,285	19,603	71,292	85,724
Income From Operations	1,988	4,565	5,285	7,213	19,051	7,037	8,442	9,105	9,425	34,009	44,323
Interest and Other Income	624	617	572	610	2,423	656	632	669	701	2,658	3,294
Non-operating Income (Expense)	624	617	572	610	2,423	656	632	669	701	2,658	3,294
Earnings Before Income Taxes	2,612	5,182	5,857	7,823	21,474	7,692	9,075	9,774	10,126	36,667	47,617
Provision (Benefit) for Income Taxes	978	2,058	2,189	2,855	8,080	3,000	3,539	3,812	3,949	14,300	18,571
Net Income	$1,634	$3,124	$3,668	$4,968	$13,394	$4,692	$5,536	$5,962	$6,177	$22,367	$29,046
Net Income Per Share Diluted	$0.11	$0.20	$0.24	$0.31	$0.86	$0.30	$0.35	$0.37	$0.39	$1.40	$1.79
Weighted Average Shares Outstanding	15,223	15,570	15,464	15,814	15,518	15,839	15,913	15,983	16,011	15,936	16,235
Year-over-year Growth											
Total Revenue	23.1%	53.9%	70.1%	89.4%	60.3%	78.7%	47.1%	35.6%	27.2%	43.3%	23.4%
Diagnostic Revenue	25.3%	50.7%	76.3%	90.8%	62.2%	82.3%	54.7%	36.0%	27.2%	45.7%	23.2%
Gross Profit	19.7%	49.9%	56.5%	83.2%	53.5%	79.7%	44.0%	36.1%	27.3%	42.9%	23.5%
Income From Operations	3.4%	83.0%	90.7%	809.6%	138.7%	254.0%	84.9%	72.3%	30.7%	78.5%	30.3%
Net Income	6.9%	63.0%	72.2%	332.0%	99.1%	187.2%	77.2%	62.5%	24.3%	67.0%	29.9%
EPS	7.5%	64.9%	72.2%	312.7%	97.8%	176.0%	73.4%	57.3%	22.8%	62.6%	27.5%
As a Percentage of Sales	**1Q02**	**2Q02**	**3Q02**	**4Q02**	**2002**	**1Q03E**	**2Q03E**	**3Q03E**	**4Q03E**	**2003E**	**2004E**
Net Sales	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Diagnostics	95.4%	92.6%	97.2%	97.3%	95.8%	97.4%	97.4%	97.4%	97.4%	97.4%	97.2%
Discovery	4.6%	7.4%	2.8%	2.7%	4.2%	2.6%	2.6%	2.6%	2.6%	2.6%	2.8%
Gross Margin (% of Diagnostics)	68.0%	69.0%	68.7%	68.9%	68.7%	69.0%	69.0%	69.0%	69.0%	69.0%	69.0%
Income From Operations	10.7%	18.3%	18.3%	22.1%	18.1%	21.1%	23.0%	23.2%	22.7%	22.5%	23.8%
Net Income	8.8%	12.5%	12.7%	15.2%	12.7%	14.1%	15.1%	15.2%	14.9%	14.8%	15.6%

Celera Genomics Group (Outperform, Aggressive Growth)

We believe that Celera Genomics is making meaningful progress in transforming into a drug discovery and development company, as its current business foci are Celera Diagnostics—Celera's joint venture with Applied Biosystems—and Celera Therapeutics. Its original Celera Discovery System (CDS) business now is distributed and marketed through Applied Biosystems' Knowledge Business, although this business will continue to generate cash flow for Celera through fiscal 2006. Celera Genomics' near-term goals include prioritizing its portfolio of preclinical drug candidates, which include the Cathepsin S and Cathepsin K inhibitors, being developed in collaboration with Aventis and Merck, respectively, while continuing to build infrastructure in its therapeutics and diagnostics businesses.

