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Companies covered: Quarterly Review

# Bioshares

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*Delivering independent investment research to investors on Australian  
biotech, pharma and healthcare companies*

## Quarterly Review

### A Weak Quarter for Life Science Stocks

Indices of Nasdaq-listed and ASX-listed life science stocks suffered substantial declines over the December quarter of 2016. This was in spite of a short recovery following the US elections in November, of 19% for the Nasdaq Biotech Index, from a pre-election low.

The **Bioshares Index** declined 7.7% for the quarter, following a 15.1% gain in the previous quarter. The **Nasdaq Biotech Index** fell by 8.4% over the quarter, after a similarly positive September quarter, in which it posted a 12.4% increase. Over the year, the Bioshares Index increased by 9.8%. The Nasdaq Biotech Index closed the year at 2,272 points, down 22% for the year.

The **Bioshares Large Cap Index** registered a 7.1% decrease for the December quarter and a 3.7% decrease for the year. This index comprises of CSL, Resmed, Cochlear, Blackmores and Sirtex Medical. Sirtex Medical's share price (\$14.17) collapsed by 55% on a quarterly basis and by 65% on an annual basis, in response to changes in market conditions and a downgrading by the company of its half-yearly sales forecasts.

CSL's share price (\$100.41) weakened by 6% over the quarter, although the company remains the largest company in the sector by capitalisation, which stands at \$45.8 billion. Resmed shares were steady at \$8.58, (+1%), while Cochlear's shares (\$122.55) drew back 13%. Blackmore's shares (\$103.36) lost 11% over the quarter.

### Capital Raisings

ASX-listed life science companies completed capital raisings during the December quarter which totalled \$122 million. In the previous quarter, \$1,014 million was raised. After adjusting for Mayne Pharma's \$888 million funding, capital raised in the September quarter totalled \$127 million. Capital raised during 2016, but excluding Mayne Pharma's funding, totalled \$496 million, or \$1,384 million with Mayne funding included. Previous years' totals were \$840 million (CY2015), \$437 million (CY2014) and \$730 million (CY2013).

December quarter capital raisings included \$16 million raised through IPOs and offers associated with backdoor listings. These new entrants included Neurotech International, Creso Pharmaceuticals and Zeldia Therapeutics. These last two companies now bring the number of listed companies with a medical cannabis orientation to six, which will increase to seven once Auscann completes a back-door listing early in 2017.

### Index Performance by Quarter (Change from previous Qtr)

	Q4 2015	Q1 2016	Q2 2016	Q3 2016	Q4 2016
Bioshares Index	7.9%	3.0%	-2.3%	15.1%	-7.7%
Nasdaq Biotech Index	11.7%	-23.0%	-1.2%	12.4%	-8.4%
Bioshares Large Cap Index	18.4%	-4.7%	9.3%	1.2%	-7.1%
ASX 300 Index	5.5%	-3.9%	3.0%	4.0%	4.0%

	Bioshares Portfolio
Year 1 (May '01 - May '02)	21.2%
Year 2 (May '02 - May '03)	-9.4%
Year 3 (May '03 - May '04)	70.6%
Year 4 (May '04 - May '05)	-16.3%
Year 5 (May '05 - May '06)	77.8%
Year 6 (May '06 - May '07)	17.4%
Year 7 (May '07 - May '08)	-36%
Year 8 (May '08 - May '09)	-7.4%
Year 9 (May '09 - May '10)	50.2%
Year 10 (May '10 - May '11)	45.4%
Year 11 (May '11 - May '12)	-18.0%
Year 12 (May '12 - May '13)	3.1%
Year 13 (May '13 - May '14)	26.6%
Year 14 (May '14 - May '15)	23.0%
Year 15 (May '15 - May '16)	33.0%
Year 16 (May '16 - current)	26.5%
<b>Cumulative Gain</b>	<b>832%</b>
<b>Av. Annual gain (14 yrs)</b>	<b>19.2%</b>

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## Bioshares Index – Top 10 Outperformers – Dec. Quarter

Company	Code	Cap. \$m	Change - Quarter	Change - Year	Price 31/12/16
Noxopharm	NOX	36	140%		\$0.420
Imugene	IMU	41	138%	58%	\$0.019
Botanix Pharmaceuticals	BOT	18	120%		\$0.044
Innate Immuno-therap.	IIL	243	119%	476%	\$1.095
Optiscan Imaging	OIL	22	100%	107%	\$0.060
Neurotech International	NTI	34	93%	0%	\$0.385
Scigen	SIE	9	89%	-15%	\$0.017
LBT Innovations	LBT	45	84%	250%	\$0.350
Medlab Clinical	MDC	152	77%	347%	\$0.850
Phylogica	PYC	50	67%	92%	\$0.025

## Outperformers

Noxopharm recorded the greatest share price gain for the December quarter, with an increase of 140%. The company is developing a drug delivery technology, NOX66, which it believes can be used to more effectively deliver its anticancer compound idronoxil, including into the brain. Novogen founder Dr Graham Kelly is the CEO of Noxopharm. He holds a 32% stake in the company. Idroxinol is another name for phenoxodiol, the compound on which Novogen was based.

