

Subscribe to
Bioshares
\$470/
48 issues

More details can be found
on the back page

Companies covered: **Quarterly Review**

	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 - May '17)	16.8%
Year 17 (May '17 - May '18)	-7.1%
Year 18 (May '18 - current)	-18.6%
Cumulative Gain	551%
Av. Annual gain (17 yrs)	17.1%

Bioshares is published by Blake Industry & Market Analysis Pty Ltd.

Blake Industry & Market Analysis Pty Ltd
ACN 085 334 292
PO Box 193
Richmond Vic 3121
AFS Licence
No. 258032
Enquiries for Bioshares
Ph: (03) 9326 5382
Fax: (03) 9329 3350
Email: info[at]bioshares.com.au

David Blake - Editor/Analyst
Ph: (03) 9326 5382
Email: david[at]bioshares.com.au
Mark Pachacz - Editor/Analyst
Ph: 0403 850 425
Email: mark[at]bioshares.com.au

Individual Subscriptions (48 issues/year)
\$470 (Inc.GST)
Edition Number 776 (2 January 2019)

Copyright 2019 Blake Industry and Market Analysis Pty Ltd. ALL RIGHTS RESERVED.
Secondary electronic transmission, photocopying, reproduction or quotation is strictly prohibited without written consent of the publisher.

Bioshares

2 January 2019
Edition 776

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

Quarterly Review

The Difficult, Risky Business of Biotech

Investors were reminded of just how difficult and risky investments in life science companies can be over the December quarter and also over the course of 2018. Investment in the sector is largely of a speculative nature, which is characterised by a high frequency of business failure. Furthermore, most biotech stocks suffer more markedly when the market enters a downturn, as investors shift to cash and favour those few stocks mature enough to weather multiple challenges from different fronts.

The **Bioshares Index** recorded a 19.5% decline for the quarter, with the **Bioshares Botanicals Index** (formerly the MedCann Index) falling 20.3%, both in line with a 20.6% decrease in the **Nasdaq Biotech Index**. A more widespread downwards pressure on the market was on display with a 7.5% fall in the **Bioshares Large Cap Index** and an 8.8% decrease in the ASX300.

Not listed in the table below but of relevance is a 15% decline over the year for the ASX200 Financials Index, a sell-off that is connected in part to findings from the Financial Services Royal Commission. A consequence is that CSL (Cap'n: \$84 billion) now ranks fourth in the ASX 20 Index, behind CBA, BHP and Westpac, but ahead of ANZ and NAB. What a stock like CSL offers is strong and sustainable earnings growth in a business sector where the barriers to entry are high, with attractive margins from products that are most often necessary rather than discretionary in nature.

Capital Raisings

Despite the downturn in the Bioshares Index and the wider market, funding for ASX-listed life science companies was relatively buoyant in the December quarter. Biotechs raised \$174 million in the last quarter of 2018 (see table on page 4). The figure included the first tranche of \$24.5 million of a total raise of \$39.7 million by Avita Medical. In September, Avita Medical received US FDA clearance for ReCell, its autologous skin regeneration device, for use with burns patients. It will use the funds for marketing in the US. The second tranche of \$15.2 million will require approval by shareholders in January.

Index Performance by Quarter (Change from previous Qtr)

	Q4 2017**	Q1 2018	Q2 2018	Q3 2018	Q4 2018
Bioshares Index	10.6%	2.8%	0.4%	8.3%	-19.5%
Bioshares Large Cap Index	7.8%	8.9%	20.5%	5.6%	-7.5%
Bioshares Botanicals Index	53.4%	9.6%	-1.9%	-5.2%	-20.3%
Nasdaq Biotech Index	-3.9%	-0.1%	2.8%	11.2%	-20.6%
ASX 300 Index	6.9%	-4.9%	7.5%	-0.2%	-8.8%

**Botanicals (formerly Medicinal Cannabis) stocks moved from Bioshares Index to separate index

Publication Schedule – New Year Period

The next edition of *Bioshares* 777 will be emailed Tuesday January 29, 2019. Bioshares is published 48 times a year.

Bioshares Index – Top 10 Outperformers – Dec Quarter

Company	Code	Cap. \$m	Change - Quarter	Change - Year	Price 31/12/18
Biotron	BIT	68	180%	297%	\$0.115
Exopharm	EX1	44	175%	0%	\$0.550
Resonance Health	RHT	24	131%	173%	\$0.060
Volpara	VHT	197	120%	57%	\$1.100
Memphasys	MEM	10	115%	-7%	\$0.028
BARD1 Life Sciences	BD1	22	100%	214%	\$0.022
Proteomics International	PIQ	31	62%	41%	\$0.380
Suda Pharmaceuticals	SUD	15	50%	-63%	\$0.006
Living Cell Technologies	LCT	25	47%	63%	\$0.044
Antisense Therapeutics	ANP	10	44%	8%	\$0.026

During the quarter, four companies completed IPOs, with Fiji Kava (FIJ) raising \$5.2 million, Emvision (EMV) \$6 million, Exopharm (EX1) \$7 million and HeraMED (HMD) \$6 million. Apart from Exopharm, whose offer was fully subscribed, all other IPOs were reported as being oversubscribed.

In 2018, \$751 million was raised by ASX-listed life science companies, compared to \$840 million in 2017. Eight IPOs brought in \$75 million in 2018, in contrast to 13 IPOs which secured \$166 million in 2017.

Outperformers

The best performing stock in the December quarter was Biotron, which registered a 180% gain. In the September quarter the company reported interim results of a 36 patient, Phase II trial of BIT255 along with anti-retroviral therapy (Atripla) in HIV patients. Biotron reported that “BIT255 has had a profound effect on a source of virus that persists in the presence of antiretroviral drugs.” However, a company poster presented at the HIV DART and Emerging Viruses Meeting in November stated that “the addition of BIT225 to ART did not have a significant impact on the plasma HIV-1 RNA decline kinetics, as expected due to the effectiveness of ART.” The company was successful in securing \$4.7 million from options exercised in the December quarter.

