

# **Drug Portfolio Analysis**

Barbara Gilmore-Halliwell & Diane Webb June 18, 2008



# <u>Agenda</u>

- Drug Development Industry Issues & Concerns in 2008
  - □ Fewer FDA Approvals
  - □ Blockbusters vs. Targeted Therapeutics
  - Drug Safety
  - □ Drug Development Costs
  - □ Political Landscape 2008
- Drug Development Approval Process Overview
  - □ Drug / Diagnostic: milestones & differences
  - □ FDA & EMEA
  - Companion Diagnostics & Targeted Therapeutics
  - Challenges (Regulatory / Reimbursement)
- Clinical Trials
- Deals & Alliances
- Portfolio Analysis Resources by phase of development
- Drug Pipeline Databases
- Conclusion Implications & Considerations



# Drug Development Industry Issues & Concerns in 2008:

- □ Fewer FDA Approvals
- □ Blockbusters vs. Targeted Therapeutics
- □ Drug Safety
- Drug Development Costs
- □ Political Landscape 2008



# Fewer FDA Approvals

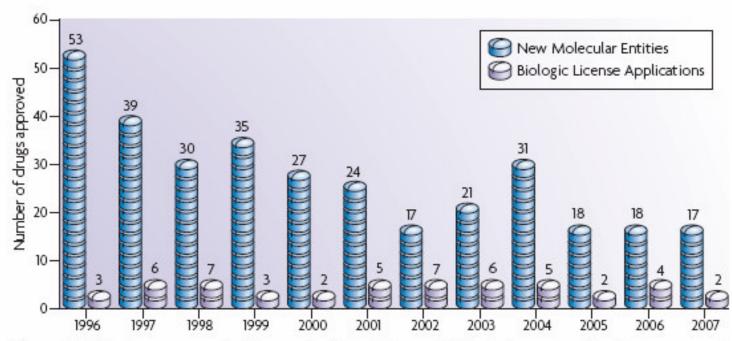


Figure 1 | FDA drug approvals. New molecular entities and biologic license applications approved by the US FDA by year.

Source: Nature Reviews Drug Discovery 7, 107-109 (February 2008)



# Drug Approvals / Failures: Implication for Alliances

Table 1   Drug development scorecard: January 2006 to December 2007								
Source	FDA approvals	Phase III failures						
Biotech industry	47 (45%)	68 (74%)						
Biotech–pharma alliances	16 (16%)	18 (21%)						
Acquisitions/licenses by pharma	4 (4%)	0						
Pharma industry	36 (35%)	5 (5%)						
Total	103	91						

Source: Nature Reviews Drug Discovery 2008;7:197-8

# Pipeline problems: Increasing the urge to merge

		•	eals in the biotechnology and forcing firms to plug the gaps
Company	Target	Price	Main purpose of purchase
Pfizer	PowderMed	≤US\$400 million*	Influenzavaccines
Genzyme	AnorMED	US\$580 million	Mozobil for haematopoietic stem-cell transplantation
Genentech	Tanox	US\$919 million	Improve returns on Xolair (omalizumab)
Merck	Sirna	US\$1.1 billion	Access to RNA interference technology
Lilly	ICOS	US\$2.1 billion	Full ownership of Cialis (tadalafil)
Gilead	Myogen	US\$2.5 billion	Bolster Gilead's pulmonary programme
Abbott	Kos	US\$3.7 billion	Acquire cholesterol treatments

Source: Nature Drug Discovery V.5 2006

# 2007-2008 Patent Expiry

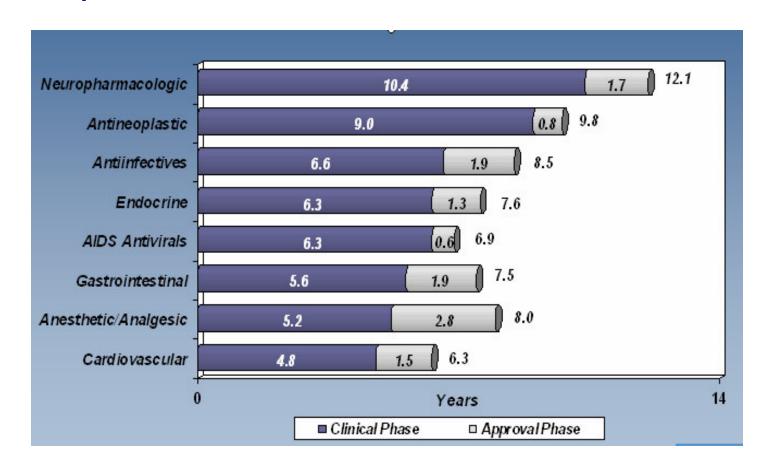
Source:	EvaluatePharma®						
Report:	Top 100 Drugs (WW Sa	ales) - Ranked 2007					
All Fina	ancial Data in US \$ (mIn	)					
					Annual Sa	les WW -	
					Sale	es	
Rank	Product	Generic Name	Company	Therapeutic Subcategory	2006	2007	Patent Expiry
93	Flixotide/Flovent	fluticasone propionate	GlaxoSmithKline	Corticoids	1,215	1,243	5/14/2004
91	NeoRecormon	epoetin beta	Roche	Anti-anaemics	1,233	1,282	12/31/2005
78	Seloken ZOK/Toprol XL	metoprolol succinate	AstraZeneca	Beta blockers	1,795	1,438	11/20/2006
20	Norvasc	amlodipine besylate	Pfizer	Calcium antagonists	4,866	3,001	3/23/2007
75	Pulmicort	budesonide	AstraZeneca	Corticoids	1,292	1,454	9/13/2007
71	Zyrtec/Reactine	cetirizine	Pfizer	Anti-histamines	1,569	1,541	12/25/2007
19	Fosamax	alendronate	Merck & Co	Bone calcium regulators	3,134	3,049	2/6/2008
58	Prograf	tacrolimus	Astellas Pharma	Immunosuppressants	1,455	1,724	4/8/2008
9	Effexor	venlafaxine	Wyeth	Anti-depressants	3,722	3,794	6/13/2008
13	Risperdal	risperidone	Johnson & Johnson	Anti-psychotics	3,338	3,437	6/29/2008
81	Keppra	levetiracetam	UCB	Anti-epileptics	956	1,407	7/14/2008
68	Depakote	divalproex sodium	Abbott Laboratories	Anti-epileptics	1,308	1,575	7/29/2008
33	Topamax	topiramate	Johnson & Johnson	Anti-epileptics	2,027	2,453	9/26/2008
86	Casodex	bicalutamide	AstraZeneca	Hormone therapies	1,206	1,335	10/1/2008
80	Betaferon/Betaseron	interferon beta-1b	Bayer AG	MS Therapies	672	1,410	12/31/2008
42	Lamictal	lamotrigine	GlaxoSmithKline	Anti-epileptics	1,836	2,196	1/22/2009
82	lmigran/lmitrex	sumatriptan	GlaxoSmithKline	Anti-migraine preparations	1,311	1,371	2/6/2009
60	CellCept	mycophenolate mofetil	Roche	Immunosuppressants	1,471	1,679	5/3/2009
40	Prevacid	lansoprazole	TAP Pharmaceutical Products	Antacids & anti-ulcerants	2,600	2,275	5/10/2009
49	Valtrex/Zelitrex	valacyclovir	GlaxoSmithKline	Anti-virals	1,558	1,870	6/23/2009

Source: EvaluatePharma 2008

SLA 2008 - B. Gilmore-Halliwell & D. Webb



# Clinical and Approval Times Vary Across Therapeutic Classes, 2002-04



Source: Tufts CSDD, 2006



# Approval Success Rates for NCEs Also Vary by Therapeutic Class



Source: Tufts CSDD Impact Report, 8(3): May/June 2006

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# Blockbuster vs. Targeted Therapeutic:



- Segmented markets not as profitable as mass markets
- Goals of big pharma moving toward targeted therpeutics & personalized medicine

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## Blockbuster: Definition



- Blockbuster drugs defined as those with peak sales of \$1 billion annually.
- General population use
- Clinical trials large (\$\$\$)
- 79% IND's fail in clinical development
- Efficacious in 40-60% of the population

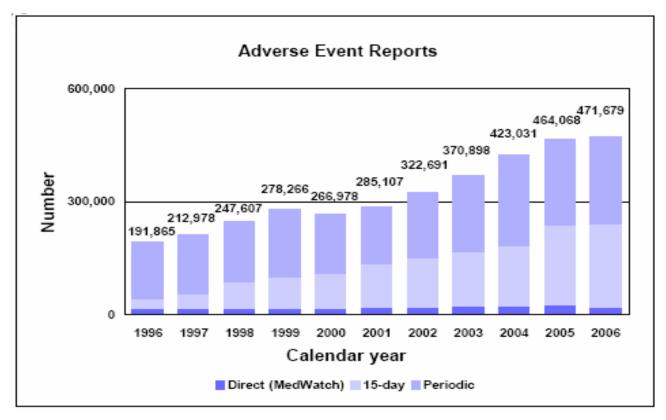
## FDA Concerns: Safety & Efficacy Issues





# FDA Safety Concerns

## Post Marketing Adverse Event Reports --



Source: CDER Report to the Nation August 2007 (www.fda.org/CDER)



# Costs of Drug Development

# **Key Facts**

## **Research and Development**

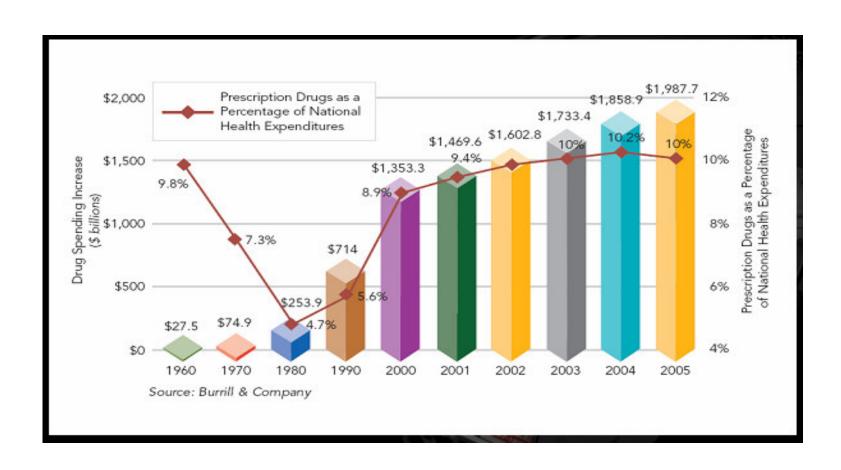
Time to develop a drug = 10-15 years<sup>1</sup>

## Development Costs

- Cost to develop a drug
   2001 = \$802 million<sup>2</sup>
   1987 = \$318 million
   1975 = \$138 million
- Cost to develop a biologic
   2006 = \$1.2 billion<sup>3</sup>

- Development Cost 2010 → \$2.0 Billion
- Due to an increasing number of drugs being discontinued, forcing companies to write-off investment of failed products.

# Prescription Drug Costs as a Percentage of Healthcare -

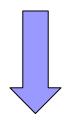




# Healthcare Spend -

## Current Spend -

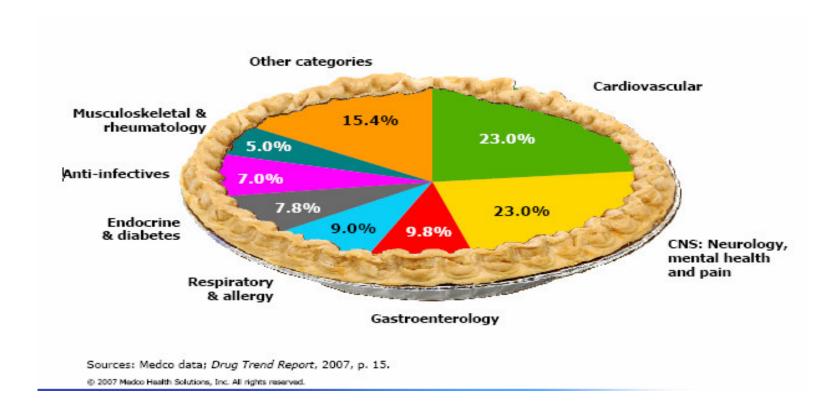
- 8¢ of every \$1.00 on Diagnostics
- 92¢ of every \$1.00 on Therapy



Better use of diagnostics would decrease the costs of therapy.

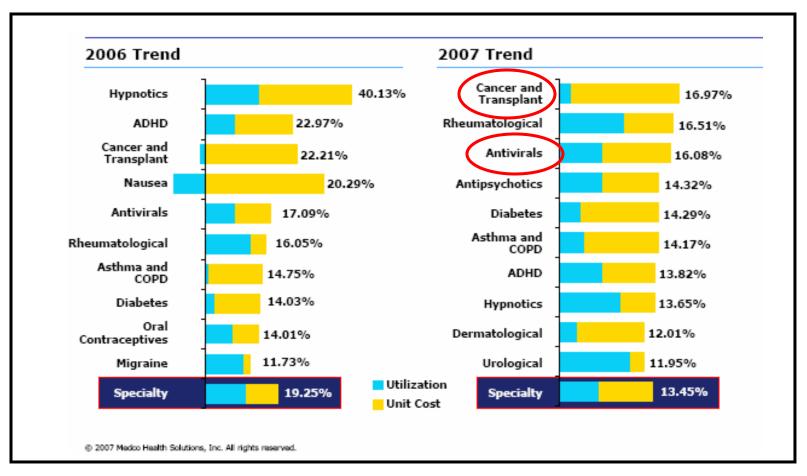
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# Top Contributors to RX Spend by Therapeutic Category (2007)



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## Top RX Driver Trends – H1 2006 vs. H1 2007



Source: Medco Health Sciences (2007)



# Political Landscape 2008

- August 2006 Senator Barack Obama introduced the Genomics & Personalized Medicine Act
- January 2007 Senators Kennedy & Enzi introduced the Genetic Information Nondiscrimination Act
- May 21, 2008 GINA (Genetic Information Nondiscrimination Act) signed into law



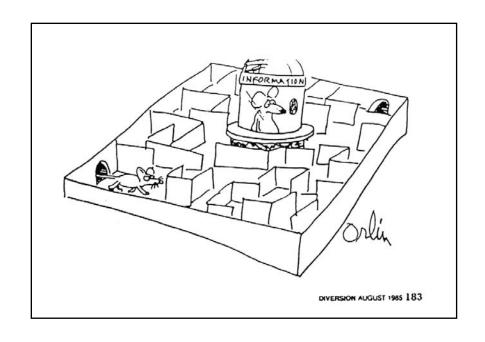
# Planning is critical....





