

**European Biotech Peer Ownership Matrix: Target Investors**

Target Investor Inclusion Criteria: Active, US-based investors whose investment focus includes small- and micro-cap equities.

Account Name	AGGREGATE PEER HOLDINGS						INDIVIDUAL PEER HOLDINGS									ADDITIONAL INVESTOR DETAILS		
	# HBV Peers Held	# HIV Peers Held	# French Peers Held	Total # Peer Groups Held	Total # Peers Held	Total Peer Holdings (\$M)	ABUS Holdings (\$M)	ADOC.PA Holdings (\$M)	ARWR Holdings (\$M)	DVAX Holdings (\$M)	ERYP.PA Holdings (\$M)	GNCA Holdings (\$M)	INO Holdings (\$M)	TNG.PA Holdings (\$M)	Equity AUM (\$M)	City	State	
AllianceBernstein, L.P. (U.S.)	3 / 5	1 / 3		2 / 3	3 / 12	2.17	0.00		0.50	1.00		0.00	0.67		141,777.19	New York	NY	
Alyeska Investment Group, L.P.		1 / 3		1 / 3	1 / 12	0.31	0.00				0.31				7,005.39	Chicago	IL	
American Century Investment Management, Inc.	1 / 5			1 / 3	1 / 12	1.67				1.67					90,976.53	Kansas City	MO	
Amici Capital, LLC	1 / 5			1 / 3	1 / 12	60.15				60.15					2,398.56	New York	NY	
Apex Capital, LLC	1 / 5			1 / 3	1 / 12	9.33				9.33					803.17	Orinda	CA	
Ascend Capital, LLC	1 / 5			1 / 3	1 / 12	4.39	4.39								3,203.77	Orinda	CA	
AWM Investment Company, Inc.	1 / 5			1 / 3	1 / 12	7.53			7.53	0.00					626.99	New York	NY	
Bailard, Inc.	1 / 5			1 / 3	1 / 12	1.65	1.65								1,075.68	Foster City	CA	
Baker Brothers Investments	2 / 5		1 / 6	2 / 3	3 / 12	33.08	2.14		7.22		23.72				12,188.51	New York	NY	
BlackRock Advisors, LLC	3 / 5	2 / 3		2 / 3	4 / 12	8.25	0.00		1.83	2.91		1.02	2.49		260,835.96	Wilmington	DE	
Blue Ridge Capital, LLC	1 / 5			1 / 3	1 / 12	20.16	20.16								8,894.16	New York	NY	
Blume Capital Management, Inc.	1 / 5			1 / 3	1 / 12	0.00				0.00					132.17	Berkeley	CA	
BMO Asset Management U.S.	1 / 5			1 / 3	1 / 12	0.06				0.06					23,195.10	Chicago	IL	
BNP Paribas Asset Management, Inc.	1 / 5			1 / 3	1 / 12	2.53	2.53								4,983.98	Boston	MA	
BNY Asset Management	3 / 5	2 / 3		2 / 3	4 / 12	6.29			1.32	2.07		0.67	2.23		112,385.36	New York	NY	
Broadfin Capital, LLC	1 / 5	1 / 3		2 / 3	2 / 12	31.63				17.94		13.69			1,645.46	New York	NY	
Citadel Advisors, LLC	4 / 5	1 / 3		2 / 3	4 / 12	8.52	4.24		0.30	3.90			0.09		69,240.99	Chicago	IL	
Clough Capital Partners, L.P.	1 / 5			1 / 3	1 / 12	12.27				12.27					2,863.17	Boston	MA	
Clovis Capital Management, L.P.	1 / 5			1 / 3	1 / 12	2.34				2.34					192.56	New York	NY	
Columbia Management Investment Advisers, LLC	4 / 5	1 / 3		2 / 3	4 / 12	20.25	0.81		6.06	13.23			0.14		163,315.83	Boston	MA	
Cormorant Asset Management, LLC	1 / 5			1 / 3	1 / 12	11.71				11.71					727.66	Boston	MA	
Cougar Capital, LLC	1 / 5			1 / 3	1 / 12	0.39			0.39						127.45	New York	NY	
D.E. Shaw & Company, L.P.	4 / 5	2 / 3		2 / 3	5 / 12	27.98	23.89		0.67	2.39		0.15	0.88		52,117.47	New York	NY	
Deerfield Management Company		1 / 3		1 / 3	1 / 12	7.75						7.75			3,215.46	New York	NY	
Denver Investment Advisors, LLC	1 / 5	1 / 3		2 / 3	1 / 12	0.10							0.10		3,017.50	Denver	CO	
Deutsche Investment Management Americas, Inc.		1 / 3		1 / 3	1 / 12	0.83			0.00			0.83			28,961.10	New York	NY	
Driehaus Capital Management, LLC	1 / 5			1 / 3	1 / 12	4.06	0.00			4.06					4,902.77	Chicago	IL	
DRW Trading, Inc.	1 / 5			1 / 3	1 / 12	1.17				1.17					110.14	Chicago	IL	
DSC Advisors L.P	1 / 5			1 / 3	1 / 12	2.34				2.34					252.38	Chicago	IL	
EAM Investors, LLC	1 / 5		1 / 6	2 / 3	2 / 12	6.85		0.05		6.80					989.93	Cardiff-by-the-Sea	CA	
Edge Wealth Management, LLC	1 / 5			1 / 3	1 / 12	0.13			0.13						269.43	New York	NY	
Emerald Advisers, Inc.	1 / 5	1 / 3		2 / 3	1 / 12	2.42							2.42		3,445.95	Lancaster	PA	