New listing Exopharm closed the quarter up 175% from its 20 cents offer price.

Perth-based Resonance Health closed the quarter at \$0.06, an increase of 131%. The stock had reached a high of \$0.105 on December 12, as investors found favour with the company’s receipt of an FDA clearance for Ferrismart, a machine-learning solution for the quantification of liver iron concentration. The company will supply Ferrismart through its channel partner Blackford Analysis, which may also be used to sell or distribute Ferriscan and Hepafat-Scan.

Breast cancer imaging algorithms company Volpara Health Technologies posted a striking 120% gain for the quarter. The increase reflected the company’s continued growth in recurring revenues and its penetration of the US market rising to 4.2% of US women,

Bioshares Index - Bottom 10 Underperformers – Dec Quarter

Company	Code	Cap. \$m	Change - Quarter	Change - Year	Price 31/12/18
Factor Therapeutics	FTT	2	-97%	-96%	\$0.002
Bionomics	BNO	57	-79%	-73%	\$0.105
Phosphagenics	POH	8	-78%	-72%	\$0.005
AirXpanders	AXP	15	-76%	-96%	\$0.026
Neurotech International	NTI	5	-67%	-78%	\$0.045
Medibio	MEB	4	-66%	-94%	\$0.021
Impedimed	IPD	72	-58%	-81%	\$0.190
Adherium	ADR	6	-54%	-63%	\$0.037
Admedus	AHZ	37	-54%	-79%	\$0.062
Amplia Therapeutics	ATX	6	-53%	-50%	\$0.140

based on the reach of VolparaEnterprise users. Volpara is a stock with high credibility and strong value creation prospects.

Shares in sperm sorting technology company Memphasys rose 115% over the quarter. The technology is being developed to treat male infertility. The company has brought in several key opinion leaders from the US and in Europe to assess the company’s technology.

Underperformers

Clinical trial failures led the underperformers board for the December quarter. Factor Therapeutics Phase II trial failed conclusively to show any difference between its wound healing drug VF001 used with standard care, against standard care. Its shares fell 97% over the quarter, with the company now effectively a shell. This ends the vitronectin-IGF1 matrix protein wound healing hypothesis.

Bionomics trial of BNC210 in 196 PTSD patients failed to meet its primary endpoint of a decrease in PTSD symptoms as measured by CAPS-5. However, the drug showed statistically significant activity in Australian patients in the trial, of having an anti-depressant effect in the high dose treatment group. The stock closed down 79% for the quarter. Development of BNC210 has ceased, with the exception of a small trial of BNC210 in elderly patients, which is evaluating its effects on agitation.

The long standing CEO of the company, Dr Deborah Rathjen, will leave the company at the end of January. Bionomics appears to be now sitting in a holding pattern, pending results from the agitation study in Q1 2019, a decision by Merck to move the partnered BNC375 cognition therapy candidate into a Phase II program, which could trigger a milestone payment which could be in the order of US\$20 million. US specialist life science investor BVF Partners injected \$9.9 million into Bionomics after the trial failure, presumably to ensure the company is well positioned should the company enter an auction period with Merck, which is also a Bionomics shareholder. BVF is now Bionomics largest shareholder with a 19.9% stake.

Phosphagenics shares fell by 78%, due to its failed arbitration

Bioshares Model Portfolio (2 Jan 2019)

Company	Code	Price (current)	Price added to portfolio	Recommendation	Cap'n (\$M)	Date added
Clinuvel Pharmaceuticals	CUV	\$18.00	\$4.15	Hold	\$861	December 2014
Volpara Health Technologies	VHT	\$1.100	\$0.375	Spec Hold A	\$197	June 2017
Somnomed	SOM	\$1.830	\$0.94	Spec Buy A	\$115	January 2011
Opthea	OPT	\$0.570	\$0.160	Spec Buy A	\$142	November 2014
Pharmaxis	PXS	\$0.270	\$0.260	Spec Buy A	\$106	December 2016
Cynata Therapeutics	CYP	\$1.270	\$1.100	Spec Buy B	\$128	November 2018
Cogstate	CGS	\$0.580	\$0.515	Spec Buy A	\$69	August 2018
Micro-X	MX1	\$0.295	\$0.38	Spec Buy A	\$45	May 2017
Visioneering Technologies	VTI	\$0.155	\$0.435	Spec Buy B	\$37	March 2017
Adalta	1AD	\$0.230	\$0.23	Spec Buy A	\$27	July 2017
AcruX	ACR	\$0.175	\$0.31	Spec Buy A	\$29	July 2017
Bluechiip	BCT	\$0.055	\$0.05	Spec Buy B	\$29	December 2018
Rhinomed	RNO	\$0.190	\$0.320	Spec Buy B	\$27	December 2015
AirXpanders	AXP	\$0.027	\$0.745	Spec Buy B	\$15	September 2015
Dimerix	DXB	\$0.089	\$0.09	Spec Buy B	\$14	December 2018
Medigard	MGZ	\$0.020	\$0.028	Spec Buy B	\$3	December 2018

Portfolio Changes – 2 January 2019

IN:
No changes

OUT:
No changes

Stocks Removed from Bioshares Portfolio in TTM

Date removed	Stock
December 2018	ADR
November 2018	FTT
October 2018	BNO
September 2018	DVL, MEB, OSP
February 2018	VLA (acquired)
December 2017	IPD

proceedings with Mylan, and a settlement which gave Mylan full rights to licence, market and/or sell TPM-daptomycin. The company had backed its proceedings against Mylan on the basis that it could win up to US\$300 million in damages. Phosphagenics initiated proceedings against Mylan in January 2016. The arbitration hearing concluded in November 2017, with results expected six months later. However, the results were finally made available in November 2018. Phosphagenics now has a doubtful future.