Table 19
Celera Genomics Group
Quarterly Earnings Statement
($ in thousands, except per share amounts)

	Q1 02	Q2 02	Q3 02	Q4 02	FY 2002	Q1 03	Q2 03	Q3 03E	Q4 03E	FY 2003E	FY 2004E
Revenues	$ 27,274	$ 35,024	$ 30,487	$ 28,100	$ 120,885	$ 23,600	$ 22,900	$ 21,558	$ 20,847	$ 88,905	$ 86,104
COS	11,915	17,992	12,502	6,600	49,009	3,400	3,700	3,663	3,626	14,389	14,146
Gross Margin	15,359	17,032	17,985	21,500	71,876	20,200	19,200	17,895	17,221	74,516	71,958
R&D	27,742	30,611	37,629	36,700	132,682	32,500	32,900	34,545	36,272	136,217	146,912
SG&A	12,605	13,956	13,636	10,200	50,397	7,000	7,000	8,050	9,660	31,710	34,312
Amortization	471	1,635	2,636	2,700	7,442	2,700	1,700	1,700	1,700	7,800	6,800
Restructuring				2,800	2,800	-	-	-	-	-	-
Total Operating Expenses	40,818	46,202	53,901	52,400	193,321	42,200	41,600	44,295	47,632	175,727	188,024
Operating Loss	(25,459)	(29,170)	(35,916)	(30,900)	(121,445)	(22,000)	(22,400)	(26,400)	(30,411)	(101,211)	(116,066)
Interest Income	10,850	8,704	6,805	5,300	31,659	5,200	4,700	5,625	5,499	21,024	21,578
Loss on Investments	-	-	-	-	-	-	(300)	-	-	(300)	-
Other Income (Expense)	(716)	(1,171)	(3,521)	700	(4,708)	(3,200)	600	(633)	(1,078)	(4,311)	(2,371)
Loss From Celera Diagnostics	(9,377)	(8,500)	(12,353)	(14,500)	(44,730)	(13,300)	(9,900)	(15,235)	(15,725)	(54,160)	(29,000)
Loss Before Income Taxes	(24,702)	(30,137)	(44,985)	(39,400)	(139,224)	(33,300)	(27,300)	(36,643)	(41,715)	(138,958)	(125,859)
Benefit for Income Taxes	9,140	11,135	16,469	16,600	53,344	13,700	11,200	13,924	15,852	54,676	45,243
Net Loss	(15,562)	(19,002)	(28,516)	(22,800)	(85,880)	(19,600)	(16,100)	(22,718)	(25,863)	(84,282)	(80,617)
EPS	$ (0.25)	$ (0.29)	$ (0.42)	$ (0.33)	$ (1.30)	$ (0.28)	$ (0.23)	$ (0.32)	$ (0.36)	$ (1.17)	$ (1.10)
Shares Outstanding	61,792	64,693	68,406	69,205	66,047	71,100	71,404	72,071	72,431	71,752	73,341
Year-over-year Growth											
Revenue	49%	72%	30%	3%	35%	-13%	-35%	-29%	-26%	-26%	-3%
Total Operating Expenses	-37%	-32%	-19%	-23%	-28%	3%	-10%	-18%	-9%	-9%	7%
Net Loss	-39%	-36%	-2%	-34%	-28%	26%	-15%	-20%	13%	-2%	-4%

As a Percentage of Sales	Q1 02	Q2 02	Q3 02	Q4 02	FY 2002	Q1 02	Q2 02E	Q3 02E	Q4 02E	FY 2002E	FY 2004E
Net Revenues	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
COS	44%	51%	41%	23%	41%	14%	16%	17%	17%	16%	16%
Gross Margin	56%	49%	59%	77%	59%	86%	84%	83%	83%	84%	84%
R&D	102%	87%	123%	131%	110%	138%	144%	160%	174%	153%	171%
SG&A	46%	40%	45%	36%	42%	30%	31%	37%	46%	36%	40%
Amortization	2%	5%	9%	10%	6%	11%	7%	8%	8%	9%	8%
Total Operating Expenses	150%	132%	177%	186%	160%	179%	182%	205%	228%	198%	218%
Operating Loss	-93%	-83%	-118%	-110%	-100%	-93%	-98%	-122%	-146%	-114%	-135%
Interest Income	40%	25%	22%	19%	26%	22%	21%	26%	26%	24%	25%
Loss Before Income Taxes	-91%	-86%	-148%	-140%	-115%	-141%	-119%	-170%	-200%	-156%	-146%
Benefit for Income Taxes	-37%	-37%	-37%	-42%	-38%	-41%	-41%	-38%	-38%	-39%	-36%
Net Loss	-57%	-54%	-94%	-81%	-71%	-83%	-70%	-105%	-124%	-95%	-94%