Imugene shares surged 138% in the quarter, with the company's completion of a \$3.2 million capital raising, commencement of its Phase Ib clinical trial of HER-Vaxx, and appointment of Leslie Chong as CEO, providing impetus for the share price increase.

Two medical cannabis plays, Botanix Pharmaceuticals and Medlab Clinical, both experienced strong gains for the quarter, of 120% and 77% respectively. Botanix successfully completed a skin irritation study of its delivery technology, Pemetrex, which prefaces its clinical program for BTX-1503, its synthetic cannabidiol in development for treating acne. Medlab Clinical expects to initiate the first trial in Australia of cannabis for the treatment of intractable pain suffered by cancer patients.

Shares in Innate Immunotherapeutics rose 119% over the quarter (and 475% for the year), ahead of the release of data in 2017 from its Phase IIB trial of MIS416 for the treatment of secondary progressive multiple sclerosis, with a stronger motivator likely being requests from more than 40 trial subjects wanting to continue with treatment.

New listing Neurotech International made a favourable entrance, closing the quarter up 93% from its offer price of \$0.20. Neurotech is commercialising the Mente device and platform, which can help improve the behaviour of people with autism.

LBT Innovations, up 84% for the quarter, had an astonishing run during the quarter, at one stage hitting, \$1.09 and increasing by 580% from its average share price for 2016 through to October 7 of \$0.16. The trigger for the price gain was the receipt of FDA clearance of APAS, its automated plate assessment system for use in microbiology labs.

## Bioshares Index - Top 10 Underperformers – Dec. Quarter

Company	Code	Cap. \$m	Change - Quarter	Change - Year	Price 31/12/16
Prana Biotechnology	PBT	24	-56%	-57%	\$0.046
Invion	IVX	2.5	-50%	-67%	\$0.002
Dimerix	DXB	12	-47%		\$0.008
Jayex Healthcare	JHL	7	-44%		\$0.045
pSiVida	PVA	88	-37%	-60%	\$2.580
Impedimed	IPD	386	-35%	-13%	\$1.030
Holista Colltech	HCT	17	-34%	24%	\$0.099
Adherium	ADR	41	-33%		\$0.240
Paradigm Biopharm.	PAR	40	-33%	18%	\$0.390
Mayne Pharma Group	MYX	2,016	-33%	-5%	\$1.345

One stock in a turn around phase is Optiscan Imaging, which posted a 100% share price gain for the quarter. A recapitalisation, coupled to board and management changes, and several potential product and market development initiatives may see the stock appreciate further in 2017.

## Underperformers

Prana Biotechnology was the worst performing stock in the Bioshares Index in the December quarter, registering a 56% fall. During the quarter, the company received advice from the FDA that in order to have the Partial Clinical Hold on PBT2 lifted, it would have to conduct further clinical studies. The company, which was holding cash of \$29 million towards the end of the year, has "commenced a process of reviewing other potentially suitable opportunities that may be highly attractive and have the ability to add shareholder value in the medium to longer term."

Mayne Pharma Group, which now tops the Bioshares Index with a capitalisation of \$2 billion, saw its shares fall 33% for the quarter to close at \$1.345 after reaching a high of \$2.11 in August. This generics medicines, speciality brands and contract services company raised \$888 million in the previous quarter to fund the acquisition of a portfolio of products from Teva Pharmaceuticals and Allergan for US\$652 million. Some of the weakness with Mayne Pharma's share price may be attributable to the US Department of Justice's commencement of legal proceedings concerning anti-competitive marketing by Mayne Pharma of generic doxycycline hyclate, delayed-release tablets in conjunction with Heritage Pharmaceuticals. The Mayne Pharma board believes the legal proceedings will not have a material impact on future earnings.

Impedimed's share price fell back 35% over the quarter to rest at \$1.03. The company's market value had embodied high expectations for its expansion into heart failure management, and health and wellness markets, with its recently launched SOZO body composition and fluid status measurement device. In the September quarter the company's share price had increased by 68% to \$1.69.

Shares in pSiVida fell 37% over the quarter due to lacklustre sales of Iluvien, an ophthalmology product partnered on a profit share basis to Alimera Sciences, whose shares also declined over the quarter, by 27%.