AirXpanders shares fell by 76% over the quarter. Its share price of \$0.026 is 96% less than a year ago, and the stock had reached an all time high of \$1.235 in September, 2016. What went wrong? The company invested too heavily in plant and inventory and misjudged the rate of acceptance by plastic surgeons in the US. This destroyed sales expectations and eroded investor confidence. Much of this pain was factored into the stock in the first half of the year. However, the stock's December quarter's weakness could be attributed to the company still maintaining relatively high inventory levels at the close of the September quarter. The company will need to significantly repair its balance sheet and grow cash flows if it wants to restore investor confidence.

Several other US market-focused stocks that underperformed in the December quarter were Medibio (-66%), Impedimed (-58%) and Adherium (-54%). These companies share the challenge of commercialising non-invasive health analytic, or diagnostic technologies, of an increasing digital nature, in the highly complex US

healthcare market. In general, it is not FDA clearances that become the principal challenge for such companies; rather it is unlocking the path, or paths to market, which secure adoption and recurring payments. The challenge is compounded by the potential to access direct-to-consumer channels, which require expertise of a kind different to that needed to work with US health insurers and healthcare groups. This problem is also relevant to other companies, such as CardieX and ResApp Health.

Bioshares

Capital Raisings by Australian-listed Biotech Companies Q4 2018

Company	Code	Investment Manager or Investor	Type of Raising	Funds Raised (\$M)
Avita Medical	AVH	Cowen & Co / Bell Potter	Placement (T1)	\$24.5
Admedus	AHZ	SIO Partners / Star Bright Holding	Rights Issue	\$19.0
Osprey Medical	OSP	Allan Gray / Vesparum Capital	Placement	\$10.0
Osprey Medical	OSP	Vesparum Capital	Rights Issue	\$4.3
Opthea	OPT		Options Exercise	\$13.3
Paradigm Biopharm.	PAR	Bell Potter	Placement	\$9.0
Bionomics	BNO	BVF Partners	Placement	\$7.8
CardieX	CDX	CVC Limited / SG Hiscock / C2 Ventures	Placement	\$5.5
Rhinomed	RNO	Bell Potter / Morgans Corporate	Placement	\$5.0
Rhinomed	RNO		SPP	\$0.10
Biotron	BOT		Options Exercise	\$4.7
Phylogica	PYC		Placement (T2)	\$4.7
Imagion Biosystems	IBX	Pamplona Corporate	Rights Issue	\$4.3
Kazia Therapeutics	KZA	WG Partners	Placement	\$3.4
Kazia Therapeutics	KZA		SPP	\$0.8
GI Dynamics	GID		Placement (T2)	\$3.9
BARD1	BD1	Merchant Corporate Advisory	Rights Issue	\$3.3
Mach 7 Technologies	M7T	Australian Ethical	Placement	\$3.3
Respiri	RSH	Fawcner Capital	Placement	\$3.2
Esense-Health	ESE	EverBlu Capital	Placement	\$3.15
Holista Colltech	HCT		SPP	\$2.2
Simavita	SVA		Placement	\$2.08
Simavita	SVA		Convertible Notes	\$1.00
Dorsavi	DVL		Rights Issue	\$2.1
Micro-X	MX1		Placement	\$2.0
Bluechiip	BCT		SPP	\$1.95
Orthocell	OCC		Placement	\$1.8
Genetic Technologies	GTG	Kentgrove	Placement	\$1.4
Medibio	MEB		Convertible Notes (T1)	\$0.61
Bod Australia	BDA		Placement	\$0.45
Affinity Energy and Health	AEB	MEF I,L.P. (Magna)	Convertible Notes	\$0.37
Neuroscientific Biopharm.	NSB		Options Rights Issue	\$0.29
Fiji Kava	FJ	PAC Partners	IPO (20 cps)	\$5.2
Emvision	EMV	Mac Equity Partners	IPO (25 cps)	\$6.0
Exopharm	EX1	Alto Capital	IPO (20 cps)	\$7.0
Heramed	HMD	Twenty 1 Corporate	IPO (20 cps)	\$6.0
Total raised in Q4 2018				\$173.6
Total raised in Q3 2018				\$220.2
Total raised in Q2 2018				\$136.7
Total raised in Q1 2018				\$220.1
Total raised CY 2018				\$750.6