# **Drug Approval Process Overview: Information Maze**

- Plethora of resources competing for those budget dollars
- What do you really needed?
- What decisions are to be made?
- Organic development v. in-license?
- Drug / diagnostic combo?





# Differences Between Small Molecules & "Targeted" Monoclonal Antibodies –

- Small Molecules
   (Traditional
   Pharmaceutical Drugs)
  - Oral or Intravenous
  - Target multiple pathways
  - □ Cheaper to manufacture
  - Short half-life
  - Enter cytoplasm, therefore target any molecule or pathway regardless of location

- Monoclonal Antibodies (Biotech drugs)
  - Intravenous only
  - □ Target <u>specific</u> protein
  - □ Expensive to manufacturer
  - Inconvenient to administer but longer half-life
  - Confined to proteins in extra cellular matrix



# **Balanced Equation**

- Biotech Strengths
  - □ IP for novel products
  - Distinguished products
  - □ Niche technologies
  - Innovative business cultures

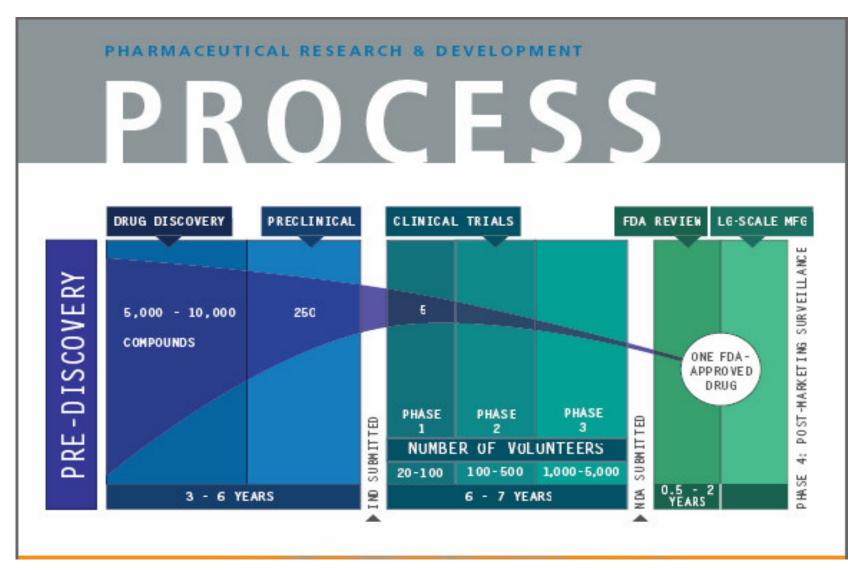
- Pharma Strengths
  - Financial strength
  - Development & commercial expertise
  - □ Global reputation
  - Recognized voice at regulatory agencies
  - Marketing success



# FDA & EMEA - Comparison

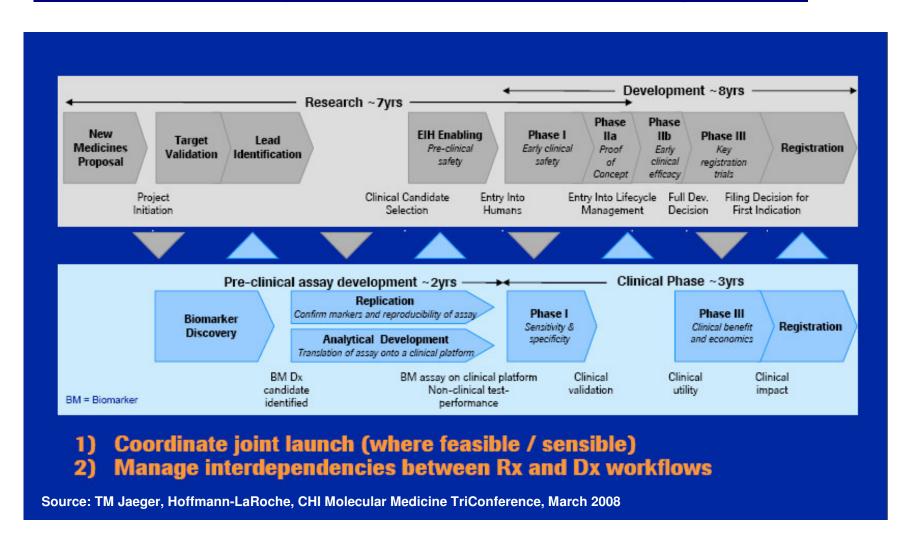
	FDA	EMEA				
Employees	12,000	440				
Review Language	English	11 Languages				
Countries Covered	1- United States	15 Member Nations				
Communications with Companies	Extensive – Relate to phases, filings & pre-market	Does not communicate with companies until late in process.				
Regulatory influence on drug pricing.	FDA not involved with pricing issues	Once approved, each country must price drug for marketing authorization of country				





Source: 2007 PhRMA's Innovation.org

## Pharma & Diagnostic Workflow Perspective -



# **Drugs with Companion Diagnostics**

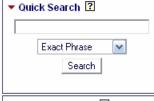
All Financial Data in US	S \$ (mln)											
		Annual Sales WW - Sales							Grow	th per Year	ear (%)	
	Company	2003	2004	2005	2006	2007	2008	2004	2005	2006	2007	2008
Angiomax/ Angiox	The Medicines Company	85	136	141	201	255	322	60%	4%	43%	27%	26%
Erbitux	Bristol-Myers Squibb	-	357	684	1,075	1,337	1,757	n/a	92%	57%	24%	31%
Gleevec/Glivec	Novartis	1,128	1,634	2,170	2,554	3,050	3,430	45%	33%	18%	19%	12%
Herceptin	Genentech	876	1,156	1,723	3,134	4,046	4,833	32%	49%	82%	29%	19%
Iressa	AstraZeneca	228	389	273	237	238	224	71%	(30%)	(13%)	0%	(6%)
Nexavar	Bayer AG	-	-	-	163	370	583	-	-	n/a	127%	57%
Purinethol	Teva Pharmaceutical Industries	33	25	9	8	6	6	(24%)	(64%)	(14%)	(16%)	(7%)
Selzentry/ Celsentri	Pfizer	-	-	-	-	45	121	-	-	-	n/a	167%
Tarceva	Genentech	-	13	311	649	886	1,190	n/a	n/a	109%	37%	34%
Tykerb	GlaxoSmithKline	-	-	-	-	102	280	-	-	-	n/a	174%
Ziagen	GlaxoSmithKline	273	284	247	216	218	201	4%	(13%)	(13%)	1%	(8%)
Report Total	•	2,622	3,994	5,559	8,237	10,554	12,947	52%	39%	48%	28%	23%

Source: EvaluatePharma® 2008

# Tools & Solutions: Knowledge Express



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Tools for Biotechnology, Pharmaceutical, Life Sciences, and Technology Transfer

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#### THERMACLEAR TEAMS UP WITH SEPHORA IN THE QUEST FOR CLEAR SKIN

SAN FRANCISCO, Calif. (September 14, 2007) - Therative announced today that ThermaClear, its innovative, hand-held aone treatment device, is now available at Sephora.com, the leading specialty beauty retailer in the U.S. ThermaClear will also be featured on the weekly Sephora show on HSN in late...

#### Agilent Technologies' Mass Spectrometry Software Platform to Support All...

DENVER, ASMS, June 2, 2008 --Agilent Technologies Inc., (NYSE: A) chose the American Society of Mass Spectrometry meeting to announce that it is expanding its MassHunter Workstation software with many new functionalities, new modules and to support all Agilent mass spectrometers (MS). ...

#### Study: Dietary Ginger may work against cancer growth

Minneapolis/St. Paul - October 28. 2000 - The substance that gives ginger its flavor appears to inhibit the growth of human colorectal cancer cells, according to research at the University of Minnesota's Hormel Institute in Austin, Minn. Working with mice that lack an immune systems, research...

#### Biomedical Deals & Alliances

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#### Chembio Awarded NIH Grant for Rapid TB Test on DPP(TM) Platform

MEDFORD, NY, Jun 05, 2008 -- Chembio Diagnostics, Inc. (OTCBB: CEMI) ("Chembio" or the "Company") announced today that it has been awarded a \$296,000 one year, Phase One Small Business Innovative Research (SBIR) grant from the United States National Institutes of Health (NIH) to develop a simple,...

#### ZymoGenetics and Merck Serono Initiate Second Phase 2/3 Clinical Study of...

SEATTLE, Jun 05, 2008 -- Zymo Genetics, Inc. (NASDAQ:ZGEN) announced today that its partner Merck Serono, a division of Merck KGaA, Darmstadt, Germany, initiated a Phase 2/3 trial of atacicept in patients with systemic lupus erythematosus (SLE). This study will evaluate the efficacy and safety of...

### OFFICIAL SIGNING CEREMONY FOR WIBP STRATEGIC ALLIANCE

MONTREAL, QUEBEC, CANADA - June 5, 2008 - ProMetic Life Sciences Inc. (TSX:PLI) ("ProMetic") announced today that the official signing ceremony for the strategic alliance concluded earlier this year with the Wuhan Institute of Biological Products ("WIBP") a subsidiary of...

### New Technologies Posted

Powered by KE eMarket

#### Immunotoxins with Deletions in Domain II that Remove Immunogenic Epitopes...

Anti-CD22 immunotoxins consist of a disulfide-linked FV (VH/VL) antibody fragment recombinantly linked to a toxic moiety capable of killing cells. In particular, a 38-kDa active fragment of Pseudomonas exotoxin A (PE38) containing three specific domains (domain Ib, domain II and domain III) has...



## Knowledge Express Site News Latest KE Additions | View All Site News...

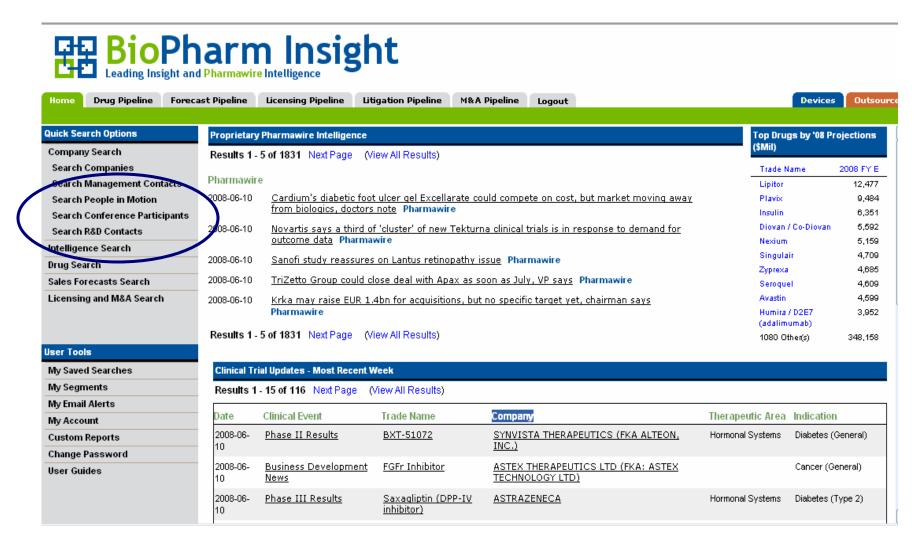




- Past Month: 17 Techs Added, 0 Removed.
- 7,705 KE Technologies Available
- 339 KE Profiles Available

Data Resource	Last Updated
BioSpace Pipelines	Jun 8 2008
CW Clinical Trial Listings	Jun 8 2008
CW Drugs in Clinical Trials	Jun 8 2008
CW FDA Drug Approvals	Jun 8 2008
BioWorld Cardio Update	Jun 8 2008
BioWorld Medical Device Daily	Jun 8 2008
TechEx	Jun 8 2008
KE Profiles	Jun 8 2008
KE Technologies	Jun 8 2008
BioWorld International	Jun 8 2008
UVentures	Jun 8 2008
BioWorld Today Archive	Jun 7 2008
Biomedical NewsSearcher	Jun 6 2008