Genentech, Inc. (Market Perform, Established Growth)

Genentech is a fully integrated biotechnology company that discovers, manufactures, and markets biological drug products. The company derives about 55% of its revenues from two cancer drugs: Rituxan and Herceptin. Genentech recently completed regulatory submissions to the FDA for Xolair for asthma and Raptiva for psoriasis, both of which could gain clearance by year-end 2003. In addition, the company is testing several new products, including Avastin and Tarceva for cancer, which could contribute significantly to earnings between 2003 and 2006. While we believe Genentech is arguably one of the most compelling long-term growth opportunities in the drug industry, we believe shares could be volatile over the next 12 months as Rituxan growth slows and additional information is released regarding the outlook for Genentech's late-stage drug candidates.

Table 20
Genentech, Inc.
Quarterly Earnings Statement
($ in millions, except per share amounts)

Fiscal Year Ends December	1Q02	2Q02	3Q02	4Q02E	2002E	1Q03E	2Q03E	3Q03E	4Q03E	2003E	2004E
Product Sales	$476.5	$523.5	$551.8	$611.8	$2,163.7	$623.9	$636.9	$649.9	$688.8	$2,599.4	$3,122.1
Royalties	81.8	85.5	85.1	113.1	365.6	107.4	109.7	116.5	123.4	456.9	548.3
Contract Revenue	26.8	13.3	17.4	31.2	88.7	31.7	34.5	35.9	35.9	138.0	120.0
Total Revenues	585.2	622.3	654.3	756.1	2,617.9	763.0	781.0	802.3	848.1	3,194.4	3,790.4
COGS	102.4	106.9	112.5	119.8	441.6	121.3	124.2	127.6	134.8	507.9	606.5
Gross Profit	482.7	515.5	541.8	636.2	2,176.2	641.7	656.8	674.7	713.3	2,686.5	3,184.0
R&D	146.7	147.9	143.7	185.2	623.5	178.5	182.8	187.7	198.5	747.5	890.7
MG&A	123.6	126.9	145.4	177.3	573.3	175.5	179.6	184.5	195.1	734.7	879.4
Collaboration Profit Sharing	72.1	84.1	90.0	104.5	350.7	103.8	106.2	109.1	115.3	434.4	523.1
Operating Expenses	342.4	358.9	379.1	467.0	1,547.5	457.8	468.6	481.4	508.9	1,916.6	2,293.2
Operating Income	140.3	156.6	162.7	169.2	628.8	183.9	188.2	193.3	204.4	769.8	890.7
Interest & Other, Net	27.5	30.0	20.8	22.3	100.6	18.6	19.8	20.5	21.7	80.5	97.1
Income Before Taxes	167.9	186.5	183.6	191.4	729.4	202.4	208.0	213.8	226.1	850.4	987.8
Taxes	49.2	66.0	63.4	67.2	245.8	66.8	68.6	70.6	74.6	280.6	326.0
Net Income	118.7	120.5	120.2	124.2	483.6	135.6	139.4	143.3	151.5	569.7	661.9
Diluted Shares Outstanding	535.0	524.5	519.4	519.0	524.5	515.4	516.7	519.3	520.6	518.0	520.0
Diluted EPS (Excl. Special Items)	0.22	0.23	0.23	0.24	0.92	0.26	0.27	0.28	0.29	1.10	1.27

As a Percentage of Total Revenue:	1Q	2Q	3Q	4Q	2002E	1Q	2Q	3Q	4Q	2003E	2004E
Total Revenues	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
COGS	17.5%	17.2%	17.2%	15.9%	17.3%	15.9%	15.9%	15.9%	15.9%	16.7%	16.6%
Gross Profit	82.5%	82.8%	82.8%	84.1%	83.1%	84.1%	84.1%	84.1%	84.1%	84.1%	84.0%
R&D	25.1%	23.8%	22.0%	24.5%	23.8%	23.4%	23.4%	23.4%	23.4%	23.4%	23.5%
MG&A	21.1%	20.4%	22.2%	23.5%	21.9%	23.0%	23.0%	23.0%	23.0%	23.0%	23.2%
Collaboration Profit Sharing	12.3%	13.5%	13.8%	13.8%	13.4%	13.6%	13.6%	13.6%	13.6%	13.6%	13.8%
Operating Income	24.0%	25.2%	24.9%	22.4%	24.0%	24.1%	24.1%	24.1%	24.1%	24.1%	23.5%
Net Income	20.3%	19.4%	18.4%	16.4%	18.5%	17.8%	17.8%	17.9%	17.9%	17.8%	17.5%