Selected Clinical Trial Developments - Q4 2018

Company	Code	Product/Therapeutic	Event
Actinogen Medical	ACW	Xanamem (Alzheimer's disease)	Enrolled final patient in 186 patient, Phase II trial (previously 174 patients). Results expected Q2 2019.
Avita Medical	AVH	ReCell (significant superficial partial and mid-thickness burns)	Commenced randomised, controlled study in 90 pts <18yo
Bionomics	BNO	BNC210 (PTSD)	Reported results of Phase II trial, 193 pts. The primary endpoint of decrease in PTSD symptoms as measured by CAPS-5 at 12 weeks was not met.
Botanix Pharmaceuticals	BOT	BTX1308 (synthetic cannabidiol) (psoriasis)	Dosed first pt in 15 pt, Phase I study, comparing two doses of BTX1308 against vehicle and betamethasone valerate. Data expected Q1 2019.
CardieX	CDX	CardieX's blood pressure analytics algorithm with Blumio's wearable blood pressure sensor	Blumio initiated single centre, non-randomised, 200 pt study to demonstrate accuracy as compared to arterial line. Completion expected Q1 2019.
Clinivel Pharmaceuticals	CUV	Scenesse (afamelanotide) (vitiligo)	Reported results of 21 patient, Phase II study of Scenesse in combination with NB-UVB (narrow band ultra-violet light B (wave length 280-315 nm)). 18 pts completed study Achieved a statistically significant increase in pigmentation of areas of head and neck (VASI p<0.001) and hands, upper extremities, trunk and lower extremities (VAS p<0.05 but not feet, at day 196, with maintenance observed three months after end of treatment.
Dimerix	DXB	DMX200 (focal segmental glomerulosclerosis)	Dosed first pt in 10pt Phase II study
Envision	EMV	Brain scanner (stroke triage)	Commenced trial with healthy human volunteers
Factor Therapeutics	FTT	VF001-DP (wound healing, venous leg ulcers)	Reported results of Phase II trial. There was no demonstrated clinically meaningful or statistically significant difference in measures of wound healing, compared to placebo.
Imugene	IMU	HER-Vaxx (peptide vaccine targeting Her2) (gastric cancer)	Tested three doses in 14 pt, Phase Ib study. Met safety and tolerability endpoint. 5 pts showed partial response, 4 pts showed stable disease. Phase II trial to commence early in 2019.
Medlab Clinical	MDC	Nanabis (CBD:THC) (advanced cancer pain) (oro-buccal spray)	Non-randomised Phase I trial. Commenced dose escalation stage in 25 pts; drug is being studied as an adjunct to opioid analgesics
Mesoblast	MSB	MPC-150-IM (Revascor) (mesenchymal stem cell therapy) (end stage heart failure pts implanted with an LVAD)	159 pt Phase II trial. Trial did not meet primary endpoint of weaning from full LVAD support. Also delivered a 76% reduction in major GI bleeding episodes and a 65% reduction in hospitalisations. FDA advised MSB that reduction in bleeding episodes is an acceptable endpoint for product approval.
Optiscan Imaging	OIL	Confocal Laser Endomicroscope (assessment of breast cancer margin)	Commenced four stage clinical trial in lumpectomy subjects
Opthea	OPT	OPT-302 (VEGFC,D inhibitor) (soluble receptor 'trap' molecule) Wet AMD	Completed enrollment in Phase II b trial, of 351 treatment naïve pts. Treatment arms: OPT-302 administered at 0.5mg or 2.0mg in combination with VEGF-A inhibitor Lucentis, or Lucentis alone.
Oncosil Medical	OSL	Oncosil (targeted radioactive isotope - Phosphorus 32) (pancreatic cancer)	Reported interim analysis from 42 implanted pts, local disease control rate of 88% at week 16 p<0.0001). 9 pts had undergone surgical resection (21.4% resection rate), with 8 out of 9 reporting R0 surgical margins.
Paradigm Biopharmaceuticals	PAR	Pentosan Polysulphate Sodium (PPS) (knee osteoarthritis)	Completed 112 pt, randomised, double blind, placebo controlled Phase IIb study. Met primary endpoint of change in KOOS pain score from baseline at day 53 (p<0.026). PPS was injected twice weekly for six weeks.
Prescient Therapeutics	PTX	PTX-200 (Her2 negative, locally advanced breast cancer)	Reported interim durability analysis from 56 pt study. Five responders have not had disease progression.
Pharmaxis	PXS	LOXL2 inhibitor (second compound) (fibrotic diseases)	Completed Phase I study. Demonstrated target engagement, achieving more than 85% inhibition over 24 hours from 100mg daily dose
Pharmaxis	PXS	LOXL2 inhibitor (first compound) (fibrotic diseases)	Completed Phase I study. Demonstrated target engagement, achieving more than 80% inhibition with 400mg over a 14 day period
Telix Pharmaceuticals	TLX	TLX250-CDx (girentuximab labelled with zirconium isotope 89) (kidney cancer imaging)	Completed 10 pt study, validating improved image quality and radiation characteristics. Confirmed dose for Phase III kidney cancer imaging trial.

The ASX-Listed Life Sciences Sector
December 31, 2018: Capitalisation \$131 billion, 144 companies

Bioshares Large Cap. Index

Company	Code	Cap. \$m	Principal Activities	Change - Quarter	Change - Year	Price 31/12/18
CSL	CSL	83,870	Manufactures pharmaceutical products including vaccines and human plasma fractions	-8%	31%	\$185.16
Resmed Inc.	RMD	22,685	Manufactures diagnostic and treatment equipment for sleeping disordered breathing	0%	45%	\$15.92
Cochlear	COH	10,018	Manufactures cochlear hearing implants	-13%	1%	\$173.57
Blackmores	BKL	2,110	Manufactures vitamin, mineral and herbal supplements and skin & hair products in Australia and N.Z.	-8%	-28%	\$122.00
Mayne Pharma Group	MYX	1,227	Manufactures, develops and markets generic drugs, with operations in Australia and the USA	-40%	12%	\$0.775

Capitalisation Total 119,909

Bioshares Index

Company	Code	Cap. \$m	Principal Activities	Change - Quarter	Change - Year	Price 31/12/18
Clinuvel Pharmaceuticals	CUV	866	Markets an analogue of the alpha-MSH protein, named Scenesse, as a photo-protective agent. Approved in Europe.	-18%	121%	\$18.100
Nanosonics	NAN	852	Developing a novel disinfection technology, the first product is a point of care ultrasound probe disinfection unit, branded Trophon EPR	-21%	3%	\$2.840
API	API	680	Pharmaceutical wholesaler. Merging with Sigma Pharmaceuticals.	-20%	-18%	\$1.380
Sigma Pharmaceuticals	SIG	604	Pharmaceutical manufacturing and wholesaling. Merging with API.	-10%	-42%	\$0.570
Mesoblast	MSB	577	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.	-46%	-21%	\$1.160
Starpharma Holdings	SPL	440	Developer of pharmaceutical chemical scaffolds known as 'dendrimers'	-25%	-13%	\$1.185
Polynovo	PNV	393	Developing novel polymer-based products for treating wounds and burns	-1%	14%	\$0.595
Medical Developments	MMP	288	Commercialising the Pentrox inhaler for temporary pain relief. Used widely in ambulances across Australia.	5%	-38%	\$4.400
Clovercorp	CLV	226	Development and production of omega-3 food additives from tuna oil	-12%	88%	\$1.370
Volpara	VHT	197	Markets breast density assessment tools and analytics, for use with breast X-ray screening programs	120%	57%	\$1.100
AFT Pharmaceuticals	AFP	192	Development and sale of pharmaceuticals in Australasia and Rest-of-World	-1%	-6%	\$1.975
Paradigm Biopharm.	PAR	147	Development of existing approved drug, pentosan polysulphate sodium to treat bone marrow oedema and joint pain	16%	275%	\$1.050