## Tools & Solutions: BioPharm Insight

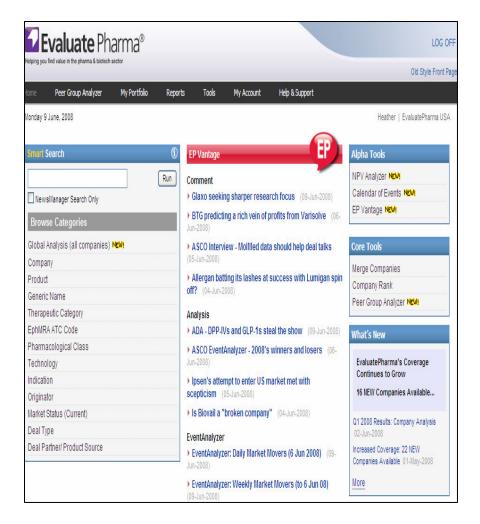


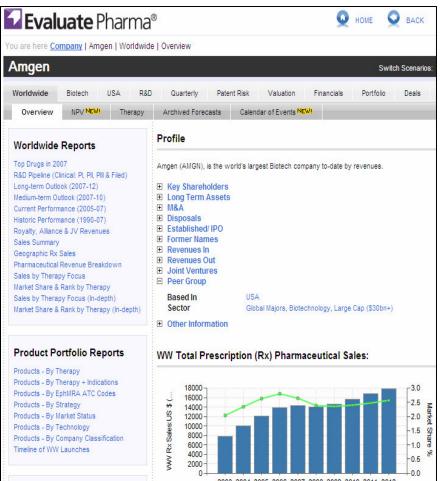
## Tools & Solutions –HCUP Database

	omes by p	patient and hos	pital c	haracte	eristics	for						
		Total number of	days	\$ .	Charges, \$ (median)	\$	Costs, \$ (median)	Aggregate costs	Aggregate charges, \$ (the "national bill")	Admitted from emergency department	Admitted from other hospital	Admitted from long term care
All disch	narges	38,661,786 (100.00%)	4.6	20,455	10,754	7,632	4,274	294,775,758,011	790,119,407,815	16,672,068 (43.12%)	1,350,234 (3.49%)	571,345 (1.48%)
Age	<1	4,897,575 (12.67%)	3.6	8,859	1,966	3,364	777	16,370,920,602	43,127,730,488	272,339 (5.56%)	103,226 (2.11%)	8,110 (0.17%)
group	1-17	1,784,461 (4.62%)	3.6	14,443	7,445	5,787	2,985	10,389,681,314	25,957,747,399	869,453 (48.72%)	83,120 (4.66%)	15,831 (0.89%)
	18-44	10,323,379 (26.70%)	3.7	15,064	8,698	5,674	3,400	58,513,722,924	155,385,805,594	3,625,159 (35.12%)	223,071 (2.16%)	101,324 (0.98%)
	45-64	8,546,409 (22.11%)	5.0	25,687	14,960	9,603	5,809	82,212,571,586	219,945,930,235	4,445,928 (52.02%)	351,014 (4.11%)	134,657 (1.58%)
	65-84	10,347,463 (26.76%)	5.7	27,445	16,206	10,102	6,320	104,697,650,596	284,404,611,069	5,621,332 (54.33%)	485,562 (4.69%)	220,776 (2.13%)
	85+	2,711,697 (7.01%)	5.9	22,258	13,685	8,218	5,479	22,317,047,851	60,432,378,795	1,822,759 (67.22%)	102,200 (3.77%)	89,840 (3.31%)
	Missing	50,802 (0.13%)	2.8	17,233	10,842	5,285	3,354	274,163,138	865,204,236	15,097 (29.72%)	2,041 (4.02%)	807 (1.59%)
Sex	Male	15,773,422 (40.80%)	5.0	23,428	11,938	8,753	4,761	137,995,269,631	369,391,144,136	7,629,850 (48.37%)	666,715 (4.23%)	251,451 (1.59%)
	Female	22,757,558 (58.86%)	4.4	18,405	10,101	6,865	4,013	156,047,181,005	418,365,417,777	8,994,183 (39.52%)	679,125 (2.98%)	317,812 (1.40%)
	Missing	130,806 (0.34%)	2.7	18,532	12,837	5,523	3,861	733,307,375	2,362,845,903	48,035 (36.72%)	*	2,082 (1.59%)
Owner	Government	5,194,845 (13.44%)	4.8	17,112	8,887	7,921	4,221	41,108,998,153	88,846,437,795	2,306,094 (44.39%)	165,808 (3.19%)	49,947 (0.96%)
	Private, not-for- profit	28,023,511 (72.48%)	4.6	20,513	10,836	7,719	4,365	215,947,882,206	574,034,316,324	12,193,721 (43.51%)	1,023,436 (3.65%)	426,042 (1.52%)
	Private, for- profit	5,004,831 (12.95%)	4.5	23,970	13,016	6,873	3,847	34,455,349,196	120,086,916,730	2,059,309 (41.15%)	115,098 (2.30%)	71,469 (1.43%)

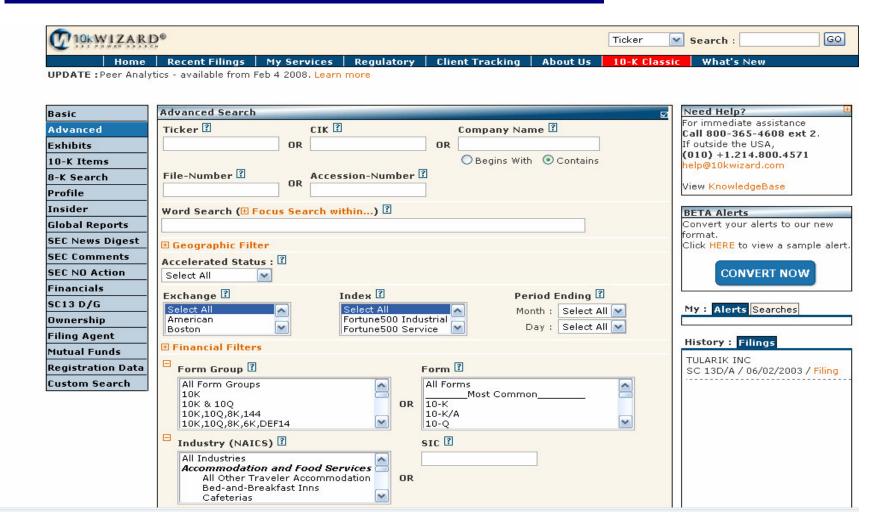
- HCUPnet is a free, on-line query system based on data from the Healthcare Cost and Utilization Project (HCUP).
- It provides health statistics on hospital stays —
- National, State & regional.

## Tools & Solutions - EvaluatePharma





## Tools & Solutions – 10K Wizard





# Planning is critical.

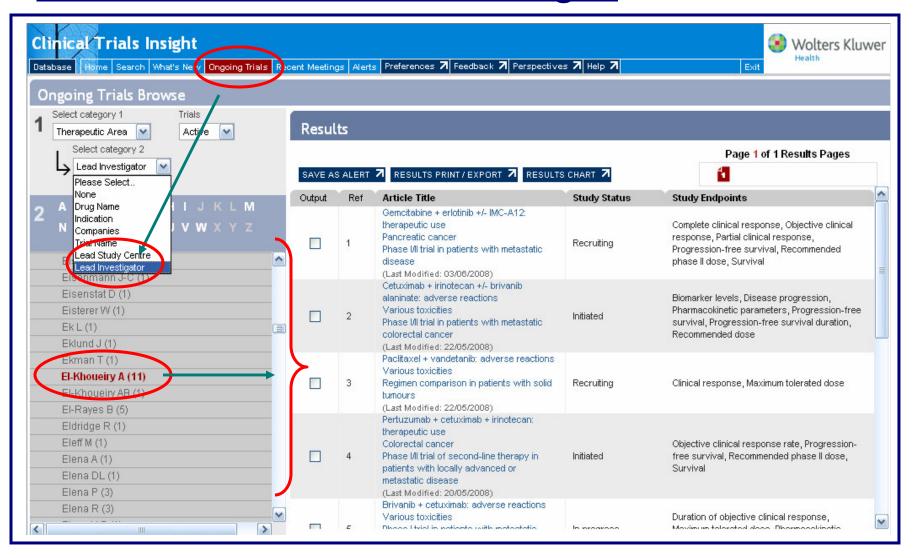




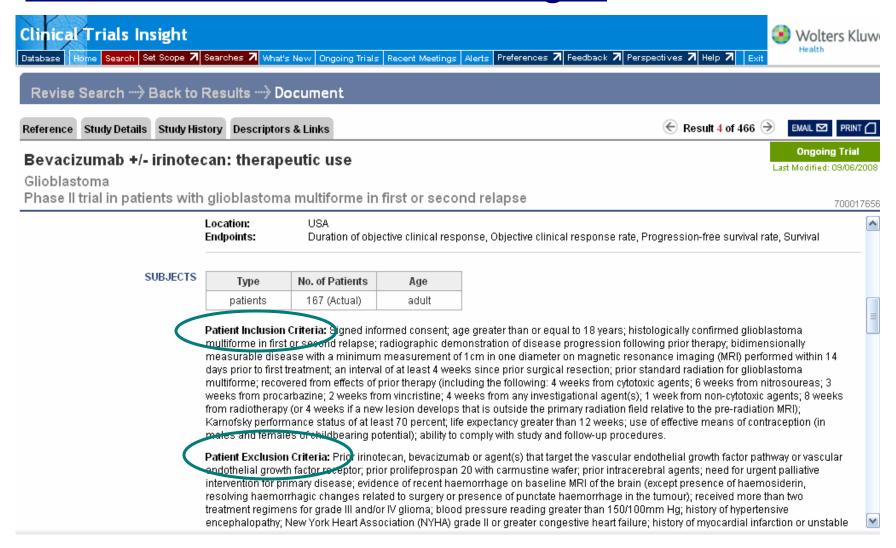
## **Clinical Trials Databases**

- ADIS Clinical Trials Insight (\$\$\$) link with ADIS RDI
- Cancer Clinical Trials, NIH (free)
- (www.cancer.gov/clinicaltrials)
- CenterWatch Clinical Trials Listing Service (\$) (<u>www.centerwatch.com</u>)
- CiteLine TrialTrove (Informa) (\$\$\$) Link with PharmaProjects (www.citeline.com/trialtrove.html)
- ClinicalTrials.gov (NIH) (free) (www.clinicaltrials.gov)
- Inteleos (\$) (www.inteleos.com)

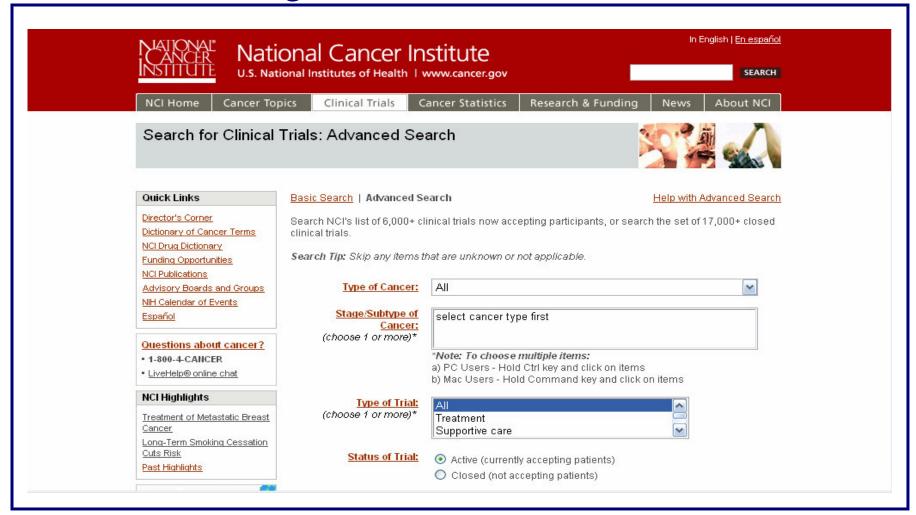
# ADIS - Clinical Trial Insight



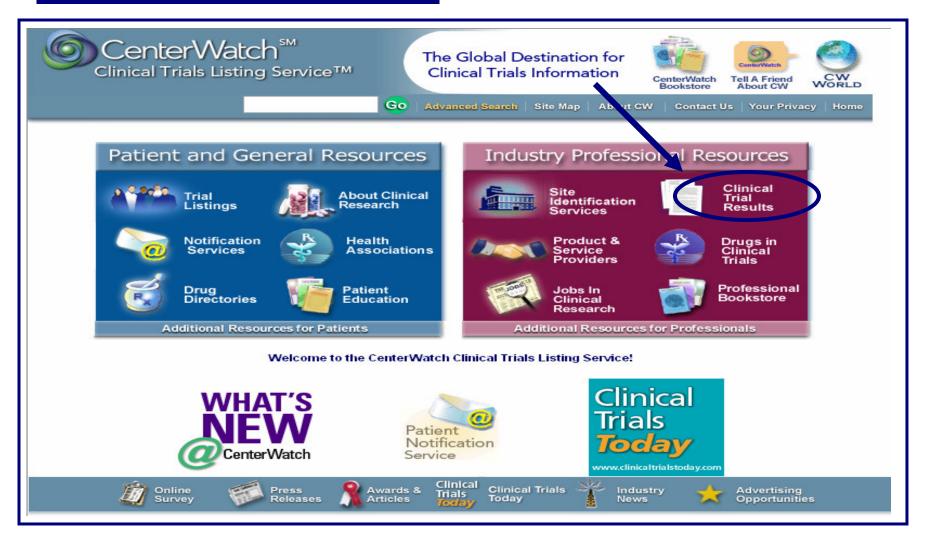
# ADIS - Clinical Trial Insight



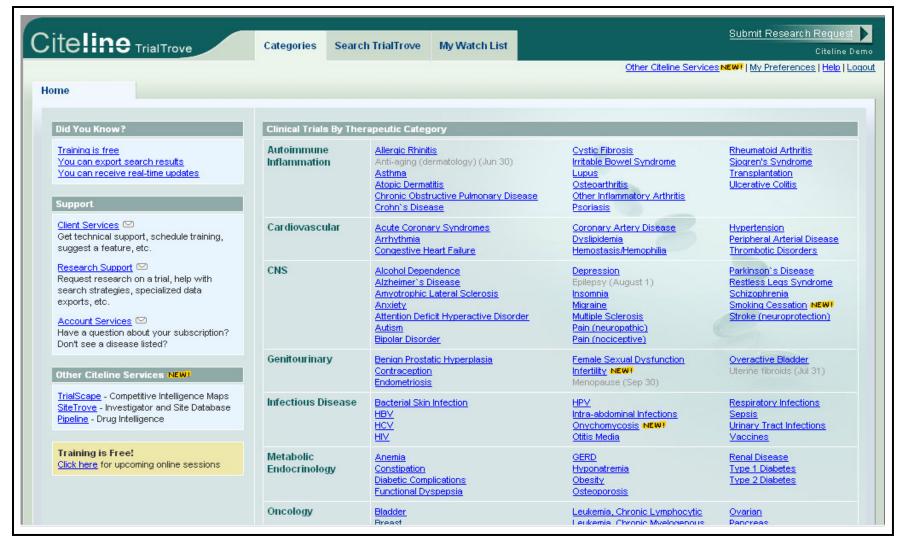
# National Cancer Institute – www.cancer.gov



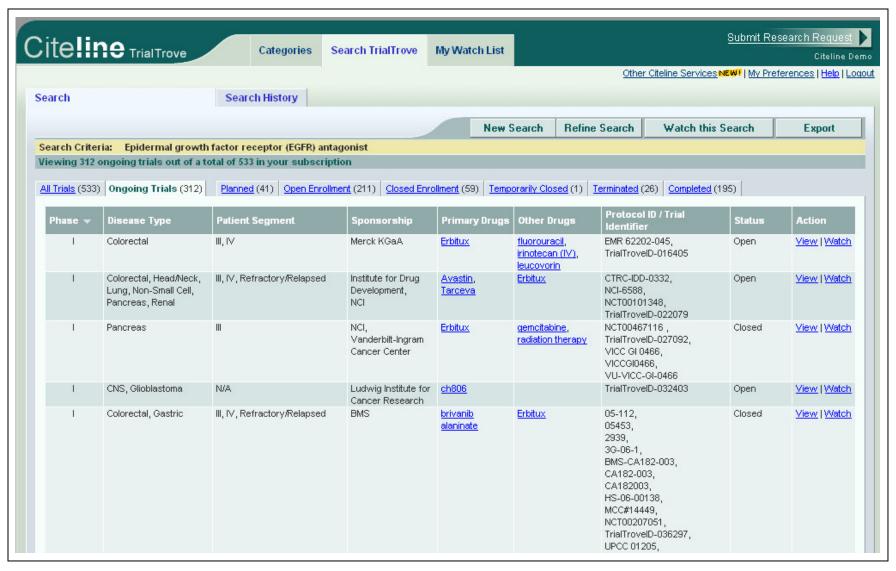
## CenterWatch: Clinical Trials www.centerwatch.com



#### **Citeline - TrialTrove**



#### Citeline TrialTrove



#### ClinicalTrials.gov



Home Search Study Topics Glossar

Search

ClinicalTrials.gov is a registry of federally and privately supported clinical trials conducted in the United States and around the world. ClinicalTrials.gov gives you information about a trial's purpose, who may participate, locations, and phone numbers for more details. This information should be used in conjunction with advice from health care professionals. Read more...