**Capital Raisings by Australian-listed Biotech Companies Q4 2016**

Company	Investment Manager or Investor	Type of Raising	Funds Raised (\$M)
Medibio	Hunter Capital/ Foster Stockbroking	Placement	\$13.5
Volpara Health Tech.	Morgans Corporate	Placement	\$7.0
Volpara Health Tech.	Morgans Corporate	Rights Issue	\$3.7
Ellex Medical	Petra Capital/Taylor Collison	Placement	\$10.3
Genetic Signatures		Placement (T1)	\$8.9
Genetic Signatures		SPP	\$1.0
Mach7	JM Financial	Placement	\$9.0
Genetic Technologies	Maxim Group	Placement	\$8.1
LBT Innovations	Bell Potter/ Roth Capital Partners	Placement	\$7.0
Living Cell Technologies	Hunter Capital	Placement	\$6.3
Dorsavi	Bell Potter	Placement (T1)	\$5.0
Orthocell	Argonaut Securities	Placement	\$4.0
Imugene	WG Partners LP	Placement	\$3.2
Cellmid		Placement	\$3.0
Pharmaust		Rights Issue	\$2.7
Benitec Biopharma	Nant Capital (Nant Ventures)	Placement	\$2.6
Optiscan Imaging		Placement	\$1.9
Proteomics International	KS Capital	Placement	\$1.4
Proteomics International		SPP	\$0.6
Atcor Medical	Taylor Collison	Placement	\$1.9
GI Dynamics		Placement	\$1.5
Reproductive Health Science	Taylor Collison	Rights Issue	\$1.0
Immuron		Rights Issue (Shortfall & Oversubs)	\$1.0
Allegra Orthopaedics	Robinw ood	Placement	\$0.8
Analytica	INOv8 LLC	Placement (T2)	\$0.25
	IPOs	Neurotech International (NTI)	\$7.0
		Creso Pharmaceuticals (CPH)	\$5.0
	Backdoor Listings	Zelda Therapeutics (ZLD)	\$4.0
<b>Total raised in Q4 2016</b>			\$121.7
<b>Total raised in Q3 2016</b>			\$1,014.8
<b>Total raised in Q2 2016</b>			\$111.9
<b>Total raised in Q1 2016</b>			\$135.6
<b>Total raised YTD 2016</b>			\$1,383.9

Bioshares Model Portfolio (30 December 2016)						<b>Portfolio Changes – 2 January 2017</b>
Company	Price (current)	Price added to portfolio	Recommend- ation	Cap'n (\$M)	Date added	
Dorsavi	\$0.540	\$0.480	Spec Buy B	\$87	December 2016	<b>IN:</b> No changes  <b>OUT:</b> No changes
Pharmaxis	\$0.280	\$0.260	Spec Buy B	\$89	December 2016	
Factor Therapeutics	\$0.068	\$0.054	Spec Buy B	\$50	September 2016	
GI Dynamics	\$0.023	\$0.024	Spec Buy C	\$12	May 2016	
Adherium	\$0.240	\$0.495	Spec Buy A	\$41	March 2016	
Bionomics	\$0.330	\$0.295	Spec Buy A	\$159	March 2016	
Rhinomed	\$0.019	\$0.032	Spec Hold B	\$15	December 2015	
AirXpanders	\$1.170	\$0.745	Spec Hold A	\$276	September 2015	
Osprey Medical	\$0.460	\$0.695	Spec Buy B	\$119	September 2015	
Clinuvel Pharmaceuticals	\$7.45	\$4.15	Spec Hold A	\$356	December 2014	
Innate Immunotherapeutics	\$1.095	\$0.190	Spec Buy A	\$243	November 2014	
Opthea	\$0.845	\$0.160	Spec Buy A	\$127	November 2014	
Impedimed	\$1.030	\$0.245	Spec Buy A	\$386	December 2013	
IDT Australia	\$0.180	\$0.260	Spec Buy B	\$45	August 2013	
Viralytics	\$1.190	\$0.300	Spec Buy B	\$286	August 2013	
Somnomed	\$3.89	\$0.94	Buy	\$221	January 2011	
Cogstate	\$1.215	\$0.13	Spec Hold A	\$138	November 2007	