Bioshares Index

Company	Code	Cap. \$m	Principal Activities	Change - Quarter	Change - Year	Price 31/12/18
Opthea	OPT	145	Developing OPT-302 to treat wet AMD (an eye disease)	-1%	-17%	\$0.580
Telix Pharmaceuticals	TLX	142	Development of molecularly-targeted radiation (MTR) therapies and diagnostics	-21%	-32%	\$0.650
Neuren Pharmaceuticals	NEU	141	Developing neuroprotective therapeutics.	14%	-56%	\$1.400
Avita Medical	AVH	134	Markets ReCell, a skin repair product	-23%	29%	\$0.081
Cynata Therapeutics	CYP	131	Stell cell technology company aiming to produce unlimited uniform, pharmaceutical grade MSCs from a single donor.	0%	110%	\$1.300
Oncosil Medical	OSL	117	Developing Oncosil, a brachytherapy for pancreatic cancer and liver cancer	-8%	19%	\$0.185
Somnomed	SOM	115	Markets oral devices for the treatment of sleep apnea and snoring.	-3%	-50%	\$1.830
Pharmaxis	PXS	104	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.	-15%	4%	\$0.265
Ellex Medical Lasers	ELX	99	Develops, manufactures and markets solid state ophthalmic lasers used to treat secondary cataracts and retinal disorders.	-1%	-28%	\$0.690
Invion	IVX	99	Development of Photosoft, a photosensitiser derived from chlorophyll, which it is believed can accumulate selectively in tumours and be manipulated for therapeutic purposes.	-47%	200%	\$0.018
G Medical	GMV	96	Developing next generation mobile health and e-health devices, and cloud and medical call centres	-22%		\$0.270
Probiotec	PBP	93	Manufacturer, marketer and distributor of a range of over the counter (OTC) pharmaceuticals, complementary medicines and speciality ingredients	4%	68%	\$1.515
Immutep	IMM	85	Developing immuno-oncology drug candidates IMP761 and IMP321 (eftilagimod alpha)	-40%	27%	\$0.028
Genetic Signatures	GSS	83	Development and sale of molecular diagnostics(MDx) kits and products	7%	146%	\$0.800
SDI	SDI	78	Manufacture & distribution of amalgam (fillings) & other dental materials and product R&D	11%	8%	\$0.655
Cyclopharm	CYC	76	A nuclear medicine company that markets the Technegas lung imaging system	4%	16%	\$1.105
ResApp Health	RAP	73	Developing digital healthcare solutions to diagnose and manage respiratory conditions	-50%	35%	\$0.105
Impedimed	IPD	72	Markets products that aid the diagnosis of secondary lymphoedema, muscle wasting and other disorders	-58%	-81%	\$0.190
Cogstate	CGS	72	Markets cognitive performance diagnostic products	5%	-33%	\$0.600
Compumedics	CMP	71	Develops, manufactures and markets sleep diagnostic and monitoring equipment.	-11%	-5%	\$0.400
Phylogica	PYC	68	Developing peptide compound libraries for use in human therapeutics	-10%	-30%	\$0.028
Biotron	BIT	68	Developing a drug to treat HIV	180%	297%	\$0.115

Bioshares Index

Company	Code	Cap. \$m	Principal Activities	Change - Quarter	Change - Year	Price 31/12/18
Imugene	IMU	65	Developing a Her2 positive cancer vaccine technology	-14%	20%	\$0.018
Reva Medical	RVA	62	Developing the Fantom scaffold, its third version of a bioresorbable coronary stent	-40%	-78%	\$0.150
Bionomics	BNO	57	Discovery and development of drugs to treat CNS diseases	-79%	-73%	\$0.105
Vita Life Sciences	VLS	53	Development, manufacture and distribution of prescription and OTC medicines as well as complementary and alternative medicines, dietary supplements and health foods	2%	25%	\$0.970
Botanix Pharmaceuticals	BOT	53	Developing BTX1503 for the treatment of acne. BTX1503 combines synthetic cannabidiol with a transdermal drug delivery system, Permetrex.	-29%	6%	\$0.070
Noxopharm	NOX	51	Developing a cancer treatment, NOX66, a formulation of idronoxil, which targets NADH oxidase 2.	-35%	-63%	\$0.420
Actinogen Medical	ACW	50	Developing Xanamem for the treatment of dementia in Alzheimer's disease patients	-12%	10%	\$0.045
Osprey Medical	OSP	50	Markets DYEVERT, a device which reduces the amount of dye needed in imaging procedures	-48%	-72%	\$0.115
Medadvisor	MDR	46	Medication adherence software platform company	-13%	-27%	\$0.035
Respiri	RSH	45	Respiratory and pulmonary devices company. Markets Airsona, an ehealth product.	4%	116%	\$0.095
Star Combo Pharma	S66	45	Develops, manufactures and markets nutritional and OTC products	-33%		\$0.565
Micro-X	MX1	45	Development of a mobile medical x-ray imager for hospitals, a version for deployed military use and a mobile security back-scatter imager	-24%	-31%	\$0.295
Exopharm	EX1	44	Development of technology for improving the purification of exosomes, which are extra-cellular vesicles which transport bioactive molecules through out the body.	175%	0%	\$0.550
Asian American Medical Group	AJJ	44	Manages liver treatment centres in Asia; expanding into radiation oncology	8%	30%	\$0.130
Invitrocue	IVQ	40	Singapore-based analytical services company (life sciences). Listed through BUN.	-13%	-3%	\$0.078
Universal Biosensors	UBI	39	Development, manufacture and commercialisation of a range of in vitro diagnostic tests for point-of-care use	-8%	-27%	\$0.220
Regeneus	RGS	38	Commercialisation of autologous adipose derived stem cells and factors. Markets HiQCell for human use and CryoShot for veterinary use.	-5%	44%	\$0.180
Visioneering Technologies	VTI	37	Markets a next-generation contact lens	-6%	-72%	\$0.155
Admedus	AHZ	37	Markets Cardiocel, a bio-scaffold	-54%	-79%	\$0.062
IDT Australia	IDT	34	Manufacturer of pharmaceutical ingredients to international standards for major pharmaceutical groups.	-22%	61%	\$0.145
OBJ	OBJ	33	Developing transdermal drug delivery technologies	-22%	-55%	\$0.018