#### Search for Clinical Trials

Find trials for a specific medical condition or other criteria in the ClinicalTrials.gov registry. ClinicalTrials.gov currently has 57,256 trials with locations in 156 countries.

#### Investigator Instructions

Get instructions for clinical trial investigators/sponsors about how to register trials in ClinicalTrials.gov.

#### Background Information

Learn about clinical trials and how to use ClinicalTrials.gov, or access other consumer health information from the US National Institutes of Health.

#### Resources:

**Understanding Clinical Trials** 

What's New

Glossary

#### Study Topics:

**List by Condition** 

List by Drug Intervention

List by Sponsor

**List by Location** 

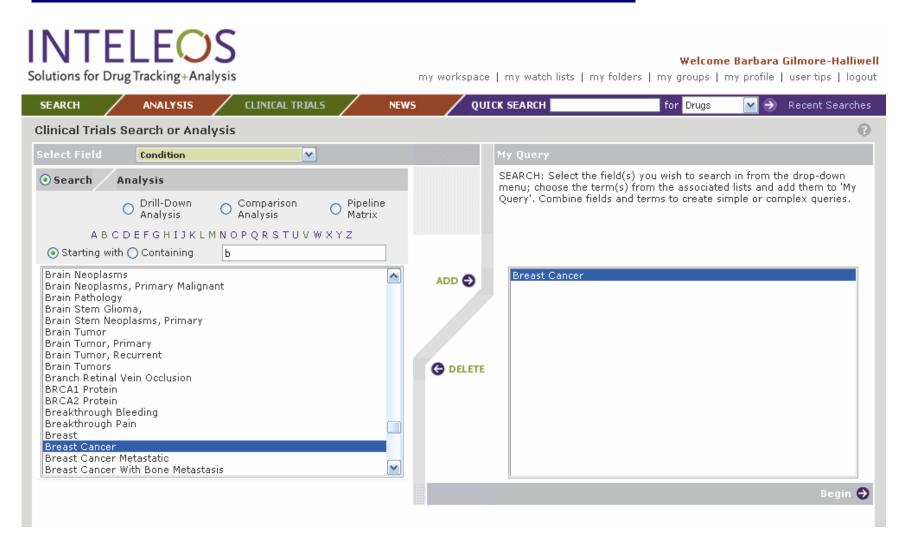
U.S. National Library of Medicine, Contact Help Desk
U.S. National Institutes of Health, U.S. Department of Health & Human Services,
USA.gov, Copyright, Privacy, Accessibility, Freedom of Information Act







#### Inteleos - Clinical Trials Section



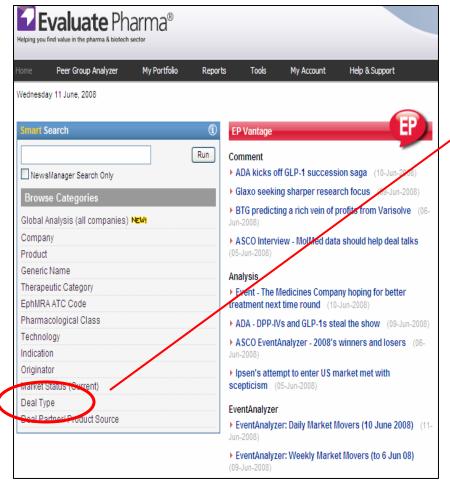


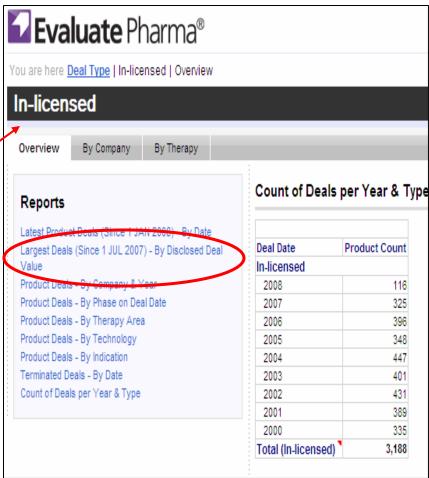
#### Deals & Alliance Resources Comparisons

- EvaluatePharma
- IDeals (Thomson Scientific)
- MedTrack
- Recombinant Capital's ReCap
- Windhover

#### EvaluatePharma: Search by Deal Type -

## In-licensed, Joint Venture, Company Acquisition, Product Acquisition, Out-licensed Technology





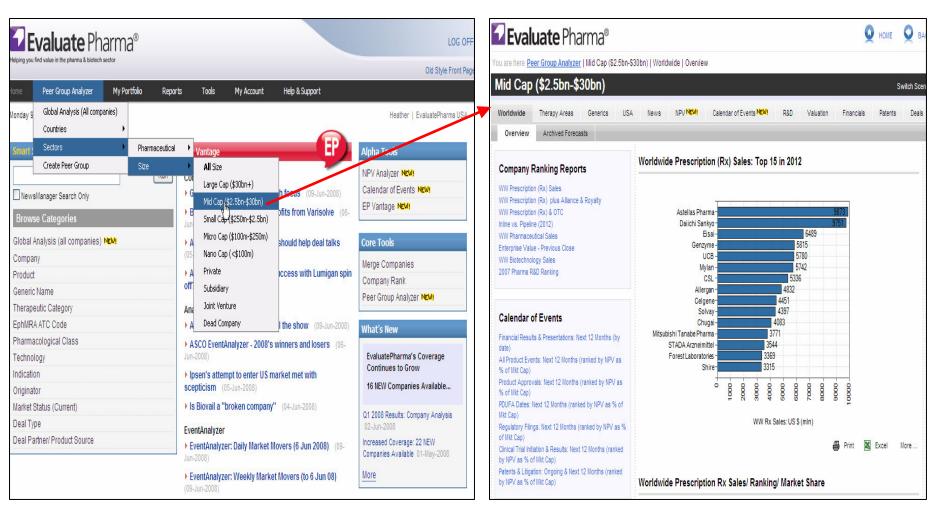
## EvaluatePharma – **Top In-Licensed Drugs by Deal Value**



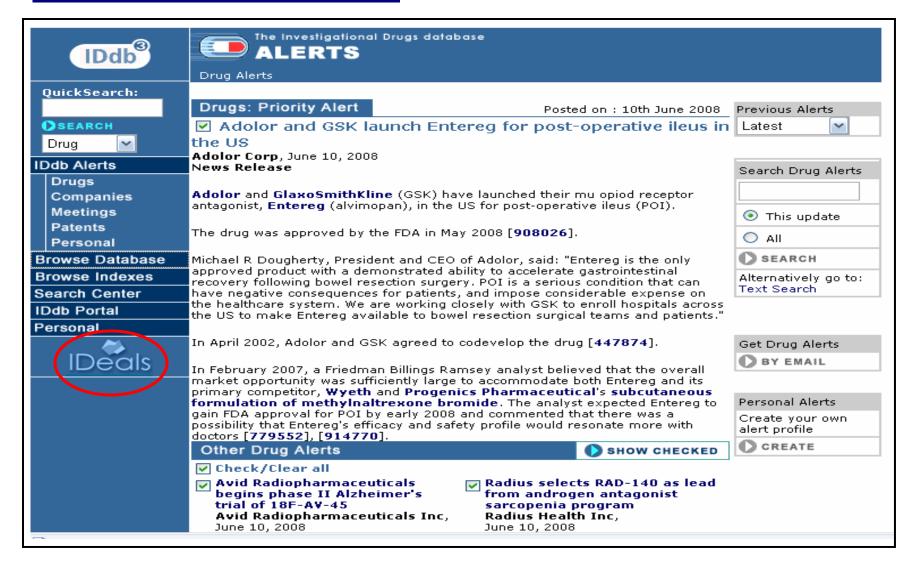
#### Sample Deal Report from EvaluatePharma(R)

ank	Company	Deal Type	Product	Deal Partner/ Product Source	Status on Deal Date		Upfront Payment ▽△	<b>V</b>	Deal Comment 것소	44	Milestones (Sales Related)
	Genzyme	In- licensed	Mipomersen	Isis Pharmaceuticals		1/7/2008	175		JAN08 in-licensed WW rights from Isis Pharmaceuticals (part of larger strategic alliance): Genzyme paid \$150m to buy 5m shares of Isis stock & will pay \$175m upfront fee, potential \$825m development & regulatory milestone payments plus up to \$750m in commercial milestone payments. Genzyme & Isis will share profits: initially 70/30 Genzyme/Isis split & reaching (on a sliding scale) \$0/50 when annual WW revenues reach >\$25n. Deal also gives Genzyme preferred access to future Isis drugs for CNS & certain rare diseases.		750
2	GlaxoSmithKline	in- licensed	TC-2696	Targacept	Phase II	7/27/2007	20		JUL07 Entered collaboration with Targacept covering pain, smoking cessation, addiction, obesity and Parkinson's disease: GSK to pay \$35m upfront including \$15m in equity investment, milestones upto \$1.5nn & tiered double-digit royalties on sales, in return for WW rights to develop & market candidates from TRGTs neuronal nicotinic receptor program. GSK has option to assume development after PII. TRGT retains co-promotion option for pain to specialists & hospital based physicians in USA.	1,464	
3	GlaxoSmithKline	In- licensed	OMP-21M18	OncoMed Pharmaceuticals	Pre-clinical	12/10/2007	~	1,345	DECOT Research alliance with OncoMed for cancer stem cell antibody programme; GSK to pay upfront fees (comprised of cash as well as an equity investment), milestones up to \$1.4b, & double-digit royalties & also have option to invest in a future initial public offering by OncoMed.	1.345	
4	GlaxoSmithKline	In- licensed	Elesciomol	Synta Pharmaceuticals	Phase II	10/8/2007	79	996	DEC07 GSK pays \$80m upfront to Synta. OCT07 In-licensed WW ex USA rights from Synta; GSK to pay upfront payments \$80m, milestone upto \$135m, regulatory milestones upto \$450m, commercial milestone payments upto \$300m & double-digit tiered royalties; GSK & Synta to share all development costs; GSK to purchase upto \$45m of Synta's common stock. GSK & Synta to receive a tiered proff share based on levels of annual net sales.	577	296
5	Merck & Co	In- licensed	Deforolimus (MK- 8669)	ARIAD Pharmaceuticals	Phase II	7/12/2007	75	927	JULOT License WW rights from ARIAD in exchange for \$75m upfront, up to \$452m in development/regulatory milestones, up to \$200m in sales-based milestones, at least \$200m in estimated contributions by Merck to global development, up to \$200m in interest-bearing repayable development-cost advances from Merck (after ARIAD has paid \$150m in global development costs), WW ex US tiered double-digit royalties & US co-promotion (ARIAD books US sales & pays MRK 50% of income). Companies to each fund 50% of cost of US development, MRK to pay 100% of the cost of ex-US development. ARIAD to manufacture the API, & Merck will be responsible for formulation of the finished conduct.	452	200
6	Astellas Pharma	In- licensed	CTS-21166	CoMentis	Phase I	4/25/2008	79		APR08 WW rights in-licensed from CoMentis. CoMentis will receive an upfront payment of \$80m, a qualty investment of \$20m & upto \$660m in milestones. In addition, CoMentis has the right to receive development milestones for next-generation beta-secretase inhibitors discovered under the terms of the research collaboration. Astellas will fund 100% of the pre-Phase III global development costs. & CoMentis will share the Phase III development costs. Astellas has exclusive worldwide commercialisation rights while CoMentis retains the right to co-promote in the U.S., where profit will be shared. CoMentis will receive royalties on sales outside the U.S.	9	
7	Sanofi-Aventis	In- licensed	IL-6 Trap	Regeneron Pharmaceuticals	Phase I	11/29/2007	93		NOV07 In-licensed WW rights from REGN. REGN to receive \$85m upfront payment, \$475m R&D funding over next 5 yrs, equity investment of \$312m & upto \$250m milestone payment for nereleukin-6 receptor (IL-GR) MAb, Delta-like ligand-4 (DIH) Inhibitor MAb & any other MAb therapeutics developed through collaboration. Sanofi-Aventis will have an option to extend the research agreement for up to an additional three years. Regeneron will have the right to copromote any and all collaboration products worldwide. In US, profits will be shared equally. Ex. US profits will be split on a pre-determined sliding scale with Sanofi-Aventis' share ranging from 65% to 55%. Payments include product lines: MAb Research Project & DIH Inhibitor.		27
8	Boehringer Ingelheim	In- licensed	Immunology Research Project	Ablynx	Research project	9/7/2007	-	656	SEP07 Ablymx & Boehringer Ingelheim collaborate jointly in the discovery of up to 10 Nanobody therapeutics against agreed targets across multiple therapeutic areas including immunology, oncology & respiratory. Boehringer expects to pay up to €75m during R&D term (including €15m in equity) plus up to €125m in development milestones per Nanobody & royalties. Ablynx has certain co-promotion rights in Europe.	649	