## Selected Clinical Trial Developments - Q4 2016

Company	Code	Product/Therapeutic	Event
Admedus	AHZ	HSV-2 vaccine	Interim results from Phase II study (40 subjects), unblinded data from 20 pts: reported 58% decrease in viral shedding from pts receiving vaccine
Avita Medical	AVH	ReGenerCell (diabetic foot ulcers)	Treatment underway at 3 UK sites; 24 pt trial, 26 week evaluation period
Biotanix Pharmaceuticals	BOT	Permetrex (drug delivery technology)	Completed skin irritation study; reported formulation had "minimal or weak irritancy potential"
Bioxyne	BXN	L. fermentum VRI-003 (Probiotic, gut health)	Commenced RCT of VRI-003; in 60 healthy adults with no medically diagnosed gastrointestinal disease
Imugene	IMU	HER-Vaxx (B cell peptide vaccine) (gastric cancer)	Commenced Phase Ib safety and dose escalation study in 18 pts; Phase IIa to follow in 68 pts with met gastric cancer
Living Cell Technologies	LCT	NTCELL implant (Parkinson's disease)	Completed treatment of 6 pts (4 treatment, 2 sham) in group 1 of Phase IIb trial. Results are blinded until 26 weeks after trial completion
Mesoblast	MSB	MSC-100-IV (Graft versus host disease)	Successfully completed fertility analysis in 60 pt (pediatric) open label Phase III trial
Neuren Pharmaceuticals	NEU	trofinetide (NNZ-2566) (Rett syndrome)	Completed enrolment in Phase II trial, 82 subjects
Novogen	NRT	Cantrixil (TRX-E-002-1) (ovarian cancer)	Commenced Phase I study; 60 pts
Prima Biomed	PRR	IMP321 (soluble LAG-3 fusion protein) (met. breast cancer)	Released interim data from Phase IIb, 15 pts, safety run in phase; drug was safe and well tolerated at 6mg and 30 mg dosage levels. In combination with paclitaxel.
Prima Biomed	PRR	IMP321 (soluble LAG-3 fusion protein) (unresect or met. melanoma)	DSMB confirmed that IMP321 was safe and well tolerated at first dose level (1mg), in combination with Keytruda (pembrolizumab)
Prescient Therapeutics	PTX	PTX-200 (AKT inhibitor) (refractory or relapsed acute myeloid leukemia)	Dosed first patient in Phase Ib trial, 15-18 pts; 4 dose levels to be evaluated
ResApp Health	RAP	ResAppDx mobile software application	Commenced SMARTCOUGH-C study; 1,111 pts. Primary endpoints - diagnosis of pneumonia compared to radiologic and clinical diagnosis
Viralytics	VLA	CAVATAK (oncolytic virotherapy) (advanced melanoma)	Reported disease control rate of 100% and objective response rate of 70% from Phase Ib CAPRA study (from 10/10 pts); in combination with Keytruda (pembrolizumab)

**The ASX-Listed Life Sciences Sector**  
**December 31, 2016: Capitalisation \$81 billion, 124 companies**

**Bioshares Large Cap. Index**

Company	Code	Cap. \$m	Principal Activities	Change - Quarter	Change - Year	Price 31/12/16
CSL	CSL	45,756	Manufactures pharmaceutical products including vaccines and human plasma fractions	-6%	-5%	\$100.41
Resmed Inc.	RMD	12,088	Manufactures diagnostic and treatment equipment for sleeping disordered breathing	1%	15%	\$8.58
Cochlear	COH	7,038	Manufactures cochlear hearing implants	-13%	28%	\$122.55
Blackmores	BKL	1,780	Manufactures vitamin, mineral and herbal supplements and skin & hair products in Australia and N.Z.	-11%	-53%	\$103.360
Sirtex Medical	SRX	818	The company's core technology uses radioactive particles to irradiate tumours in the liver. Approved for use in most major regions.	-55%	-65%	\$14.170

**Capitalisation Total**                      67,480

**Bioshares Index**

Company	Code	Cap. \$m	Principal Activities	Change - Quarter	Change - Year	Price 31/12/16
Mayne Pharma Group	MYX	2,016	Manufactures, develops and markets generic drugs, with operations in Australia and the USA	-33%	-5%	\$1.345
Sigma Pharmaceuticals	SIP	1,389	Pharmaceutical manufacturing and wholesaling	-9%	49%	\$1.29
API	API	1,008	Pharmaceutical wholesaler	7%	7%	\$2.060
Nanosonics	NAN	926	Developing a novel disinfection technology, the first product is a point of care ultrasound probe disinfection unit	-8%	68%	\$3.110
Mesoblast	MSB	546	Developing cellular medicines based on its proprietary mesenchymal lineage adult stem cells for high, unmet medical needs including advanced heart failure, chronic low back pain, acute graft versus host disease and inflammatory conditions such as biologic refractory rheumatoid arthritis.	28%	-23%	\$1.430
Reva Medical	RVA	467	Developing the Fantom scaffold, its third version of a bioresorbable coronary stent	-14%	27%	\$1.090
Impedimed	IPD	386	Markets products that aid the diagnosis of secondary lymphoedema, muscle wasting and other disorders	-35%	-13%	\$1.030
Clinuvel Pharmaceuticals	CUV	356	Developing an analogue of the alpha-MSH protein, named Scenesse, as a photo-protective agent. Approved in Europe.	23%	183%	\$7.450
Vralytics	VLA	286	Developing a cancer treatment based on the application of viruses (oncolytic virus technology)	30%	80%	\$1.190
Airxpanders	AXP	276	Design, manufacture and distributor of the Aeroform, a patient controlled tissue expander, for use in breast reconstruction after mastectomy	-16%	12%	\$1.170