Essex Investment Management Company, LLC	1 / 5			1 / 3	1 / 12	0.61				0.61					609.18	Boston	MA	
Eventide Asset Management, LLC	1 / 5			1 / 3	1 / 12	4.56				4.56					1,848.47	Boston	MA	
EverPoint Asset Management, LLC	3 / 5			1 / 3	3 / 12	10.34	3.80		5.72	0.82					4,628.25	New York	NY	
Falcon Edge Capital, L.P.	1 / 5			1 / 3	1 / 12	31.05	31.05								1,456.27	New York	NY	
Falcon Point Capital, LLC	2 / 5			1 / 3	2 / 12	0.48				0.27					278.05	San Francisco	CA	
Federated Global Investment Management Corporation	1 / 5			1 / 3	1 / 12	72.99			0.21	72.99					14,760.43	New York	NY	
Fidelity Management & Research Company	1 / 5	1 / 3		2 / 3	2 / 12	53.90			0.00	4.31		49.59			827,183.37	Boston	MA	
First Manhattan Company	1 / 5			1 / 3	1 / 12	0.05				0.05					15,945.88	New York	NY	
Franklin Advisers, Inc.	2 / 5	1 / 3		2 / 3	3 / 12	54.49	24.39			18.43		11.67			125,645.97	San Mateo	CA	
Ghost Tree Capital, LLC		1 / 3		1 / 3	1 / 12	3.71						3.71			295.89	New York	NY	
Gilder Gagnon Howe & Company, LLC		1 / 3		1 / 3	1 / 12	0.13						0.13			7,604.13	New York	NY	
Glenmede Trust Company (Asset Management)	1 / 5			1 / 3	1 / 12	0.04			0.04						7,498.74	Philadelphia	PA	
Goldman Sachs Asset Management, L.P. (U.S.)			1 / 6	1 / 3	1 / 12	2.48									115,704.34	New York	NY	
GRT Capital Partners, LLC			1 / 6	1 / 3	1 / 12	0.09									518.39	Boston	MA	
GW&K Investment Management, LLC	1 / 5			1 / 3	1 / 12	1.50				1.50					4,210.80	Boston	MA	
HealthCor Management, L.P. (U.S.)	1 / 5			1 / 3	1 / 12	20.46	20.46								1,768.41	New York	NY	
Heights Capital Management, Inc.	1 / 5	1 / 3		2 / 3	1 / 12	7.61							7.61		2,332.79	San Francisco	CA	
Invesco Advisers, Inc.	1 / 5			1 / 3	1 / 12	4.01	4.01								184,378.43	Atlanta	GA	
J.P. Morgan Investment Management, Inc.	1 / 5			1 / 3	1 / 12	9.76			9.76						254,424.54	New York	NY	
Kennedy Capital Management, Inc.	1 / 5			1 / 3	1 / 12	2.67				2.67					5,520.04	St. Louis	MO	
Kingdon Capital Management, LLC	1 / 5			1 / 3	1 / 12	12.00				12.00					1,749.33	New York	NY	
Lombard Odier Asset Management (USA) Corporation	1 / 5			1 / 3	1 / 12	7.03				7.03					1,118.65	New York	NY	
Manulife Asset Management (U.S.), LLC	3 / 5	2 / 3		2 / 3	4 / 12	0.74			0.16	0.26		0.10	0.22		62,988.17	Boston	MA	
Mariner Investment Group, LLC	1 / 5			1 / 3	1 / 12	2.39	2.39								380.63	Harrison	NY	
Marshall Wace North America, L.P.	1 / 5			1 / 3	1 / 12	1.23				1.23					7,614.89	New York	NY	
Millennium Management, LLC	4 / 5	2 / 3		2 / 3	5 / 12	38.94	16.17		15.27	0.34		6.11	1.06		48,198.81	New York	NY	
New Leaf Venture Partners, LLC	1 / 5			1 / 3	1 / 12	14.35				14.35					206.28	New York	NY	
Nicholas Investment Partners, L.P.	1 / 5			1 / 3	1 / 12	2.60				2.60					1,820.01	Rancho Santa Fe	CA	
OppenheimerFunds, Inc	1 / 5			1 / 3	1 / 12	21.45			21.45						137,479.11	New York	NY	
Opus Point Partners Management, LLC	1 / 5			1 / 3	1 / 12	0.59			0.59						193.99	New York	NY	
Palo Capital, Inc.	1 / 5			1 / 3	1 / 12	0.09			0.09						126.15	Newport Beach	CA	
Point72 Asset Management, L.P.	3 / 5			1 / 3	3 / 12	6.75	4.28		0.16	2.31					12,949.23	Stamford	CT	
Polaris Capital Management, LLC	1 / 5		1 / 6	2 / 3	1 / 12	0.22							0.22		3,308.90	Boston	MA	
Polaris Partners		1 / 3		1 / 3	1 / 12	27.03					27.03				331.43	Waltham	MA	
Primecap Management Company	1 / 5			1 / 3	1 / 12	17.13	17.13								101,069.90	Pasadena	CA	
Principal Global Investors, LLC	1 / 5	2 / 3		2 / 3	2 / 12	3.07					2.91	0.16			72,880.93	Des Moines	IA	
Putnam Investment Management, LLC	2 / 5	1 / 3		2 / 3	2 / 12	3.91				2.59			1.32		54,664.63	Boston	MA	