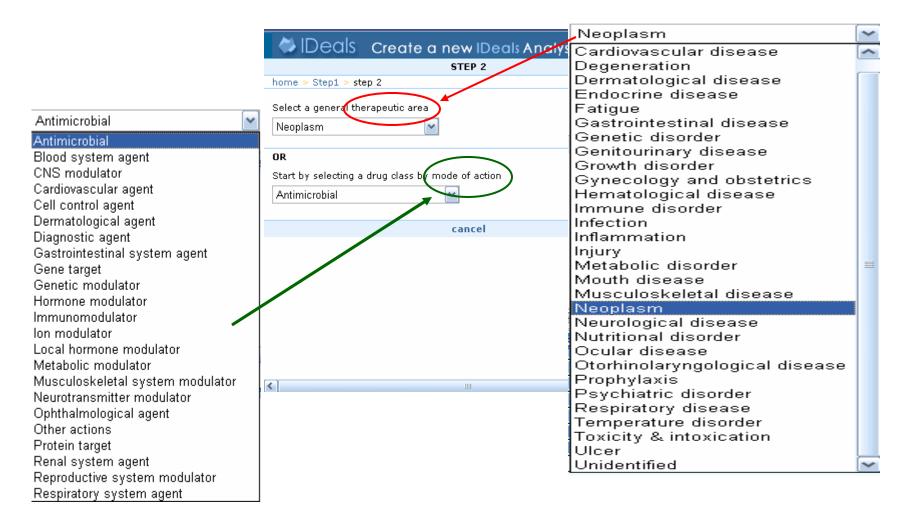
# Sample View of Peer Group Analyzer – Comparing Mid Cap Companies



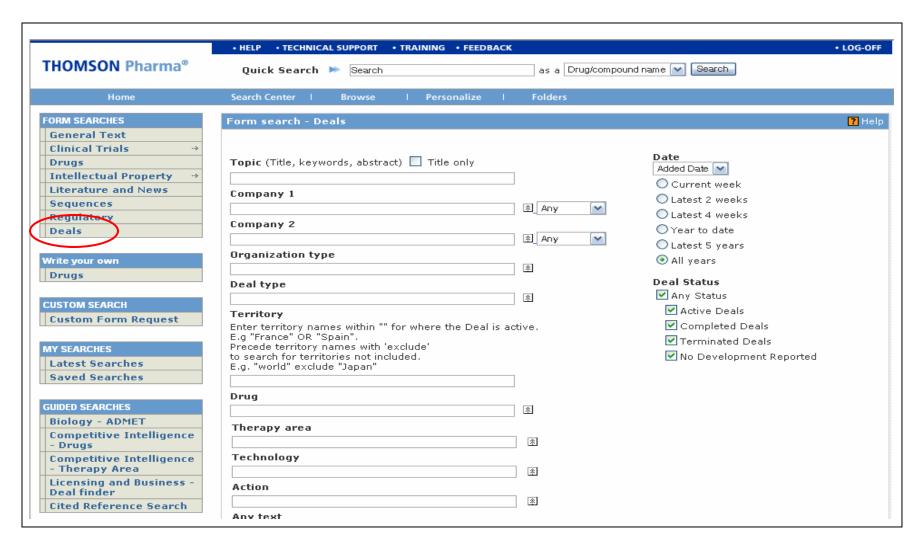
#### Thomson's - IDeals



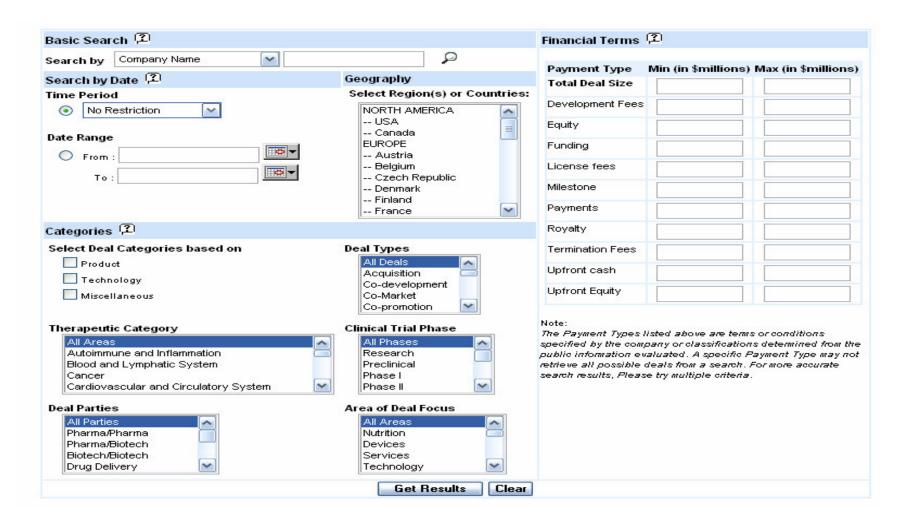
#### **Thomson Scientific - IDeals**



#### Thomson-Pharma's Deal Search



#### Deal & Alliance - MedTrack



#### MedTRACK - Company Comparison



#### Selected Companies for Comparison

#### Biotechnology:

Amgen Inc. (AMGN)

#### Pharmaceuticals:

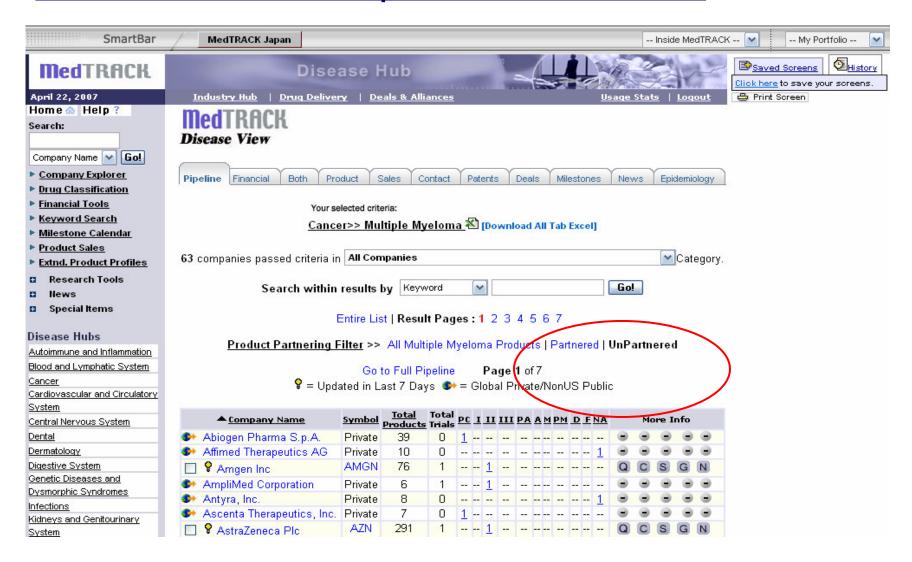
Bristol-Myers Squibb Co. (BMY) Genentech Inc. (DNA) Roche Holding AG (RHHBY)

#### Comparison by Multi Period Financials

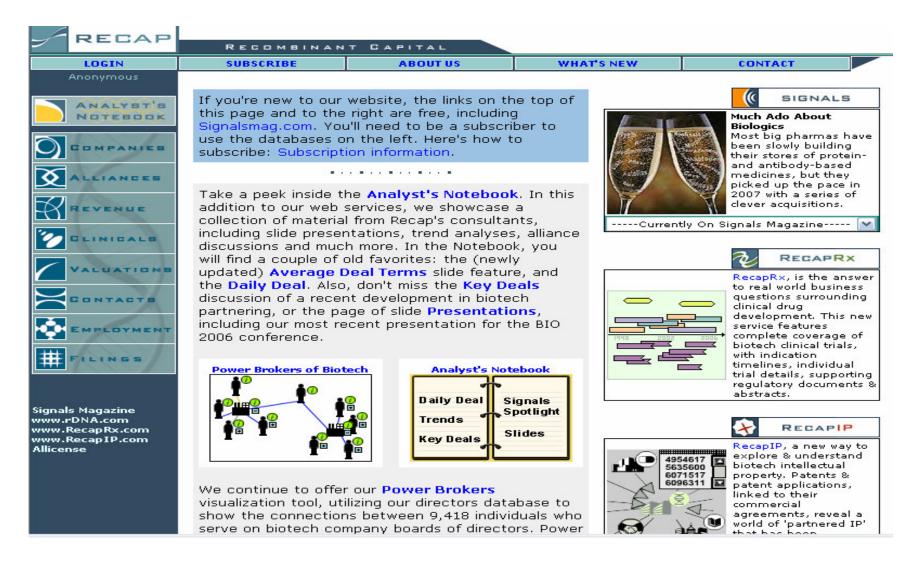
#### **Annual Income Statement**

	2007				
	AMGN	BMY	DNA	RHHBY	
REVENUES:					
Sales	14,311.0	19,348.0	11,724.0	42,977.2	
Other Revenues	460.0		_	-	
Total Revenues	14,771.0	19,348.0	11,724.0	42,977.2	
EXPENSES:					
Cost Of Goods Sold	2,308.0	6,026.0	1,500.0	12,668.6	
Cost Of Goods Sold, Total	2,308.0	6,026.0	1,500.0	12,668.6	
GROSS PROFIT	12,463.0	13,322.0	10,224.0	30,308.7	
Selling General & Admin Exp.	3,485.0	6,227.0	2,077.0	10,058.5	
R & D Expense	3,247.0	3,080.0	2,293.0	7,214.7	
Stock-Based Compensation	_	133.0	403.0	540.1	
Selling Gen. & Admin Exp., Total	6,732.0	9,440.0	4,773.0	17,813.3	
Amort. Of Intangible Assets	295.0	-	-		
Depr. & Amortization, Total	295.0	-	_	100	
OPERATING PROFIT	5,436.0	3,882.0	5,451.0	12,495.3	
Interest Expense - Non Finance Div.	-328.0	-422.0	-76.0	-256.7	
Interest Expense, Total	-328.0	-422.0	-76.0	-256.7	
Interest And Invest, Income	309.0	241.0	270.0	959.5	

#### MedTRACK - Un-partnered Deals?



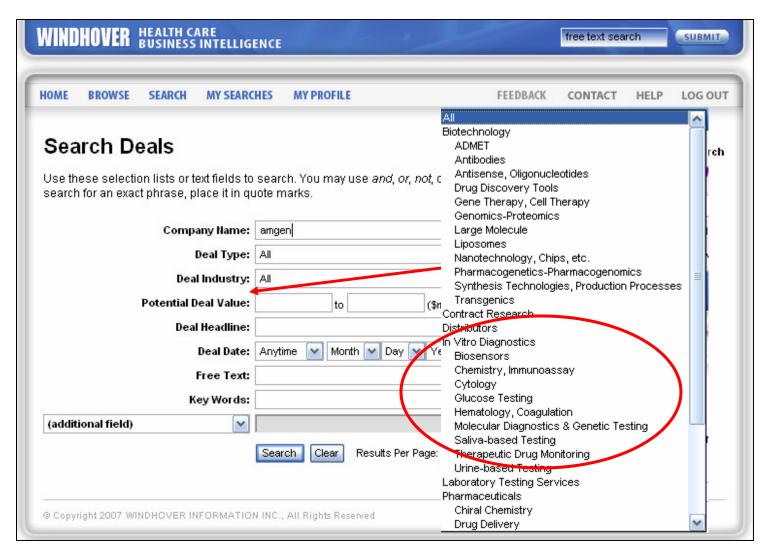
#### Recombinant Capital's ReCap



## Recombinant Capital's ReCap

		N DEALS THAT CI						24 (1999) BANK
ANALYST'S NOTEBOOK	servi	companion to the <b>Signals Ma</b> ce, rDNA.com. For this specia t rDNA.com, check out the <mark>in</mark> t	l report,	however, we've made the	data av	ailable to	all rea	aders. To learn more
COMPANIES		Agreement	Date	Туре	Size	Equity	Roy.	Subject
ALLIANCES	1.	☑ ■ Lilly / Genentech	8/78- 7/80	D,L			8%	Humulin recombinant insulin
CLINICALS	2.	☑ Wirin Brewery / Amgen	5/84- 10/89	CoD,JV,L	\$44.5		5%	EPO, G-CSF & GM CSF in Japan
VALUATIONS	3.	☑ GlaxoSmithKline / BioChem Pharma	1/90- 6/99	E,JV,L,R	\$45.9	\$34.0	15%	Epivir 3TC nucleoside analogue for AIDS & HBV
EMPLOYMENT	4.	Roche / Genentech	9/90	Acq	\$2014.0	)		60% acq. & governance agreement
ignals Magazine		■ Roche / Genentech	6/95- 7/99	CoD,L,O,S	\$0.0		22%	Ex-US products governance agreement
www.rDNA.com www.RecapRx.com www.RecapIP.com Allicense	5.	Allergan / Ligand	6/92- 1/95	E,JV,Ter,W	\$39.0	\$24.0	50%	Screening via retinoid receptors
		Allergan / Ligand Pharmaceuticals	1/95- 9/97	Ast,CoD,E,JV,O,Ter,W	\$56.0	\$6.0	50%	Allergan/Ligand JV based on retinoids
	6.	Lilly / Centocor	7/92- 6/96	CoD,Di,E,L,O	\$124.5	\$50.0	50%	Centoxin & ReoPro (CentoRx - abciximab) ex-Japar

#### Windhover Business Intelligence



### **Deals & Alliances - Comparison**

	Coverage	Sources	Special Notes
Evaluate Pharma	Historic sales 1986 - present	SEC Filings, Annual & quarterly reports, presentations to analysts & investors, FDA, USPTO, equity analysts	<ul> <li>Benchmark "peer group' companies &amp; portfolios</li> <li>NPV tools - Unique to EP – forecasts to 2028</li> <li>Gain insight into all sales at risk from patent expiry</li> </ul>
IDeals	1998 - present	Investigational Drug Database (IDDB) records	<ul> <li>Subset of data from Investigational Drugs Database (IDDB)</li> <li>Searchable by therapeutic area and mode of action</li> </ul>
MedTrack	1998 – present  (note: ownership change from LSA to DataMonitor in 2006)	<ul> <li>SEC filings</li> <li>Press releases</li> <li>Company websites</li> <li>Meetings abstracts</li> <li>Literature</li> <li>News</li> <li>Proprietary spiders to Company websites</li> </ul>	<ul> <li>Partnered &amp; un-partnered search capabilities</li> <li>Excellent export &amp; share capabilities</li> <li>Databases within include – D&amp; A, Epidemiology, Pipeline profile, deal screener, trend analysis, price to news, venture finance, company explorer, company merger tool, patent expiry</li> <li>Excellent customer service</li> </ul>