## Bioshares Index

Company	Code	Cap. \$m	Principal Activities	Change - Quarter	Change - Year	Price 31/12/16
Starpharma Holdings	SPL	267	Developer of pharmaceutical and agricultural applications of chemical scaffolds known as 'dendrimers'	12%	-3%	\$0.725
Medical Developments	MVP	260	Commercialising the Pentrox inhaler for temporary pain relief. Used widely in ambulances across Australia.	-17%	20%	\$4.420
AFT Pharmaceuticals	AFP	257	Development and sales of pharmaceuticals in Australasia and Rest-of-World	-11%	-10%	\$2.650
Innate Immuno-therapeutics	IIL	243	Developing MIS416 to treat secondary progressive multiple sclerosis	119%	476%	\$1.095
Somnomed	SOM	221	Markets oral devices for the treatment of sleep apnea and snoring.	12%	46%	\$3.890
ResApp Health	RAP	218	Developing digital healthcare solutions to diagnose and manage respiratory conditions	-25%	248%	\$0.365
Ellex Medical Lasers	ELX	170	Develops, manufactures and markets solid state ophthalmic lasers used to treat secondary cataracts and retinal disorders.	21%	87%	\$1.400
Polynovo	PNV	162	Developing novel polymer-based products for treating wounds and burns	0%	0%	\$0.290
Bionomics	BNO	159	Developing drugs to treat cancer and CNS diseases, and has also developed a gene diagnostic for epilepsy.	-25%	-11%	\$0.330
Compumedics	CMP	154	Develops, manufactures and markets sleep diagnostic and monitoring equipment.	36%	120%	\$0.870
Medlab Clinical	MDC	152	Development, production and marketing of nutraceuticals. Also developing cannabis product to treat cancer patients with intractable pain.	77%	347%	\$0.850
Cogstate	CGS	138	Markets cognitive performance diagnostic products	37%	106%	\$1.215
Opthea	OPT	127	Developing OPT-302 to treat wet AMD (an eye disease)	16%	111%	\$0.845
OBJ	OBJ	123	Developing transdermal drug delivery technologies	-8%	30%	\$0.069
Osprey Medical	OSP	119	Markets DYEVERT, a device which reduces the amount of dye needed in imaging procedures	21%	53%	\$0.460
Neuren Pharmaceuticals	NEU	100	Developing neuroprotective therapeutics	12%	-51%	\$0.056
Admedus	AHZ	92	Diversified medical products group. Markets Cardiocel, a bio-scaffold and is also developing a HSV-2 vaccine.	11%	-47%	\$0.360
Pharmaxis	PXS	89	Markets the lung function test, Aridol. Bronchitol is approved in Europe for the management of cystic fibrosis. Developing a suite of compounds from amine oxidase platform.	6%	-22%	\$0.280
pSiVida	PVA	88	Developing drug delivery technologies, with a special focus on ophthalmic applications	-37%	-60%	\$2.580

## Bioshares Index

Company	Code	Cap. \$m	Principal Activities	Change - Quarter	Change - Year	Price 31/12/16
SDI	SDI	87	Manufacture & distribution of amalgam (fillings) & other dental materials and product R&D	-19%	31%	\$0.735
Dorsavi	DVL	87	Commercialising a wireless sensor movement monitoring system and products for use in the Elite Sports, OH&S and medical/physiotherapy markets	10%	42%	\$0.540
Clovercorp	CLV	86	Development and production of omega-3 food additives from tuna oil	-13%	35%	\$0.520
Volpara	VHT	83	Markets breast density assessment tools and analytics, for use with breast X-ray screening programs	27%		\$0.635
Prima Biomed	PRR	75	Development of cancer immuno-therapy company, based on targeting LAG-3.	-5%	-29%	\$0.036
Vita Life Sciences	VSC	73	Development, manufacture and distribution of prescription and OTC medicines as well as complementary and alternative medicines, dietary supplements and health foods	-15%	-7%	\$1.295
Medibio	MEB	57	Commercialising a test for depression and anxiety	-8%	28%	\$0.385
Micro-X	MX1	55	Development of a mobile medical x-ray imager for hospitals, a version for deployed military use and a mobile security back-scatter imager	39%		\$0.460
Universal Biosensors	UBI	55	Development, manufacture and commercialisation of a range of in vitro diagnostic tests for point-of-care use	7%	-31%	\$0.310
Cyclopharm	CYC	54	A nuclear medicine company that markets the Technegas lung imaging system	-24%	75%	\$0.910
Cynata Therapeutics	CYP	53	Stell cell technology company aiming to produce unlimited uniform, pharmaceutical grade MSCs from a single donor.	17%	106%	\$0.730
Acidion	ALC	52	Markets a health informatics platform, which incorporates an intelligent EMR, clinical decision support engine, data Integration capability, smartforms, terminology support and	36%	0%	\$0.087
Anatara Life Sciences	ANR	52	Developing a natural antibiotic for the animal production industries	-13%		\$1.050
Acrux	ACR	52	Developer of the transdermal drug products Axiron, Evamist/Ellavie and Recuvyra	-6%	-59%	\$0.310
Unilife Corporation	UNS	51	Developer of retractable syringes.	-9%	-58%	\$0.050
Living Cell Technologies	LCT	51	Developing cell therapies for diabetes, Parkinson's disease and Huntington's disease	14%	78%	\$0.089
Phylogica	PYC	50	Developing peptide compound libraries for use in human therapeutics	67%	92%	\$0.025
Factor Therapeutics	FTT	50	Developing VF-001, for the treatment of venous leg ulcers and potentially to treat ocular conditions	26%	51%	\$0.068
Oventus	OVN	48	Developing an oral appliance to treat sleep apnea and snoring	-7%		\$0.660