Year-over-year Growth:	1Q	2Q	3Q	4Q	2002E	1Q	2Q	3Q	4Q	2003E	2004E
Total Revenues	18.2%	28.7%	24.9%	32.8%	26.4%	30.4%	25.5%	22.6%	12.2%	22.0%	18.7%
COGS	22.3%	40.3%	17.1%	21.8%	24.6%	18.4%	16.2%	13.4%	12.5%	15.0%	19.4%
Gross Profit	17.4%	26.5%	26.7%	35.1%	26.7%	32.9%	27.4%	24.5%	12.1%	23.4%	18.5%
R&D	7.6%	19.8%	12.1%	34.0%	18.5%	21.7%	23.6%	30.7%	7.2%	19.9%	19.2%
MG&A	-3.4%	17.7%	33.0%	37.1%	20.8%	41.9%	41.5%	26.9%	10.0%	28.2%	19.7%
Collaboration Profit Sharing	55.4%	45.2%	36.9%	36.5%	42.2%	44.0%	26.3%	21.2%	10.4%	23.9%	20.4%
Operating Income	39.5%	32.3%	30.9%	33.4%	33.8%	31.0%	20.2%	18.8%	20.8%	22.4%	15.7%
Net Income	30.1%	18.8%	14.0%	16.8%	19.6%	14.3%	15.6%	19.2%	21.9%	17.8%	16.2%
EPS (Excl. Special Items)	30.1%	21.2%	17.1%	20.9%	22.0%	18.6%	17.4%	19.2%	21.5%	19.3%	15.7%

Invitrogen Corporation (Market Perform, Core Growth)

Invitrogen is a leading supplier of research biochemical kits, products, and services to the genomics, proteomics, and broader life-science markets, which we currently value at $5.2 billion and estimate to be growing 15% compounded annually. Invitrogen specializes in developing and supplying proprietary, easy-to-use, platform-independent molecular biology kits and tools that allow researchers to more rapidly and reproducibly conduct gene extraction, cloning (copying) and expression experiments, as well as protein analysis, all critical elements of functional genomics and proteomics research. We believe Invitrogen remains well positioned to continue its overwhelming market leadership in the high-margin disposable segments of molecular biochemistry. Although industry conditions remain challenging and pharmaceutical/biotech spending levels are difficult to predict, Invitrogen continues to launch a number of new or improved kit-based products that are easy to use and save time in the lab, by reducing or eliminating processing steps. The company achieves this through a combination of in-house research and development, licensing of key technologies, and select product acquisitions.

Table 21
Invitrogen, Inc.
Quarterly Earnings Statement
($ in millions, except per share amounts)