Bioshares Index

Company	Code	Cap. \$m	Principal Activities	Change - Quarter	Change - Year	Price 31/12/18
Proteomics International	PIQ	31	Provider of protein chemistry analytical services. Seeking to commercialise a diabetic kidney disease diagnostic.	62%	41%	\$0.380
Acrux	ACR	30	Developer of topical generic drugs	-18%	20%	\$0.180
Patrys	PAB	29	Developing novel antibody therapies for a range of oncology indications. Focussed on 3E10, a cell penetrating antibody.	-29%	17%	\$0.027
Immuron	IMC	29	Sales and development of hyper-immune bovine colostrum products for therapeutic use	-40%	5%	\$0.200
Oventus	OVN	29	Developing an oral appliance to treat sleep apnea and snoring	-10%	-51%	\$0.270
Bluechip	BCT	28	Development, manufacture and commercialisation of a tracking system for biological samples	-16%	-22%	\$0.054
Mach 7 Technologies	M7T	28	Development and sales enterprise imaging management platform	0%	-22%	\$0.210
Alcidion	ALC	27	Specialist health IT solution provide. Recently acquired MKM Health and Patient Track Holdings.	-4%	-8%	\$0.045
Benitec Biopharma	BLT	27	Developing innovative therapies based on a combination of gene therapy with ddRNAi gene silencing technology	-42%	-48%	\$0.105
Rhinomed	RNO	27	Developing nasal technologies with applications for sport performance, sleep and drug delivery.	-33%	46%	\$0.190
Adalta	1AD	27	Developing AD-114 for the treatment of idiopathic pulmonary fibrosis (IPF) and other human fibrotic diseases	-15%	-8%	\$0.230
Living Cell Technologies	LCT	25	Development of NTCELL for the treatment of Parkinson's Disease, and potentially for eye and ear diseases.	47%	63%	\$0.044
Resonance Health	RHT	24	Marketing the FerriScan technology, a non-invasive tool for measuring liver iron levels	131%	173%	\$0.060
Cellmid	CDY	24	Develops and markets therapies and diagnostic tests for fibrotic diseases, cancer, ischemic diseases of the heart and hair loss.	-24%	-45%	\$0.280
Anatara Life Sciences	ANR	23	Following the licensing of its animal health product to Zoetis, is now developing a gastrointestinal dietary supplement (human health)	-6%	-73%	\$0.460
Kazia Therapeutics	KZA	23	Formerly Novogen. Developing GDC-084 for the treatment of glioblastoma multiform (a brain cancer).	-13%	-19%	\$0.365
BARD1 Life Sciences	BD1	22	Developing cancer diagnostics and therapies. Lead program is the BARD1 lung cancer test. Acquired Swiss company BARD1AG.	100%	214%	\$0.022
Bioxyne	BXN	21	Sale and distribution of probiotics	-11%	-64%	\$0.033
Emvision	EMV	20	Exploiting low energy non-ionising microwave radiation to create 3D images, with the goal of developing a device to support the diagnosis of the two main types of stroke	40%	0%	\$0.350
USCOM	UCM	20	Markets Uscom, a non-invasive heart output function monitor, BP+ non-invasive central blood pressure product and digital ultrasonic spirometry products	-6%	-31%	\$0.145
Allegra Orthopedics	AMT	20	A developer and manufacturer of prosthetic implants and medical devices.	-5%	43%	\$0.200

Bioshares Index

Company	Code	Cap. \$m	Principal Activities	Change - Quarter	Change - Year	Price 31/12/18
Anteo Diagnostics	ADO	20	Developer of a biological coatings technology that can be applied to immunoassays, bio-separations, drug delivery and other medical devices	42%	6%	\$0.017
Optiscan Imaging	OIL	19	Manufactures confocal microscopes for clinical diagnosis	-27%	-55%	\$0.045
CardieX	CDX	18	Development of wearable blood pressure measurement devices	-26%	-22%	\$0.029
LBT Innovations	LBT	18	Developer of innovative products which deliver productivity benefits across a range of life science settings	-19%	-52%	\$0.089
Prana Biotechnology	PBT	18	Developing drugs to treat CNS diseases such as Alzheimer's and Parkinson's	-23%	-54%	\$0.033
Total Brain	TTB	18	Development and commercialisation of functional brain analysis techniques. Formerly Brain Resource Corp.	-21%	-45%	\$0.033
Orthocell	OCC	18	Developing and marketing regenerative medicine products	-51%	-57%	\$0.145
Genera Biosystems	GBI	17	Develops, manufactures and distributes advanced molecular diagnostic tests, with a particular focus on women's health.	0%	-20%	\$0.160
Analytica	ALT	17	Markets the Pericoach product to aid in the management of female urinary incontinence.	-17%	0%	\$0.005
Genetic Technologies	GTG	16	A diversified molecular diagnostics company embracing blockchain technologies across genomic testing platforms. Markets Brevagenplus, a breast cancer risk prediction tool.	-45%	-54%	\$0.006
Recce	RCE	16	Development of an antibiotic ("RECCE") as a cancer treatment	0%	3%	\$0.175
Suda Pharmaceuticals	SUD	15	Developing drugs for oro-mucosal administration. Recently acquired IP for anagrelide, with intent to develop it as an anti-cancer therapy	50%	-63%	\$0.006
GI Dynamics	GID	15	Commercialising the Endobarrier, an implantable polymer liner for the management of obesity and diabetes	-30%	-43%	\$0.016
Prescient Therapeutics	PTX	15	Developing compounds to treat various cancers	-12%	3%	\$0.069
Sienna Cancer Diagnostics	SDX	15	Development and sale of an in vitro diagnostic, SCD-A7, as an adjunct to urine cytology, in the field of bladder cancer detection and diagnosis	-29%	-45%	\$0.060
AirXpanders	AXP	15	Design, manufacture and distributor of the Aeroform, a patient controlled tissue expander, for use in breast reconstruction after mastectomy	-76%	-96%	\$0.026
Dimerix	DXB	14	Developing a combination therapy, DMX200, to treat chronic kidney disease.	-15%	-29%	\$0.089
Rhythm Biosciences	RHY	14	Developing Colostat, a blood test for the early detection of colorectal cancer	-7%	-50%	\$0.140
Heramed	HMD	14	Commercialising a home pregnancy monitoring technology	-20%	0%	\$0.160
Vectus Biosystems	VBS	14	Developing an anti-fibrotic compound, VB0004, with applications in heart and kidney disease	-38%	-56%	\$0.590
Holista Colltech	HCT	14	Extracts collagen from sheepskins and markets natural healthcare products.	-15%	-33%	\$0.058