## Bioshares Index

Company	Code	Cap. \$m	Principal Activities	Change - Quarter	Change - Year	Price 31/12/16
Genetic Signatures	GSS	47	Development and sale of molecular diagnostics(MDx) kits and products	-10%		\$0.450
Anteo Diagnostics	ADO	46	Developer of a biological coatings technology that can be applied to immunoassays, bio-separations, drug delivery and other medical devices. Has acquired Belgian company,	-18%	-50%	\$0.041
LBT Innovations	LBT	45	Developer of innovative products which deliver productivity benefits across a range of life science settings	84%	250%	\$0.350
Mach 7	M7T	45	Sale of enterprise imaging management platform, and 3D medical specific printing and holographic projection solutions	-22%	-47%	\$0.038
IDT Australia	IDT	45	Manufacturer of pharmaceutical ingredients to international standards for major pharmaceutical groups.	-18%	-51%	\$0.180
Actinogen Medical	ACW	44	Developing Xanamem for the treatment of dementia in Alzheimer's disease patients	60%	18%	\$0.072
MMJ Phytotech	MMJ	42	Developing medical cannabis products	-10%	-10%	\$0.220
Imugene	IMU	41	Developing a Her2 positive cancer vaccine technology	138%	58%	\$0.019
Novogen	NRT	41	Developing 'super' benzopyrans for the treatment of cancer	-16%	-27%	\$0.084
Adherium	ADR	41	Commercialising the Smartinhaler range of devices that attach to prescription third-party inhalers, which improve compliance and efficacy	-33%		\$0.240
Oncosil Medical	OSL	40	Developing Oncosil, a brachytherapy for pancreatic cancer and liver cancer	-28%	-66%	\$0.086
Paradigm Biopharm.	PAR	40	Development of existing approved drug, pentosan polysulphate sodium to treat bone marrow oedema and allergic rhinitis	-33%	18%	\$0.390
MGC Pharmaceuticals	MXC	40	A medical and cosmetic cannabis company with growing operations in Slovenia. Acquired Czech company Panax Pharma.	2%	0%	\$0.043
TBG Diagnostics	TDL	39	Formerly Progen Pharmaceuticals (PGL). Now focused on development of HLA SSA and SBT diagnostic kits and related services. To acquire 51% of RBC Biosciences.	-23%	-20%	\$0.180
Avita Medical	AVH	39	Markets ReCell, a skin repair product	20%	29%	\$0.120
Orthocell	OCC	39	Developing and marketing regenerative medicine products	-12%	-1%	\$0.380
Phosphagenics	POH	37	Commercialising a platform technology (alpha-tocopherol), for human and animal applications.	-6%	142%	\$0.029
Noxopharm	NOX	36	Developing a cancer treatment, NOX66, a formulation of idronoxil, which targets NADH oxidase 2.	140%		\$0.420
Asian American Medical Group	AJJ	36	Manages liver treatment centres in Asia; expanding into radiation oncology	9%	-4%	\$0.120
Regeneus	RGS	34	Commercialisation of autologous adipose derived stem cells and factors. Markets HiQCell for human use and CryoShot for veterinary use.	6%	76%	\$0.165