	Q1 02	Q2 02	Q3 02	Q4 02	2002	Q1 03E	Q2 03E	Q3 03E	Q4 03E	2003E	2004E
Net sales	$159,889	$164,290	$162,588	$161,830	$648,597	$178,966	$188,342	$189,515	$188,708	$745,530	$842,547
Molecular Biology	$107,766	$108,526	$106,775	$105,815	$428,882	$120,848	$129,165	$127,283	$126,251	$503,548	$571,527
Cell Culture Media	$52,123	$55,764	$55,813	$56,015	$219,715	$58,117	$59,177	$62,231	$62,457	$241,982	$271,020
Cost of Sales	67,930	67,594	67,432	66,936	269,892	75,161	78,574	78,551	79,297	311,583	345,620
Gross Profit	91,959	96,696	95,156	94,894	378,705	103,804	109,768	110,964	109,411	433,947	496,927
Sales and Marketing	29,462	30,175	30,783	34,439	124,859	33,319	34,960	34,665	34,274	137,218	152,646
General and administrative	15,628	16,682	18,347	20,448	71,105	20,186	19,834	19,951	19,871	79,843	88,255
Research and development	7,634	7,683	8,705	9,676	33,698	10,738	11,301	11,371	11,322	44,732	50,553
Total operating expense	52,724	54,540	57,835	64,563	229,662	64,243	66,095	65,987	65,467	261,792	291,453
Operating Income	39,235	42,156	37,321	30,331	149,043	39,561	43,673	44,977	43,944	172,155	205,474
Other income (expense)											
Interest expense	(6,027)	(6,057)	(6,039)	(5,974)	(24,097)	(6,023)	(6,012)	(6,003)	(6,013)	(24,051)	(24,037)
Interest and other income	5,953	6,172	7,731	6,936	26,792	6,104	6,104	6,104	6,104	24,415	23,804
Total other income (expense)	(74)	115	1,692	962	2,695	80	92	101	91	363	(233)
Earnings before taxes	39,161	42,271	39,013	31,293	151,738	39,641	43,765	45,077	44,035	172,518	205,241
Provision for income taxes (benefit)	13,902	14,985	13,850	10,805	53,542	14,073	15,537	16,002	15,632	61,244	72,861
Net income before minority interest	25,259	27,286	25,163	20,488	98,196	25,569	28,228	29,075	28,402	111,274	132,380
Minority interest	202	301	351	448	1,302	250	250	250	250	1,000	1,000
Net Income	25,057	26,985	24,812	20,040	$96,894	25,319	27,978	28,825	28,152	$110,274	$131,380
Convertible Interest	*2,203*	2,207	-	*2,248*	*$6,658*	*2,205*	*2,205*	*2,205*	*2,205*	*$8,820*	*$8,820*
Diluted EPS	$ 0.46	$ 0.49	$ 0.46	$ 0.39	$ 1.81	$ 0.49	$ 0.53	$ 0.54	$ 0.53	$ 2.09	$ 2.41
Shares outstanding diluted (w/ Convert)	59,296	59,208	53,488	57,329	57,330	56,500	56,783	57,066	57,352	56,925	58,072
Actual Year-over-Year Growth											
Net sales	-0.5%	3.1%	4.2%	5.6%	3.1%	11.9%	14.6%	16.6%	16.6%	14.9%	13.0%
Gross Profit	5.2%	11.0%	8.6%	13.0%	9.4%	12.9%	13.5%	16.6%	15.3%	14.6%	14.5%
Operating income	19.2%	18.9%	17.6%	3.1%	15.1%	0.8%	3.6%	20.5%	44.9%	15.5%	19.4%
Net income	4.4%	5.0%	10.0%	0.5%	4.6%	1.0%	3.5%	15.5%	38.6%	13.8%	19.1%
EPS	2.8%	3.9%	10.2%	2.0%	5.0%	6.0%	7.8%	17.2%	36.2%	15.8%	15.4%
As a Percentage of Sales:											
Molecular Biology	67.4%	66.1%	65.7%	65.4%	66.1%	67.5%	68.6%	67.2%	66.9%	67.5%	67.8%
Cell Culture Media	32.6%	33.9%	34.3%	34.6%	33.9%	32.5%	31.4%	32.8%	33.1%	32.5%	32.2%
Gross Profit	57.5%	58.9%	58.5%	58.6%	58.4%	58.0%	58.3%	58.6%	58.0%	58.2%	59.0%
Sales and Marketing	18.4%	18.4%	18.9%	21.3%	19.3%	18.6%	18.6%	18.3%	18.2%	18.4%	18.1%
Operating Income	24.5%	25.7%	23.0%	18.7%	23.0%	22.1%	23.2%	23.7%	23.3%	23.1%	24.4%
Net Income	15.7%	16.4%	15.3%	12.4%	14.9%	14.1%	14.9%	15.2%	14.9%	14.8%	15.6%

Sangamo BioSciences, Inc. (Market Perform, Aggressive Growth)

Sangamo is focusing on its long-term goal of becoming a gene therapy-based therapeutics company through its zinc finger-protein (ZFP) transcription factors, which enable flexible regulation of gene expression. In addition, ZFPs produced by Sangamo can be used to identify gene function, validate the gene and the proteins it produces as useful drug targets, and help to screen and optimize potential drug candidates against these targets. As a result, through its numerous collaborations, Sangamo's ZFPs are applied to high-throughput screening, target validation, and industrial-scale production of proteins. We believe that the company's technology also offers significant advantages such as the ability to reversibly increase or decrease the expression of a gene. We view Sangamo as having substantial, long-term potential medical and economic value.