Bioshares Index

Company	Code	Cap. \$m	Principal Activities	Change - Quarter	Change - Year	Price 31/12/18
Dorsavi	DVL	13	Commercialising a wireless sensor movement monitoring system and products for use in the Elite Sports, OH&S and medical/physiotherapy markets	-27%	-79%	\$0.062
TBG Diagnostics	TDL	12	Development of HLA SSA and SBT diagnostic kits and related services	4%	-7%	\$0.057
Bio-Gene Technology	BGT	12	Commercialisation of the insecticides Flavocide (synthetic) and Qcide (plant-derived), in the fields of human health and crop protection.	-23%		\$0.100
Novita Healthcare	NHL	10	Design and development of training exercises that target core issues in early childhood and academic skills. Acquired Newly, and online matching marketplace which connects carers and aged care and disability support services	-15%	-34%	\$0.029
Memphasys	MEM	10	Developing a sperm separation technology, SpermSep. Completed a 1:15 share consolidation.	115%	-7%	\$0.028
StemCell United	SCU	10	Applies a proprietary stem cell technology to culture and grow plant extracts for use in Traditional Chinese Medicine.	-24%	-53%	\$0.019
Antisense Therapeutics	ANP	10	Developing antisense compounds to treat multiple sclerosis and Duchenne Muscular Dystrophy	44%	8%	\$0.026
Imagion Biosystems	IBX	10	Developing MagSense, a diagnostic technology which exploits the principles of superparamagnetic relaxometry	-50%	0%	\$0.030
ITL Health Group	ITD	9	Divested custom pack business. Now operates a DTC pathology test business, MyHealthTest and ITL BioMedical, which manufactures devices for clinical, laboratory and blood banking markets. To delist.	-35%	-77%	\$0.110
PharmAust	PAA	8	Developing a veterinary anti-parasitic compound (PPL-1) as a human and animal cancer therapy. Also operates Epichem, a medicinal chemistry service business.	14%	-33%	\$0.040
Simavita	SVA	8	Commercialising an incontinence assessment technology	-37%	46%	\$0.019
Phosphagenics	POH	8	Commercialising a platform technology (alpha-tocopherol) , for human and animal applications.	-78%	-72%	\$0.005
Neuroscientific Biopharm.	NSB	7	Developing EmtinB, an LRP-1 receptor agonist for the treatment of Alzheimer's disease	-19%		\$0.130
Adherium	ADR	6	Commercialising personal digital medication monitoring systems to improve patient compliance and medication efficacy	-54%	-63%	\$0.037
Race Oncology	RAC	6	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.	-21%	-83%	\$0.075
Amplia Therapeutics	ATX	6	Developing drug candidates to treat fibrotic cancers and fibrosis. Formerly Innate Immunotherapeutics.	-53%	-50%	\$0.140
Neurotech International	NTI	5	Development and sales of Mente (and platform), a treatment for improving behaviours of people with autism and other neurological conditions	-67%	-78%	\$0.045
Lifespot Health	LSH	5	Acquired Lifespot AG, which has been developing a system for the diagnosis and evaluation of skin diseases, and BodyTel AG, which has been developing a system for the management, diagnosis and evaluation of chronic disease	-26%	-57%	\$0.060

Bioshares Index

Company	Code	Cap. \$m	Principal Activities	Change - Quarter	Change - Year	Price 31/12/18
Medibio	MEB	4	Commercialising a test for depression and anxiety	-66%	-94%	\$0.021
Jayex Healthcare	JHL	3	Commercialisation of the Enlighten patient workflow platform	-14%	19%	\$0.019
Medigard	MGZ	3	Developing an injectable drug KT009 (endogenous recombinant protein GDF-6) to treat intervertebral disc degeneration	-5%	-33%	\$0.020
Cryosite	CTE	2	Provides specialised storage services, especially for umbilical cord blood	-30%	-64%	\$0.045
Factor Therapeutics	FTT	2	Business under review following the failure of wound therapy VT001 to meet endpoints in Phase II trial	-97%	-96%	\$0.002

Capitalisation Total **9,630**

Listed Biotech Investment Funds or Companies

Company	Code	Cap. \$m	Principal Activities	Change - Quarter	Change - Year	Price 31/12/18
BTC Health	BTC	18	Provides capital and management expertise to high-growth Australian biotech, medtech and pharmaceutical companies	-20%	11%	\$0.140