## Bioshares Index

Company	Code	Cap. \$m	Principal Activities	Change - Quarter	Change - Year	Price 31/12/16
Neurotech International	NTI	34	Development and sales of Mente (and platform), a treatment for improving behaviours of people with autism and other neurological conditions	93%	0%	\$0.385
Vectus Biosystems	VBS	34	Developing an anti-fibrotic compound, VB0004, with applications in heart and kidney disease	7%		\$1.450
Medadvisor	MDR	33	Medication adherence software platform company	-10%	-15%	\$0.035
ITL	ITD	33	Develops and distributes medical devices such as safety equipment to prevent needle stick injuries and sterile preparation kits.	48%	58%	\$0.340
Immuron	IMC	28	Sales and development of hyper-immune bovine colostrum products for therapeutic use	10%	-45%	\$0.270
USCOM	UCM	27	Marketing the Uscom non-invasive heart output function monitor, BP+ non-invasive central blood pressure product and digital ultrasonic spirometry products	-4%	40%	\$0.245
Genera Biosystems	GBI	27	Develops, manufactures and distributes advanced molecular diagnostic tests, with a particular focus on women's health.	29%	8%	\$0.270
Genetic Technologies	GTG	27	Markets Brevagen, a breast cancer risk prediction tool. Plans to divest its genetics business to Primary Health Care.	-31%	-56%	\$0.011
Zelda Therapeutics	ZLD	26	A medical cannabis company researching treatments for cancer, dermatological indications and for sleep disorders	56%	0%	\$0.039
Probiotec	PBP	25	Manufacturer, marketer and distributor of a range of over the counter (OTC) pharmaceuticals, complementary medicines and speciality ingredients	16%	11%	\$0.500
Cellmid	CDY	25	Developing therapies that target the midkine protein. Recently launched a range of hair loss products.	-21%	8%	\$0.026
Prana Biotechnology	PBT	24	Developing drugs to treat CNS diseases such as Alzheimer's and Parkinson's	-56%	-57%	\$0.046
SUDA	SUD	23	Developing the anti-malarial product ArTiMist. Acquired drug delivery technology and suite of products in development from Novodel	-9%	-26%	\$0.020
Optiscan Imaging	OIL	22	Manufactures confocal microscopes for clinical diagnosis	100%	107%	\$0.060
Benitec Biopharma	BLT	20	R&D company focusing on gene silencing, specifically DNA delivered RNAi technology	20%	-63%	\$0.110
Simavita	SVA	19	Commercialising an instrumented incontinence assessment device	47%	-53%	\$0.075
Respiri	RSH	18	Respiratory and pulmonary devices company. Recently launched Airsona, an ehealth product. Formerly iSonea.	-28%	2%	\$0.042
Prescient Therapeutics	PTX	18	Developing compounds to treat various cancers	-14%	-10%	\$0.086

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Botanix Pharmaceuticals	BOT	18	Developing BTX1503 for the treatment of acne. BT1503 combines synthetic cannabidiol with a transdermal drug delivery system, Permetrex.	120%		\$0.044
Holista Colltech	HCT	17	Extracts collagen from sheepskins and markets natural healthcare products.	-34%	24%	\$0.099
Atcor Medical	ACG	16	Markets the SphygmoCor device, a noninvasive technology that provides information regarding the functioning of the cardiovascular system	-29%	-68%	\$0.070
Rhinomed	RNO	15	Developing nasal technologies with applications for sport performance, sleep and drug delivery	-5%	-30%	\$0.019
Brain Resource Corp	BRC	15	Development and commercialisation of functional brain analysis techniques	-31%	-47%	\$0.100
Proteomics International	PIQ	15	Provider of protein chemistry analytical services. Seeking to commercialise a diabetic kidney disease diagnostic.	6%	-12%	\$0.250
Creso Pharma	CPH	14	A developer of medical cannabis therapies. Headquartered in Zug, Switzerland. Acquired Hemp Industries, which grows hemp in Slovakia.	18%	0%	\$0.235
Adalta	1AD	13	Developing a protein drug, AD-114 for the treatment of idiopathic pulmonary fibrosis (IPF) and other human fibrotic diseases	-31%		\$0.170
Recce	RCE	13	Development of an antibiotic ("RECCE") as a cancer treatment	-18%		\$0.165
GI Dynamics	GID	12	Commercialising the Endobarrier, an implantable polymer liner for the management of obesity and diabetes	15%	-21%	\$0.023
Biotron	BIT	12	Developing compounds to treat HCV and HIV	-25%	-24%	\$0.039
Dimerix	DXB	12	Developing a combination therapy, DMX200, to treat chronic kidney disease.	-47%		\$0.008
Race Oncology	RAC	12	Completing the development of a chemotherapy drug, called Bisantrene, which was the subject of more than 40 phase II clinical studies during the 1980s and 1990s.	-10%	-10%	\$0.220
Analytica	ALT	11	A medical devices company developing the Pericoach product to aid in the management of female urinary incontinence	-29%	-29%	\$0.005
Allegra Orthopedics	AMT	11	A developer and manufacturer of prosthetic implants and medical devices.	7%	-40%	\$0.150
PharmAust	PAA	11	Manages Epichem, a drug discovery business. Also developing a veterinary anti-parasitic compound (PPL-1) as a human and animal cancer therapy.	-29%	-32%	\$0.058
Resonance Health	RHT	10	Marketing the FerriScan technology, a non-invasive tool for measuring liver iron levels	-16%	4%	\$0.026
Scigen	SIE	9	Developer and manufacturer of biopharmaceuticals. Company is based in Singapore and was spun out of Sonic Healthcare in 2002.	89%	-15%	\$0.017
Cryosite	CTE	9	Provides specialised storage services, especially for umbilical cord blood	0%	-15%	\$0.200