Table 22
Sangamo, Inc.
Quarterly Earnings Statement
($ in thousands, except per share amounts)

	1Q02	2Q02	3Q02	4Q02	2002A	1Q03E	2Q03E	3Q03E	4Q03E	2003E	2004E
Net Revenues	$501	$366	$1,012	$2,464	$4,343	$1,678	$2,004	$2,296	$3,383	$9,361	$14,389
SG&A	862	1,086	966	901	3,815	1,001	1,031	1,062	1,094	4,190	4,715
R&D	3,358	2,989	3,202	2,435	11,984	3,296	3,460	3,633	3,815	14,204	17,266
Clinical Trials		-	-	-	-	-	-	-	-	-	1,000
Total Operating Expenses	4,220	4,075	4,168	3,336	15,799	4,297	4,492	4,696	4,909	18,394	22,981
Operating Profit (Loss)	(3,719)	(3,709)	(3,156)	(872)	(11,456)	(2,619)	(2,488)	(2,400)	(1,526)	(9,033)	(8,592)
Net Interest Income	464	346	662	329	1,801	256	245	234	222	957	807
Income before Taxes	(3,255)	(3,363)	(2,494)	(543)	(9,655)	(2,363)	(2,243)	(2,166)	(1,304)	(8,076)	(7,785)
Provision for Taxes	-	-	-	-	-	-	-	-	-	-	-
Net Loss	($3,255)	($3,363)	($2,494)	($543)	(9,655)	($2,363)	($2,243)	($2,166)	($1,304)	(8,076)	($7,785)
Shares	24,356	24,439	24,509	24,669	24,493	24,731	24,792	24,854	24,917	24,824	25,073
EPS	($0.13)	($0.14)	($0.10)	($0.02)	($0.39)	($0.10)	($0.09)	($0.09)	($0.05)	($0.33)	($0.31)
Year-over-year Growth	**1Q02**	**2Q02**	**3Q02**	**4Q02E**	**2002E**	**1Q02**	**2Q02**	**3Q02**	**4Q02**	**2003E**	**2004E**
Revenue	-21%	-73%	37%	14%	-11%	235%	448%	127%	37%	116%	54%
SG&A	34%	27%	-2%	-22%	5%	16%	-5%	10%	21%	10%	13%
R&D	52%	-2%	-18%	-32%	-6%	-2%	16%	13%	57%	19%	22%
Net Loss	90%	0%	28%	-93%	197%	-30%	-10%	299%	-86%	242%	431%
As a Percentage of Sales	**1Q02**	**2Q02**	**3Q02**	**4Q02E**	**2002E**	**1Q02**	**2Q02**	**3Q02**	**4Q02**	**2003E**	**2004E**
Net Revenues	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
SG&A	172%	297%	95%	37%	88%	60%	51%	46%	32%	45%	33%
R&D	670%	817%	316%	99%	276%	196%	173%	158%	113%	152%	120%
Total Operating Expenses	842%	1113%	412%	135%	364%	256%	224%	205%	145%	196%	160%
Operating Profit (Loss)	-742%	-1013%	-312%	-35%	-264%	-156%	-124%	-105%	-45%	-96%	-60%
Net Interest Income	93%	95%	65%	13%	41%	15%	12%	10%	7%	10%	6%
Income before Taxes	-650%	-919%	-246%	-22%	-222%	-141%	-112%	-94%	-39%	-86%	-54%
Provision for Taxes (%EBT)	0%	0%	0%	0%	0%	0%	0%	0%	0%	NM	0%
Net Income	-650%	-919%	-246%	-22%	-222%	-141%	-112%	-94%	-39%	-86%	-54%

Appendix F: Private Company Descriptions

In addition to the publicly traded companies highlighted in this report, there are several privately owned companies with mAbs in development. The following is a brief summary of two private companies, Raven biotechnologies and TolerRx, which we believe are well positioned to participate in potential tAb sector growth, given the strength of their proprietary technology platforms for discovering and/or developing mAbs.