Capitalisation Total **18**

Botanical Product Companies (Cultivated Production)

Company	Code	Cap. \$m	Principal Activities	Change - Quarter	Change - Year	Price 31/12/18
Elixinol Global	EXL	311	A supplier of hemp and medicinal cannabis products	30%		\$2.500
Cann Group	CAN	286	Medicinal cannabis company focused on the breeding, cultivation and production stages. Holds Australian ODC cultivation (MC) and research license (CR).	-25%		\$2.050
Auscann Group Holdings	AC8	178	Developing medical cannabis products for the Australian market. Holds Australian ODC cultivation (MC) and manufacture license and TGA manufacture license.	-42%	-28%	\$0.575
TPI Enterprises	TPE	93	Licensed poppy producer. Narcotic raw material processor. Holds Australian ODC cultivation (MC) and research license (CR).	-23%	-48%	\$1.150
Medlab Clinical	MDC	77	Development, production and marketing of nutraceuticals. Also developing cannabis product to treat cancer patients with intractable pain.	-23%	-53%	\$0.370
Queensland Bauxite (to be renamed Cann Global)	QBL	60	To acquire 100% of Medcan Australia and 100% of Medical Cannabis Ltd. Medcan Australia has been granted an export and import license by the ODC. Relisting expected in 2019.	0%		\$0.037
THC Global Group	THC	59	A medicinal cannabis company formed through the acquisition of Canndeo, an off-shoot of Agri Fibre Industries. Holds Australian ODC cultivation (MC) and research license (CR).	-15%	-32%	\$0.465
Creso Pharma	CPH	57	Development of cannabis and hemp derived therapeutic, nutraceutical, and life style products with wide patient and consumer reach for human and animal health.	-13%	-47%	\$0.490
MMJ Phytotech	MMJ	54	Developing medical cannabis products for the Canadian market	-19%	-46%	\$0.235
MGC Pharmaceuticals	MXC	48	A medical and cosmetic cannabis company with growing operations in Slovenia. Acquired Czech company Panax Pharma.	-17%	-55%	\$0.040
Althea Group	AGH	47	Supply of branded medicinal cannabis products in Australia. To cultivate, extract and manufacture medicinal cannabis. Holds ODC manufacturing license.	-59%	0%	\$0.245
Zelda Therapeutics	ZLD	39	A medical cannabis company researching treatments for cancer, dermatological indications and for sleep disorders	-27%	-44%	\$0.052
Bod Australia	BDA	27	Developer and distributor of natural, evidence-based cosmetics and natural medicines. Holds medicinal cannabis import license. Overseas partner is Linnea SA.	-35%	0%	\$0.390
Affinity Energy and Health	AEB	13	Investor in Uruguayan company Biogenics. Has applied to the Australian ODC to cultivate and produce medicinal cannabis	8%		\$0.013
CannPal Animal Therap.	CP1	13	Research and development of cannabis-based therapeutics for companion animals	-18%		\$0.135
Fiji Kava	FIJ	8	Cultivation and development of kava (piper methysticum) as an alternative treatment for anxiety, pain and insomnia.	-40%		\$0.120
Impression Healthcare	IHL	7	Seeking to obtain Commonwealth and state licenses to import, store, distribute and export medicinal cannabis, while diversifying from its dental products business	7%		\$0.016
eSense Health	ESE	5	Specialises in phytochemical profiling of plants to develop and reverse engineer terpenes for medical and other applications.	-31%		\$0.027

1,383

Capitalisation Total - All Indices

130,940

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 Some 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

Corporate Subscribers: Cogstate, Bionomics, LBT Innovations, Opthea, ResApp Health, Pharmaxis, Dimerix, Adalta, Medibio, Pharmaust, Actinogen Medical, Patrys

Disclaimer:

Information contained in this newsletter is not a complete analysis of every material fact respecting any company, industry or security. The opinions and estimates herein expressed represent the current judgement of the publisher and are subject to change. Blake Industry and Market Analysis Pty Ltd (BIMA) and any of their associates, officers or staff may have interests in securities referred to herein (Corporations Law s.849). Details contained herein have been prepared for general circulation and do not have regard to any person’s or company’s investment objectives, financial situation and particular needs. Accordingly, no recipients should rely on any recommendation (whether express or implied) contained in this document without consulting their investment adviser (Corporations Law s.851). The persons involved in or responsible for the preparation and publication of this report believe the information herein is accurate but no warranty of accuracy is given and persons seeking to rely on information provided herein should make their own independent enquiries. Details contained herein have been issued on the basis they are only for the particular person or company to whom they have been provided by Blake Industry and Market Analysis Pty Ltd. The Directors and/or associates declare interests in the following ASX Healthcare and Biotechnology sector securities: Analyst DB:ACR,ADR,CGS,COH,CSL, CYC,MEB,NAN,OPT,OSP,PNV,SOM,TPE,UCM,VTI; Analyst MP: ACR, ADR, AXP,CGS,OPT,CUV, MX1, NAN, PXS,RNO,SOM, VTI. These interests can change at any time and are not additional recommendations. Holdings in stocks valued at less than \$100 are not disclosed.

Subscription Rates (inc. GST)

48 issues per year (electronic distribution): **\$470**

For multiple email distributions within the same business cost centre, our pricing structure is as follows:	\$750	2-3 email addresses
	\$1010	4-5 email addresses
	\$1280	6-10 email addresses

To subscribe, post/fax this subscription form to:

Bioshares
PO Box 193 Richmond VIC 3121
Fax: +61 3 9329 3350

I enclose a cheque for \$ _____ made payable to **Blake Industry & Market Analysis Pty Ltd**, or

Please charge my credit card \$ _____ MasterCard Visa

Card Number

Signature _____ Expiry date _____

Subscriber details

Name _____

Organisation _____

Ph () _____

Emails _____