Pyramis Global Advisors, LLC		1 / 3		1 / 3	1 / 12	0.15								23,847.43	Smithfield	RI
QVT Financial, L.P. (U.S.)	2 / 5			1 / 3	2 / 12	108.97	97.52		11.45					3,217.00	New York	NY
RA Capital Management, LLC	1 / 5			1 / 3	1 / 12	17.94	0.00			17.94				1,040.94	Boston	MA
Redmile Group, LLC		1 / 3		1 / 3	1 / 12	8.56	0.00					8.56		1,140.95	San Francisco	CA
Royce & Associates, LLC	1 / 5			1 / 3	1 / 12	5.43				5.43				24,636.06	New York	NY
RTW Investments, LLC	1 / 5			1 / 3	1 / 12	18.30			18.30					362.92	New York	NY
Sabby Management, LLC	3 / 5	2 / 3		2 / 3	4 / 12	14.97	3.62		0.00	1.64		2.31	7.39	435.24	Upper Saddle River	NJ
Sit Investment Associates, Inc.	1 / 5			1 / 3	1 / 12	0.43	0.43							5,369.93	Minneapolis	MN
Skyline Ventures		1 / 3		1 / 3	1 / 12	27.36						27.36		190.43	Palo Alto	CA
Sphera Funds Management, LTD	3 / 5	1 / 3		2 / 3	4 / 12	14.08	3.02		3.40	3.51		4.15		693.20	New York	NY
SR One, LTD		1 / 3		1 / 3	1 / 12	27.07						27.07		85.79	West Conshohocken	PA
Suffolk Capital Management, LLC	1 / 5			1 / 3	1 / 12	2.46	2.46							824.36	New York	NY
Sunamerica Asset Management, LLC	3 / 5	2 / 3		2 / 3	4 / 12	1.14			0.25	0.40		0.15	0.34	22,472.60	Jersey City	NJ
T. Rowe Price Associates, Inc.	1 / 5			1 / 3	1 / 12	0.48				0.48				515,117.39	Baltimore	MD
Tocqueville Asset Management, L.P.	1 / 5	1 / 3		2 / 3	1 / 12	0.30							0.30	7,612.61	New York	NY
Tourbillon Capital Partners, L.P.	1 / 5	1 / 3		2 / 3	2 / 12	29.26	0.00			21.08		8.17		2,932.02	New York	NY
Victory Capital Management, Inc.	1 / 5			1 / 3	1 / 12	0.02				0.02				27,719.03	Brooklyn	OH
Wasatch Advisors, Inc.	1 / 5	1 / 3		2 / 3	1 / 12	15.99						15.99		14,461.88	Salt Lake City	UT
William Blair & Company, LLC (Investment Management)	1 / 5			1 / 3	1 / 12	4.39				4.39				65,868.76	Chicago	IL

Peer set was confined to publicly-traded comparable companies with a market capitalization of below \$1B as of November 5, 2015.

HBV Peers: Arbutus Biopharma (ABUS), Arrowhead Research (ARWR), Dynavax Technologies (DVAX), Inovio Pharmaceuticals, Inc. (INO), Transgene (TNG.PA)

HIV Peers: Bionor Pharma ASA (BIONOR.OSL), Genocera Biosciences, Inc. (GNCA), Inovio Pharmaceuticals, Inc. (INO)

French Peers: Adocia (ADOC.PA), Neovacs S.A. (ALNEV.PA), ERYtech Pharma SA (ERYP.PA), Genticef S.A. (GTCL.PA), Transgene (TNG.PA), Valneva (VLA.PA)

Note: No holders of ALNEV.PA, BIONOR.OSL, GTCL.PA, and VLA.PA qualified as target investors based on the inclusion criteria specified above.

Source: Ipreo; latest available 13 F Filings. File last updated on 11/06/2015.