## **Deals & Alliances - Comparison**

	Coverage	Sources	Special Notes
ReCap	1988-present	SEC filings & exhibits Press Releases	<ul> <li>On-demand service for analysis of materials contracts (extra \$\$\$)</li> <li>Comprehensive consulting services</li> <li>Trend data available without subscription</li> <li>Databases available from their website (valuation, alliances, clinical trials, IP)</li> <li>Data difficult to export &amp; share</li> </ul>
Windhover (SIS)	1991-present	<ul> <li>SEC filings &amp; exhibits</li> <li>Press Releases</li> <li>Company communications</li> <li>Analyst reports</li> <li>Secondary news sources</li> <li>Editor's Meetings with Companies</li> <li>Publication – Medtech Insight</li> </ul>	<ul> <li>Comprehensive deals, alliance and diagnostics database</li> <li>Host analyst partnering conferences</li> <li>New search &amp; advanced search options</li> <li>Links to companion Windhover products (Journals - In Vivo, Start-Up, RPM Report) – linked to deals db</li> <li>Values deals by TA, company size, phase</li> <li>Excellent customer service</li> </ul>



### **Deals & Alliance Source Comparison**

	Partnered/ Un- partnered Seachable?	Diagnostics	Inventor (person)
Evaluate Pharma	No	No	No
Ideals	No	No	No
MedTrack	Yes	Yes	No
ReCap	No	No	No
Windhover	No	Yes	No

#### Analysis: Requestor's role dictates info needed.

	Early Stage Company	Established Pharma / Large Biotech
Development	<ul> <li>Pipeline work</li> <li>Complexity &amp; cost of clinical trials</li> <li>Development strategies</li> <li>Manufacturing outsourcing</li> </ul>	Availability of patients for clinical trials (based upon competitive landscape & other ongoing clinical trials). Both capture potential patients.
Regulatory & Legal	<ul><li>Quality</li><li>Broad application of product</li><li>(IP) for future</li></ul>	<ul><li>Fit with existing pipeline</li><li>IP value</li></ul>
Product Development & New Product Planning	<ul> <li>Market potential</li> <li>Competitive landscape</li> <li>Market entry possibilities</li> <li>Marketing rights licensing</li> </ul>	<ul> <li>Market potential</li> <li>Fit with existing pipeline</li> <li>Fit with existing sales force</li> <li>Competitive landscape</li> </ul>
Management	<ul><li>Track record of internal folks</li><li>Development &amp; commercial competitors</li></ul>	■ Lead molecules / consolidation of pipeline

## Analysis: Public vs. private company?

Data Needed	Public Company	Private Company
Product & Pipeline	■ Pipeline Databases -  □ ADIS R&D Insight □ IMS R&D Focus □ Thomson Pharma – IDDB □ Pharma Projects □ Prous Integrity □ Inteleos ■ www.drug name.com ■ Drugs @ FDA	■ Pipeline Databases -  □ ADIS R&D Insight □ IMS R&D Focus □ Thomson Pharma – IDDB □ Pharma Projects □ Prous Integrity
Company Information & Manufacturing Capacity	<ul> <li>Company – BioScan, Coombs, Hoovers, IMS, VeriSpan</li> <li>Manufacturing Capacity – analyst reports, 10K &amp; news</li> </ul>	<ul> <li>Company –BioScan, Coombs,</li> <li>Hoovers, newspapers local to</li> <li>company location</li> <li>Deals databases</li> </ul>
Financials & Forecasts	<ul> <li>SEC Filings (Hoover, 10K Wizard)</li> <li>D&amp;B</li> <li>Wall Street analysts</li> <li>IMS, EvaluatePharma, BioPharm Insight</li> </ul>	<ul><li>Local Press (http://newsdirectory.com)</li><li>D&amp;B</li></ul>

## Analysis continued.....

Data Needed	Is the company public?	Is the company private?
Business News	<ul> <li>Subscription based news -         (BioCentury, BioWorld, SCRIP, Pink Sheet, IDRAC news etc.)</li> <li>News Alerts (Factiva, Lexis Publisher, NewsEdge</li> <li>Free (Bio &amp; FDLI Smart Briefs, Fierce Biotech, First Word, DMS Alerts, BioPharm Insight, PharmaVoice, DMS Alerts)</li> </ul>	<ul> <li>Local press where the company is located. Global news available at:         <ul> <li>www.newsdirectory.com</li> </ul> </li> <li>Deals &amp; alliance databases under the "public" company the deal was done</li> </ul>
Scientific News	<ul><li>Scientific alerts (Commercially available or NCBI)</li><li>Prous Drug News Daily</li></ul>	Conference proceedings
Other	■ Patents	■ Patents

#### **Business News Sources:**

#### Daily Biotech & Pharma Industry News Updates – □ AdvaMed SmartBrief (no cost) ☐ **BioCentury -** (subscription based)

- **BioSpace Diagnostics** (no cost)
- □ BioSpace GenePool (no cost)
- **Biotechnology Industry Organization (BIO) SmartBrief** (no cost)
- **BioWorld Today** (subscription based)
- **Device Space Daily** (Medical Device & Diagnostics daily news (no cost)
- □ **DMS Alerts** (no cost) Deals & Alliance News
- ☐ FDC Reports Pink Sheet (Subscription)
- □ Food & Drug Law SmartBrief (FDLI) (no cost)
- ☐ FierceBiotech (no cost) RSS available
- ☐ First Word (no cost & subscription based depending on level)
- ☐ Informa Healthcare –SCRIP (subscription based) RSS available
- **Prous Drug News Daily** (subscription)

#### Weekly Biotech & Pharma Industry News Update(s)

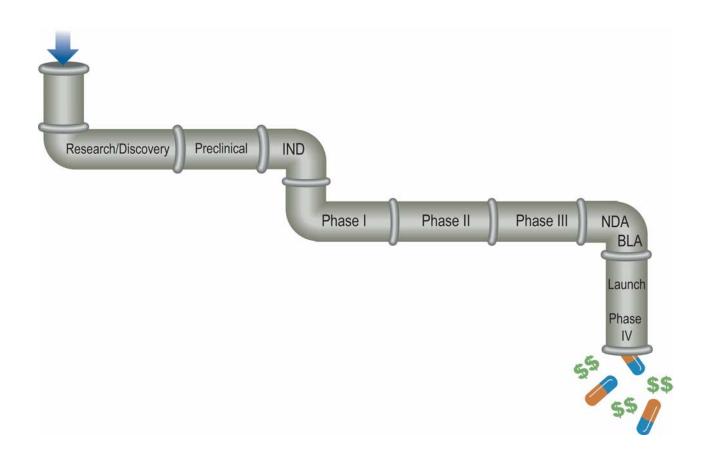
CHI Weekly Update (Cambridge Health Institute) (no cost)

#### Monthly Biotech & Pharma Industry News Update(s) -

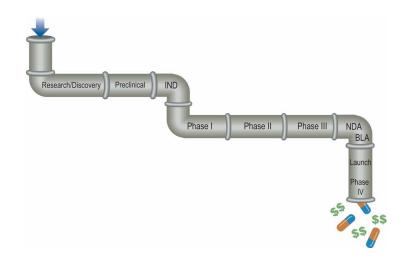
- **BioPharm International** (no cost)
- ☐ IMS Health World Market Summary (no cost)
- ☐ PharmaVoice (basic no cost, premium subscription available)



## Pipeline – Focus by stage



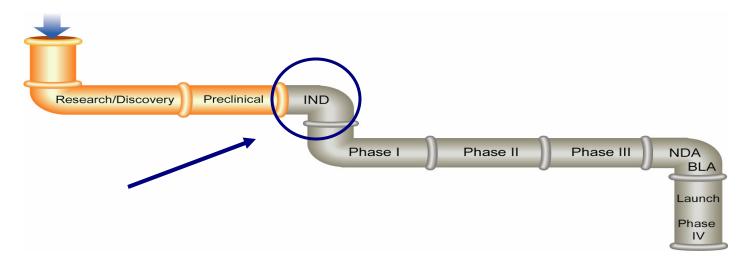
Where to look & what to look for will depend on phase of development -



Pre-clinical	Phase I	Phase II	Phase III	Submission	Launch
<ul> <li>Scientific lit</li> <li>Conference lit</li> <li>Patents</li> <li>Health Stats</li> <li>Pipeline dbs</li> <li>Business news</li> </ul>	<ul> <li>Pipeline dbs</li> <li>Scientific lit</li> <li>Clinical trials</li> <li>Analysts</li> <li>HCUP data</li> </ul>	<ul> <li>Pipeline dbs</li> <li>Scientific lit</li> <li>Conferences</li> <li>Clinical trials</li> <li>Business news</li> <li>Analysts</li> </ul>	<ul> <li>Pipeline dbs</li> <li>Scientific lit</li> <li>Conferences</li> <li>Clinical trials</li> <li>Analysts</li> <li>Business News</li> <li>Deals dbs</li> </ul>	<ul><li>■ Pipeline dbs</li><li>■ Regulatory (IDRAC)</li><li>■ FDA</li></ul>	<ul> <li>Analysts</li> <li>SEC filings</li> <li>Business News</li> <li>PDR/ GenRX</li> <li>Redbook</li> <li>IMS &amp; Scott Levin Audits</li> </ul>

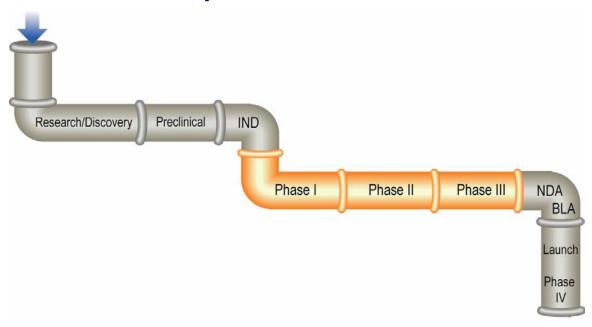
## M

### <u>Drug Development – Early Research</u>



Nomenclature	Sources
■Chemical names	■Conference proceedings
■Laboratory Codes	■Patents
■CAS registry numbers	■Drug pipeline databases
	■Scientific literature

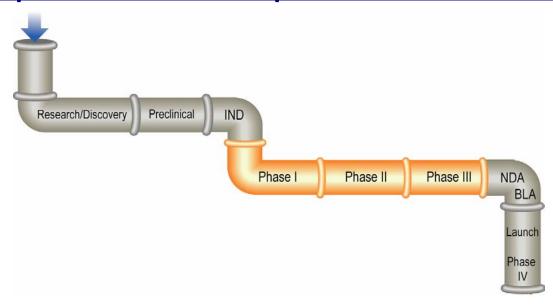
## Pipeline Development - Clinical Phases



Clinical Trials Questions	Studies that provide answers
<ul> <li>Safety &amp; Efficacy</li> <li>Maximum tolerated dose</li> <li>Half-life</li> <li>Interactions with other drugs</li> </ul>	<ul> <li>Formulation development</li> <li>Safety &amp; efficacy</li> <li>Competitive products &amp; their trials</li> <li>Don't ignore terminated trials</li> <li>Label considerations</li> </ul>



## <u>Drug Pipeline Development – Clinical</u>



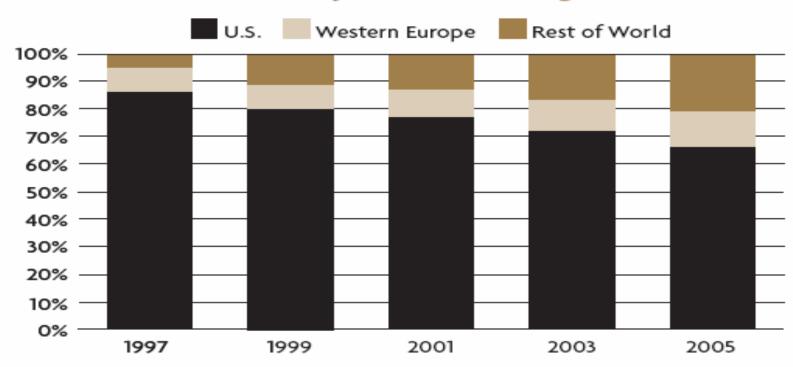
Nomenclature	Sources
<ul> <li>Non-proprietary names</li> <li>USAN (U.S. adopted names)</li> <li>INN (International non-proprietary names)</li> <li>In addition to the lab codes, CAS RN's and chemical names (previous phases)</li> </ul>	<ul> <li>Scientific literature</li> <li>Meetings &amp; conference proceedings</li> <li>Pipeline databases</li> <li>Clinical trial databases</li> <li>Analysts &amp; forecast resources</li> </ul>

## Changes in the Investigational Drug Research Process

- Increase in the <u>number & size</u> of clinical trials per New Drug Application
  - 1985 1988: Average # = 36 (3,200 patients tested/NDA)
  - 2000 2005: Average # = 70 (4,500-5,000 patients/NDA)
- Leading US Pharmaceutical companies increased # of new drug trials 52% since 2002
  - (Source: Outlook 2007 from Tufts Center for the Study of Drug Dev)
- Clinical testing phase gradually lengthening
  - □ Rise from mean time of 5.5 years in 1980's to 6.5 years in the 1990's/
  - □ In 2002 2004 duration extended 7 years
    - (Source: PhRMA 2007 Innovation.org)

## Clinical Investigations are going global -

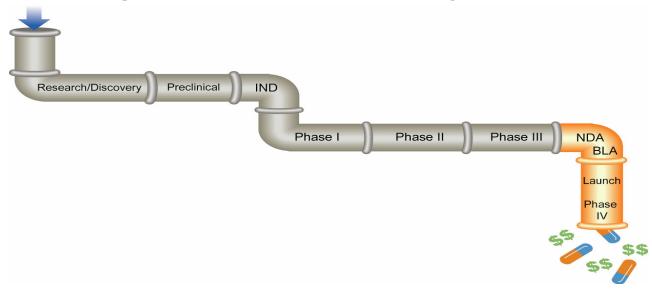




Note: A 1572 form must be submitted to the FDA by a clinical investigator prior to initiating a study in human subjects.