Raven biotechnologies, inc.
Raven is a mAb platform company that has developed a biology-based discovery system, in which target validation and drug lead creation occur simultaneously, which the company believes could shorten its drug development time line by three to seven years relative to traditional biotech companies, while substantially reducing costs. The company has developed a proprietary media in which human, tissue-specific stem cell and tumor-derived cell lines grow and function in the laboratory in a similar environment to that which occurs in the body, which provides an ideal biological system for mAb discovery. Raven has developed nearly 40 cell lines to date and has screened more than 70,000 antibodies against five of its proprietary cell lines.

The company's initial focus is on discovering and developing tumor-specific mAbs against several forms of cancer, including ovarian, pancreatic, colorectal, lung, breast, and prostate cancer. Raven has generated several lead candidate mAbs and recently secured $40 million in a Series C round of financing to fund early-stage development of its pipeline. In addition, in March 2001 Raven secured a deal with Immunogen to discover mAbs for the treatment of ovarian cancer. In October 2001, within six months of signing the deal, Raven delivered its first mAb candidate to Immunogen, and in December 2001 Raven delivered a second mAb candidate. Other partnerships include a deal with Medarex established in March 2000, in which Medarex mAbs are being tested against targets from Raven's proprietary cancer cell lines. The companies currently have one fully human mAb in preclinical development.

TolerRx, Inc.
TolerRx is a private company engaged in the discovery and development of mAb therapies for inducing or removing immunological tolerance. The company has employed its proprietary TolerMab technology to generate mAbs designed to treat autoimmune diseases by training the body's immune system to tolerate certain agents that invoke the autoimmune responses that are characteristic of diseases such as MS, rheumatoid arthritis, and psoriasis. The company also is testing its technology as an immunosuppressive for potential use in patients receiving organ transplants or blood transfusions, in which it is desirable to calm the body's immune system prior to treatment. In contrast, TolerRx's technology also may be used to invoke immune responses in patients with certain forms of cancer, which could allow the body to attack and destroy tumor cells. Lastly, TolerRx may be able to employ its technology to modify mAbs that currently are marketed or in late-stage development such that patient immune responses to a particular mAb are eliminated. For example, some patients mount a "quasi" immune response to certain mAb therapeutics by producing neutralizing antibodies (nAbs). In some cases, the level of nAbs generated by a patient increases the longer the patient receives a particular therapy. Although neutralizing antibodies and their effect on therapeutic efficacy is a poorly understood medical area, some studies suggest that an increased level of nAbs to a particular therapy leads to declining efficacy. TolerRx's technology is designed to mask the non-self regions of mAbs, essentially making them invisible to the body's immune system.

In addition to pursuing mAb-modification agreements with companies with mAbs either commercialized or in development, TolerRx has three of its own mAbs in development—one each in Phase II, Phase I, and preclinical. In January 2003, TolerRx signed an agreement with

Genentech, in which Genentech will develop, and if successful in the clinic, commercialize TolerRx's lead mAb candidate, TRX1. TRX1 is a humanized mAb in Phase I clinical development that targets CD4 antigens on the surface of cells. In addition to more than $30 million in capital that TolerRx recently secured through a Series C private financing round, the company received an upfront payment and equity investment totaling $6 million upon signing its deal with Genentech, and is entitled to receive milestone payments throughout development as well as royalties on sales of the product assuming it becomes commercialized.

Appendix G: Glossary

Affinity: The chemical attraction or force that causes an antibody and its antigen to combine to form a complex.

Agonist: A substance capable of binding to a molecular target on the surface of a cell to initiate or enhance a biological response.

Antagonist: A substance that opposes the effect of an agonist.

Antibody: A protein that is produced as a result of the introduction of an antigen into the body of a living organism and that has the ability to specifically bind the antigen that stimulated its production. An antibody is composed of two identical heavy chains and two identical light chains.

Antigen: A substance composed of two identical heavy chains and two identical light chains and is recognized by and binds to an antibody.

Assay: A laboratory test to determine the strength of a solution, the proportion of a compound in a mixture, the potency of a drug, or the purity of a preparation.

Autoimmune Disease/Disorder: A disease state in which immunity develops within the body to self antigens (autoantigens).

Chimeric Antibody: An antibody consisting of a variable and constant regions derived from two different species as a result of genetic engineering.