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Company	Code	Cap. \$m	Principal Activities	Change - Quarter	Change - Year	Price 31/12/16
Bluechiip	BCT	9	Development, manufacture and commercialisation of a tracking system for biological samples	27%	-18%	\$0.033
Invitrocue	IVQ	9	Singapore-based analytical services company (life sciences). Listed through BUN.	33%	0%	\$0.093
Reproductive Health Sc.	RHS	8	Markets the pre-implantation IVF screening kit, EmbryoCollect	31%	-22%	\$0.098
Jayex Healthcare	JHL	7	Commercialisation of the Enlighten patient workflow platform	-44%		\$0.045
Medical Australia	MLA	6	Manufacture and supply of medical devices and equipment.	-4%	-26%	\$0.046
Antisense Therapeutics	ANP	6	Developing antisense compounds to treat multiple sclerosis and acromegaly	0%	-49%	\$0.036
StemCell United	SCU	5	Applies a proprietary stem cell technology to culture and grow plant extracts for use in Traditional Chinese Medicine	8%	-84%	\$0.014
Patrys	PAB	4	Currently evaluating strategic collaborations and other complementary assets. Recently incensed two nucleus-penetrating antibodies, Deoxymabs 3E10 and 5C6	0%	-25%	\$0.006
Bioxyne	BXN	3.6	Sale and distribution of probiotics	-10%	-18%	\$0.018
Novita Healthcare	NHL	2.7	Formerly Avexa. Acquired Tali Health, a company focused on the diagnosis and treatment of children with intellectual disabilities (ex Monash Uni).	-13%	-61%	\$0.027
Invion	IVX	2.5	Evaluating Xtoll biologic for lupus and developing the drugs Nadalol and Zarfirlukast for respiratory conditions	-50%	-67%	\$0.002
Medigard	MGZ	1.9	Developed retractable syringe technology and other safety medical products.	-30%	75%	\$0.021
Memphasys	MEM	1.4	Developing a sperm separation technology, SpermSep. Formerly NuSep.	0%	-88%	\$0.005

**Capitalisation Total** 13,552

## Listed Biotech Investment Funds or Companies

Company	Code	Cap. \$m	Principal Activities	Change - Quarter	Change - Year	Price 31/12/16
Biotech Capital	BTC	12	Actively seeking new investment opportunities in the life sciences sector.	10%	11%	\$0.115

**Capitalisation Total** 12

**Capitalisation Total - All Indices** 81,044

**How Bioshares Rates Stocks**

For the purpose of valuation, Bioshares divides biotech stocks into two categories. The first group are stocks with existing positive cash flows or close to producing positive cash flows. The second group are stocks without near term positive cash flows, history of losses, or at early stages of commercialisation. In this second group, which are essentially speculative propositions, Bioshares grades them according to relative risk within that group, to better reflect the very large spread of risk within those stocks. For both groups, the rating “Take Profits” means that investors may re-weight their holding by selling between 25%-75% of a stock.

**Group A**

Stocks with existing positive cash flows or close to producing positive cash flows.

- Buy** CMP is 20% < Fair Value
- Accumulate** CMP is 10% < Fair Value
- Hold** Value = CMP
- Lighten** CMP is 10% > Fair Value
- Sell** CMP is 20% > Fair Value  
(CMP–Current Market Price)

**Group B**

Stocks without near term positive cash flows, history of losses, or at early stages commercialisation.

**Speculative Buy – Class A**

These stocks will have more than one technology, product or investment in development, with perhaps those same technologies offering multiple opportunities. These features, coupled to the presence of alliances, partnerships and scientific advisory boards, indicate the stock is relative less risky than other biotech stocks.

**Speculative Buy – Class B**

These stocks may have more than one product or opportunity, and may even be close to market. However, they are likely to be lacking in several key areas. For example, their cash position is weak, or management or board may need strengthening.

**Speculative Buy – Class C**

These stocks generally have one product in development and lack many external validation features.

**Speculative Hold – Class A or B or C**

**Sell**

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