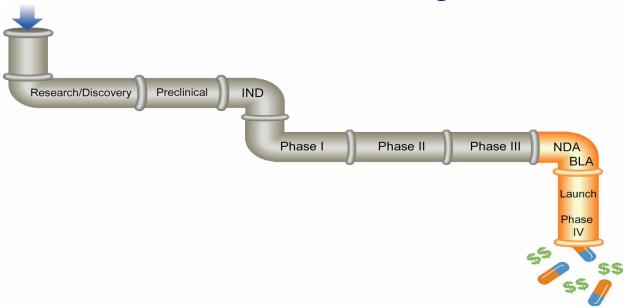
Source: Tufts Center for the Study of Drug Development

## NDA Preparation & Filing-



NDA Filing	Approval /Launch Prep
<ul> <li>Follows clinical trials</li> <li>Clinical trial data analysis phase</li> <li>NDA / BLA electronic submissions</li> <li>Manufacturing / CRM inspection</li> <li>Label reviews</li> <li>Publication planning</li> <li>MD / RN Educations</li> </ul>	<ul> <li>FDA has 6 months for standard review; priority reviews are shorter</li> <li>In most cases, FDA review time exceeds 6 months. Average is 2 years. PDUFA purpose is to shorten time to approval</li> <li>Once NDA approved, drug marketable</li> </ul>

# Pipeline Development – NDA/Launch/Post Marketing

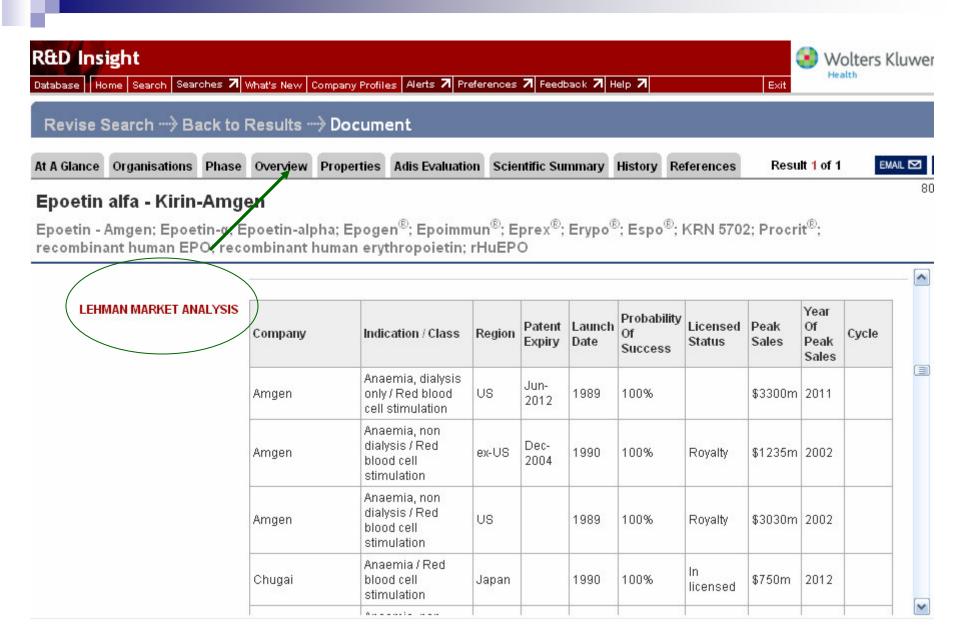


Nomenclature	Sources
<ul> <li>USAN/USP (established name)</li> <li>Proprietary names / Chemical names</li> <li>Generic names</li> <li>Brand names</li> </ul>	<ul> <li>Patent literature</li> <li>Business literature</li> <li>Clinical literature</li> <li>Analysts &amp; Forecasts</li> <li>FDA &amp; internet regulatory sites (IDRAC)</li> </ul>

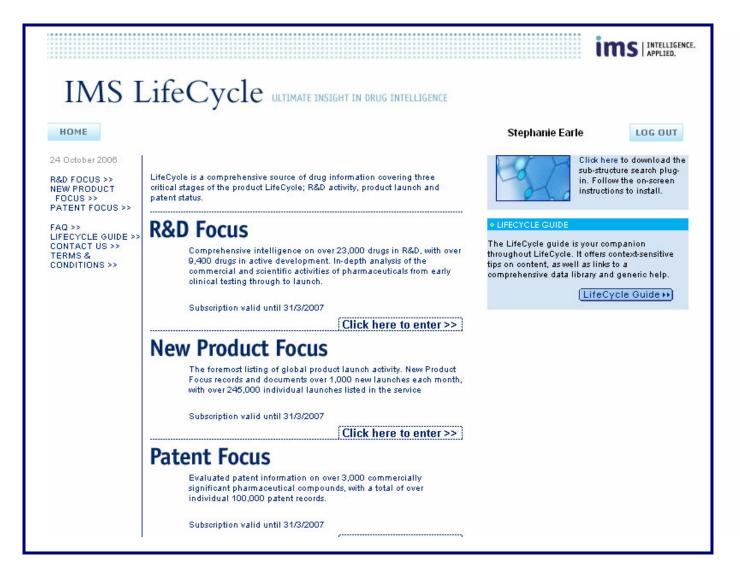


#### **Drug Pipeline Databases**

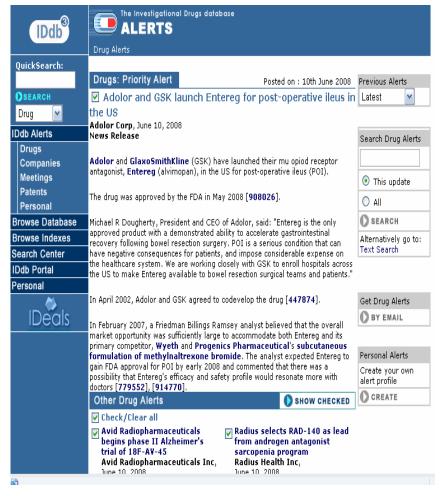
- ADIS R&D Insight
- IMS R&D Focus IMS Health (IMS Global Services)
- Investigational Drugs Database (IDDB) Thomson Scientific
- Inteleos (Elsevier)
- Pharmaprojects (Informa Healthcare)
- Prous Integrity
- Others Portals Containing Pipeline Data: BioPharm Insight / MedTrack

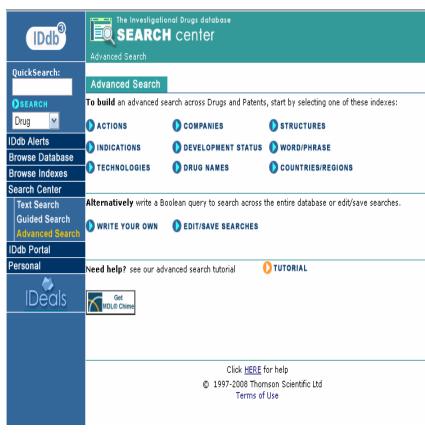


#### IMS R&D Focus -

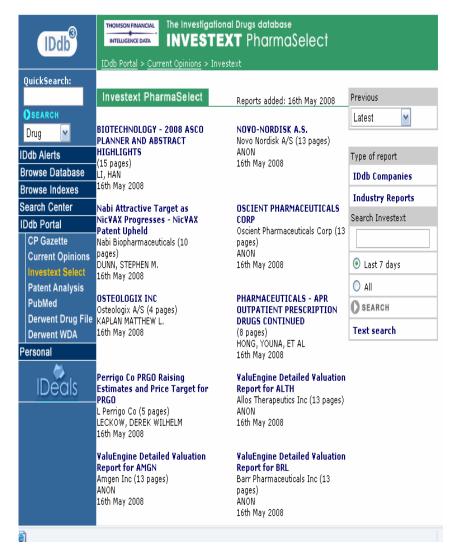


#### Investigational Drug Database "IDdb"



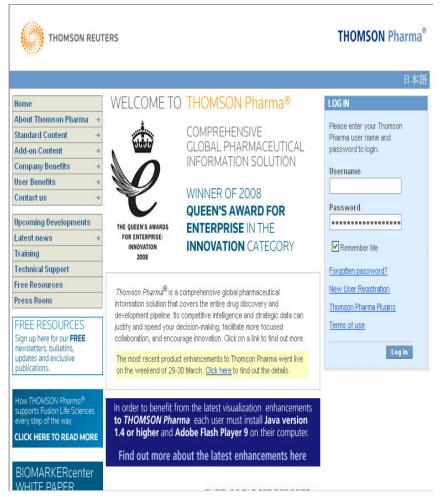


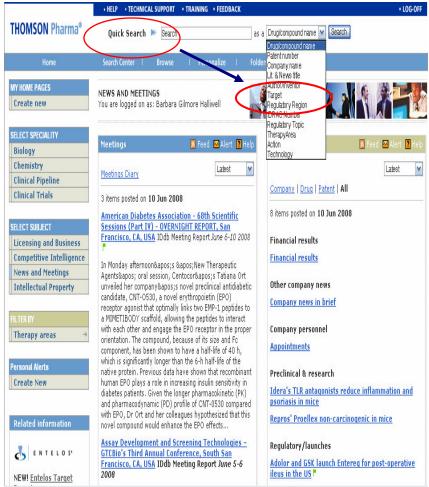
#### Investigational Drug Database "IDdb"





#### **THOMSON-Pharma**





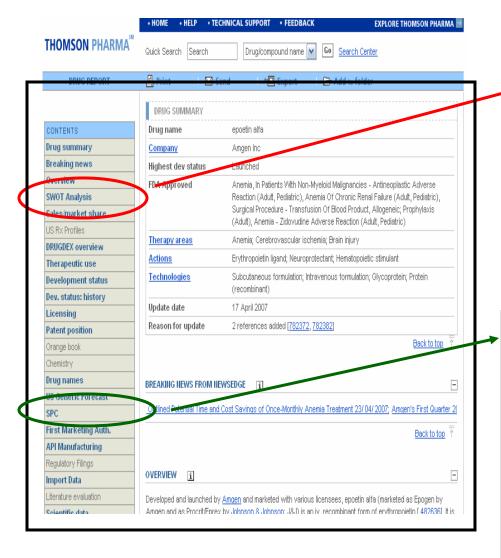
# Thomson-Pharma Sources:

- Biosis
- Conference Fast Track
- Current Chemical Reactions
- Current Contents
- Current Opinion Journals:
  - Drug Discovery Development
  - Investigational Drugs
  - Molecular Therapeutics
- Current Patents Gazette
- Data Stream
- Delphion
- •Derwent Biotechnology Resource
- Derwent Chemistry Resource

- Derwent Drug File
- Dolphin
- DrugDex
- •GENESEQ
- GENESEQ FASTAlert
- GlobalTOPIC
- •IBES
- •IDdb
- IDeals
- •IDrac
- Index Chemicus
- •INPADOC
- Investext
- Medstat
- NewsEdge

- Orange Book
- Patent Citation Index
- Patent Fast Alert
- Patents Preview
- Proceedings
- PubMed
- •SDdb
- Sharewatch
- SwissProt
- Thomson Patent Store
- Web of Science
- World Drug Alerts
- World Patent Index
- WorldScope

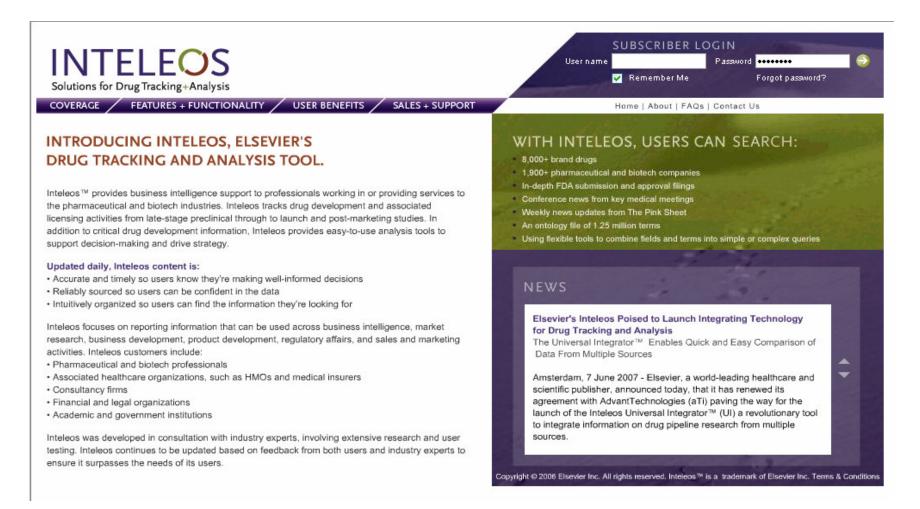
#### <u>Thomson Pharma – Unique Features</u>



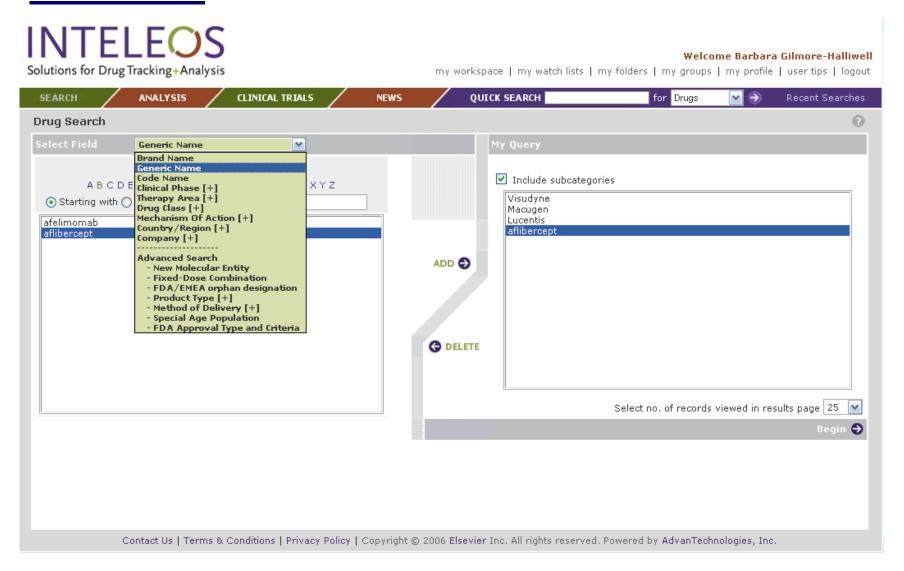


Displaying page 1   Show Full Results						
Active Ingredient(s)	Patent Details  Patent Number	SPC Holder	SPC Country	SPC Number	SPC Status	SPC Expiry
epoetin alfa	LV0010506	Kirin- Amgen Inc	Latvia	<u>040041M</u>	Rejected	19-Jun-2005
epoetin alfa	EP0148605	Kirin- Amgen Inc	Italy	920376M	Granted	02-May-2007
epoetin alfa	EP0148605	Kirin- Amgen Inc	UK	<u>930156M</u>	Withdrawn	11-Dec-2004
epoetin alfa	EP0148605	Kirin- Amgen Inc	Netherlands	930128M	Rejected	11-Dec-2004
epoetin alfa	EP0148605	Kirin- Amgen Inc	Luxembourg	<u>930338M</u>	Withdrawn	12-Dec-2004
epoetin alfa	EP0148605	Kirin- Amgen Inc	France	920481M	Granted	20-Nov-2007
epoetin alfa	EP0148605	Kirin- Amgen Inc	France	920482M	Granted	20-Nov-2007
epoetin alfa	EP0148605	Kirin- Amgen Inc	Belgium	930106M	Withdrawn	12-Dec-2004
epoetin alfa	DE3482828	Kirin- Amaen Inc	Germany	930092M	Withdrawn	12-Dec-2004