Disease indication: The specific clinical condition for which a drug is intended to be used.

Disease targets: Genetic or biochemical processes that can be targeted with potential therapeutic drugs to prevent or treat disease. A disease target molecule is a molecule (often a protein) that is part of a biochemical pathway that is involved in a disease; the molecule may not be directly involved in the disease, but the modification of its function or activities may affect the disease.

Effector functions: The defense mechanisms triggered within the body by an antibody. There are numerous ways in which the immune system can destroy pathogens, each being suited to a particular type of infection.

Efficacy: The measure of a drug's effectiveness.

Epitope: A part of the antigen molecule that is recognized and bound by an antibody.

GVHD (Graft-versus-host-disease): A condition frequently resulting from bone marrow transplant, in which the transplant cells attack the tissues of the graft recipient.

HAMA (human-anti-mouse antibody): A common outcome of treating patients with antibodies containing mouse sequences in which the patient's immune system produces antibodies that interact with the antibody mouse sequences.

High-throughput Isolation: The process of using automated processes to enable the rapid isolation of antibodies to a large number of antigen targets simultaneously.

High-throughput Screening: The process of using automated assays to search through large numbers of substances for desired activity, resulting in less costly and faster systematic processes.

Humanized: Antibodies that comprise human antibody "frameworks" into which binding sites from murine (mouse) or other antibodies have been grafted that interact/bind with antigens (also known as CDR (complementary determining regions) grafted antibodies).

Hybridoma: A cell created artificially in vitro (i.e., not performed within a living body system) by fusion of a tumor cell with a B-lymphocyte.

Immunogenic: Something that gives rise to, or is capable of, stimulating a specific immune response.

Immunoglobulins: Structurally related proteins endowed with known antibody activity (i.e., capable of recognizing and binding to an antigen). They can be categorized by structure and function into five different classes. Some immunoglobulins are carried on cell surfaces; others are free in the blood or lymph.

IND (investigational new drug): An application filed with the FDA seeking to initiate human clinical trials with a new drug.

Inflammation: The reaction of living tissue to injury or infection.

In Situ: In the natural position within a biological context.

In Vivo: In a living organism.

Isoforms: Molecules that exist in slightly different structural forms, but that may have a similar function.

Isotope: A subclass of immunoglobulin heavy or light chains.

Ligand: A molecule or compound capable of binding to a receptor.

Monoclonal Antibody (mAb): An antibody derived from a single clone of cells, all molecules of which have identical target (antigen) binding sites.

Orphan Ligands/Receptors: Ligands/receptors for which a cellular function is as yet unknown.

Phage: Abbreviation for bacteriophage; a virus that infects bacteria.

Pharmacokinetics: The absorption, distribution, metabolism, and excretion of the drug studied over a period of time.

Phase I Clinical Trials: Studies conducted in healthy subjects to determine the biological effects of a drug, especially safety and tolerability.

Phase I/II Clinical Trials: Studies carried out in patients with disease whereby the drug being tested otherwise would be inappropriate for testing in healthy subjects.

Phase IIa Clinical Trials: Studies in a limited number of patients with the aim of making a preliminary determination of the efficacy of a drug to provide proof of principle and/or to study drug dose ranges.

Phase IIb Clinical Trials: Studies in a limited number of patients to determine drug dose ranges to be used in Phase III clinical trials.

Phase III Clinical Trials: Full-scale clinical trials to determine drug efficacy and safety prior to seeking marketing approval.

Placebo: A pharmacologically inactive treatment used as a yardstick for measuring drugs.

Potency: The biological response engendered, taking into account the amount of substance administered and is often expressed as the ED_{50}, the dose needed to elicit 50% of the maximum response.

Protein: Large molecules made of smaller biological units known as amino acids. Proteins are responsible for most of the function and much of the structure of living things, including humans.

Receptor: A molecule expressed on the cell structure that specifically interacts with another soluble or cell surface molecule (ligand).

Structure-activity Relationships (SARs): The link between the structure of a molecule and its function.

Subcutaneous: Beneath the surface of skin.

One or more of the analysts responsible for covering the company mentioned in this report owns shares Biosite Incorporated, Celera Genomics Group, Invitrogen Corporation, and Sangamo BioSciences, Inc.

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