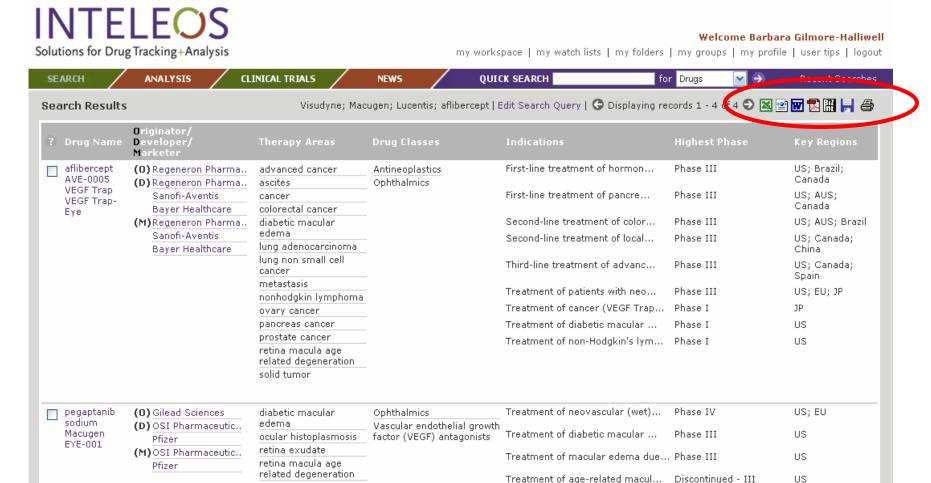
#### Inteleos -



#### <u>Inteleos -</u>



### Inteleos – Search & Export Capabilities



Treatment of chronic, post-ope...

Treatment of subfoveal choroid...

retina macula cystoid

retina macula edema

neovascularization

edema

US

US

Discontinued - I

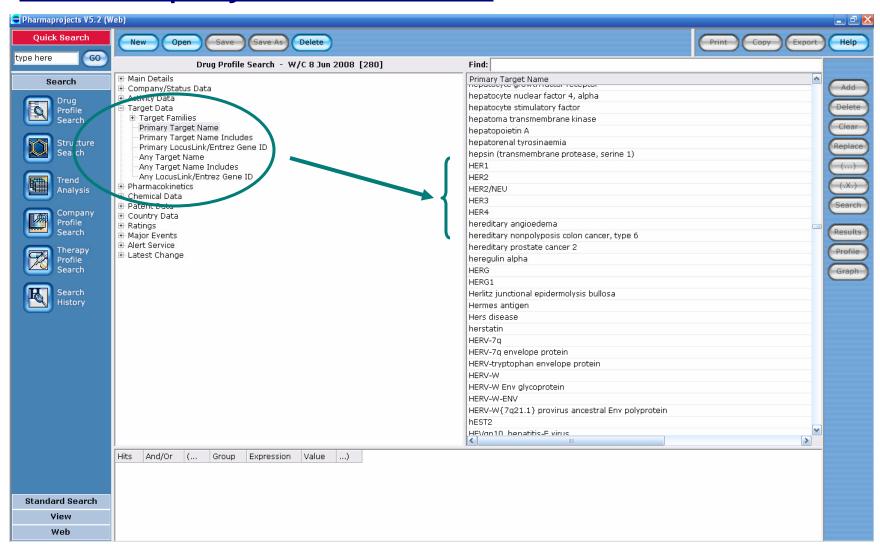
Discontinued - I



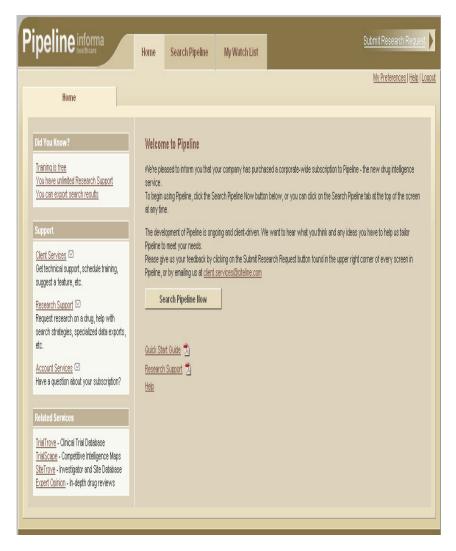
#### **Pharmaprojects**



#### Pharmaprojects - Classic

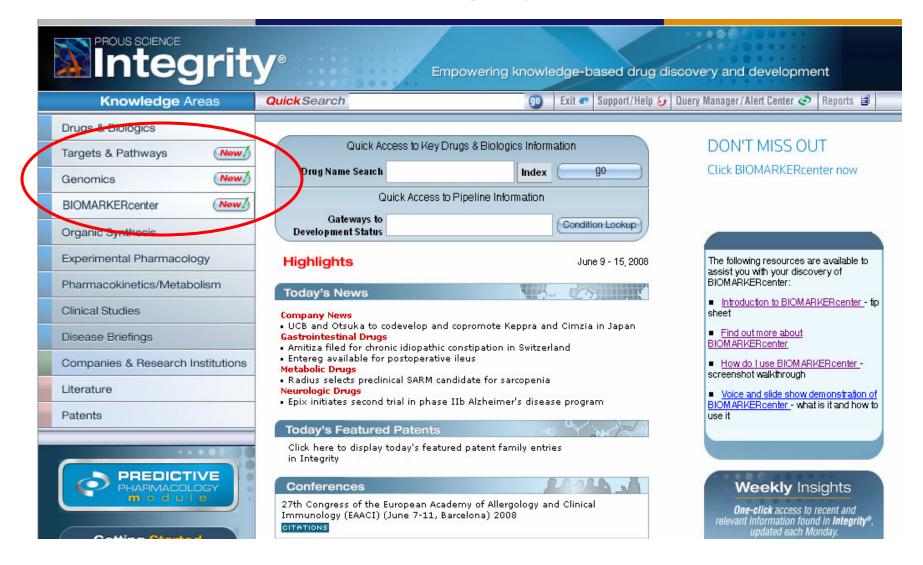


#### Pharmaprojects - Pipeline

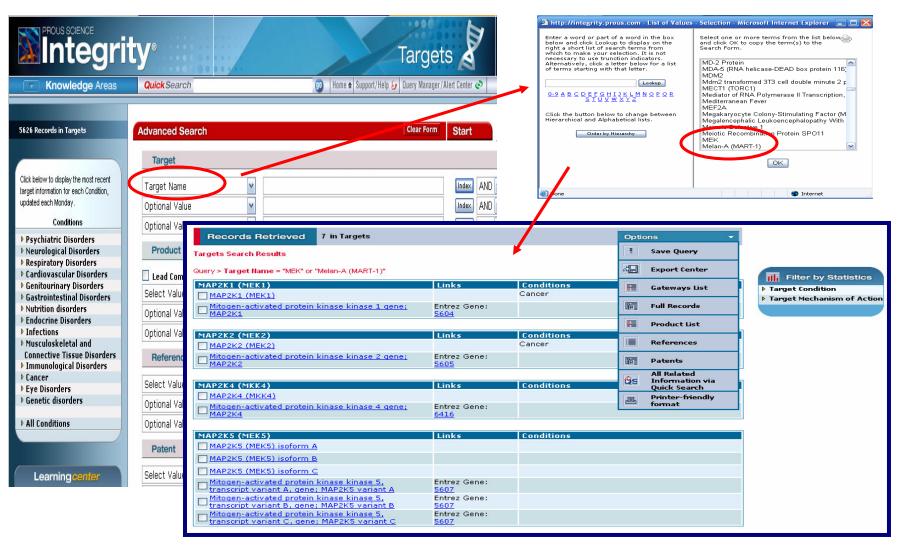




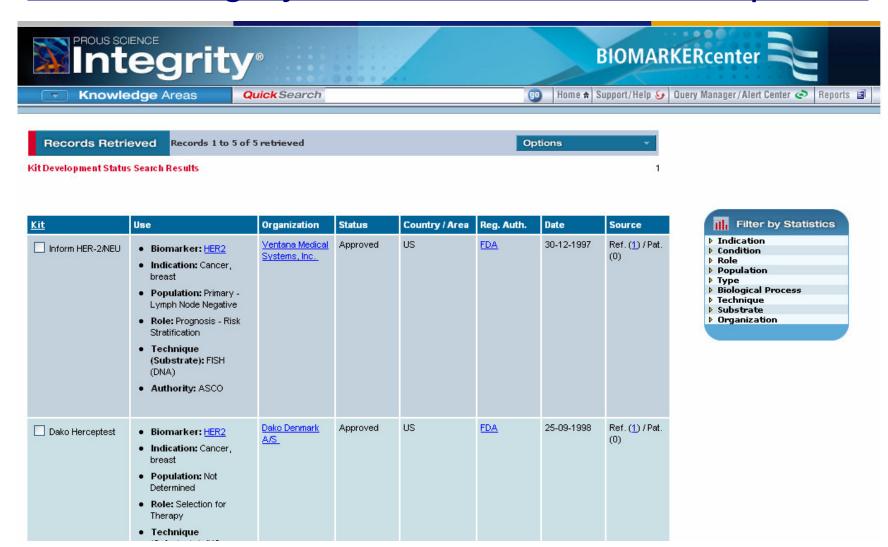
#### Thomson's Prous Integrity



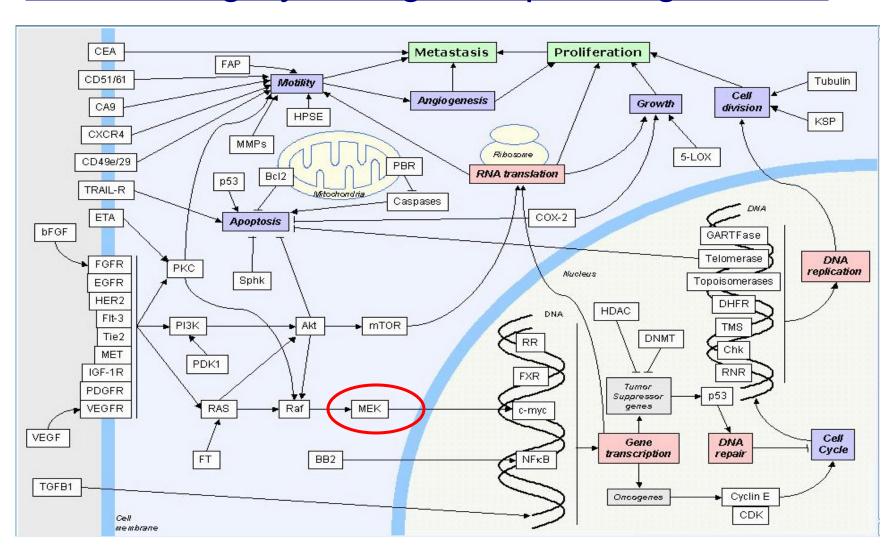
#### Prous Integrity - Target Search



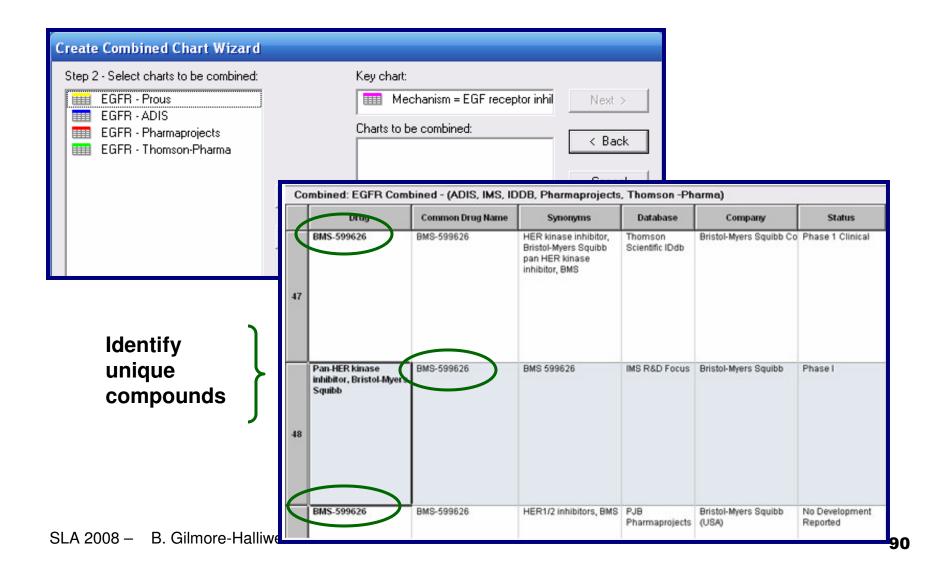
#### Prous Integrity - BioMarker Kit Development



## Prous Integrity - Targetscape Lung Cancer



## **Smart Charts - Data Integration Tool**







- There are several avenues to success when collecting information.
- Who are your customers?
- Where are budget dollars best spent?
- Where did the information in the database/portal come from? Was it a synthesis of existing data or purchase of an independent source?

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- ☐ Christine DeMeo, Prous Integrity (Thomson)
- Jonathan Evans, PharmaProjects (Informa)
- □ Heather Foit, EvaluatePharma
- □ Alan Kocotas, Knowledge Express (Infinata)
- □ Zorba Lieberman, CiteLine TrialTrove (Informa)
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# NA.

#### **Up Next: Case studies using pipeline dbs.**

