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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)	-35.8%
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 - May '19)	-2.3%
Year 19 (May '19 - Current)	70.3%
Cumulative Gain	1230%
Av. Annual gain (19 yrs)	18.9%

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# Bioshares

3 January 2020  
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*Delivering independent investment research to investors on Australian biotech, pharma and healthcare companies*

## Quarterly Review

### **Biotech Successes Drive Record Capital Inflows for December Quarter**

The **Bioshares Index** held steady in the December quarter, easing by 1%, as investors ploughed close to \$550 million into the ASX-listed life sciences sector. The Bioshares Index experienced strong growth in the previous three quarters, increasing by 16% in the March quarter, 21% in the June quarter and 18% in the September quarter, providing the buoyancy for a record quarter of capital raisings in the December quarter, and bringing the total capital raised in 2019 to \$1.06 billion.

Over the nine months to September 30, 2019, a steady flow of positive news events combined to lift share prices higher across the board. Several events of note included the FDA's approval of Clinuvell Pharmaceutical's Scenesse, Opthea's positive Phase IIb results for OPT-302, Avita Medical's launch of ReCell in the USA, and additional positive Phase IIb data and new mechanism of action data for Paradigm Pharmaceuticals' knee osteoarthritis treatment Zilosul.

The **Bioshares Large Cap Index**, which includes CSL, Cochlear, Resmed, Blackmores and Nanosonics, increased by 15.4% in the December quarter. Shares in CSL rose by 18% in the quarter, taking that company's capitalisation to \$125 billion. CSL is currently trading on a price/earnings ratio of 42.

The global bellweather index for biotech investment, the **Nasdaq Biotech Index**, reversed two negative quarters with a 21% gain in the December quarter. The Nasdaq Biotech Index returned to levels last seen in September 2018. The US FDA approved 48 drugs in 2019, with 35 approved in the second half, and 21 (44%) approved in the December quarter.

The **Bioshares Botanicals Index** slumped 43% in the December quarter. The aggregate capitalisation of the 17 companies in that index was \$831 million at December 31, 2019, compared to \$1.4 billion a year ago. Investor interest in medicinal cannabis stocks has waned on the back of slow commercial and clinical progress.

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

	Q4 2018	Q1 2019	Q2 2019	Q3 2019	Q4 2019
Bioshares Index	-19.5%	16.2%	20.9%	18.2%	-1.0%
Bioshares Large Cap Index	-7.5%	1.4%	12.0%	9.3%	15.4%
Bioshares Botanicals Index	-20.3%	17.3%	2.6%	-14.4%	-42.9%
<b>Nasdaq Biotech Index</b>	<b>-20.6%</b>	<b>15.4%</b>	<b>-2.4%</b>	<b>-8.8%</b>	<b>21.1%</b>
ASX 300 Index	-8.8%	9.5%	7.2%	1.2%	0.0%

#### Publication Schedule

The next edition of *Bioshares* (827) will be emailed Tuesday January 28, 2020. Bioshares is published 48 times a year.

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

Company	Code	Cap. \$m	Change - Quarter	Change - Year	Price 31/12/19
TALI Digital	TD1	38	466.7%	75.9%	\$0.051
Actinogen Medical	ACW	40	300.0%	-20.0%	\$0.036
Oncosil Medical	OSL	107	161.5%	-8.1%	\$0.170
Simavita	SVA	10	150.0%	31.6%	\$0.025
Resonance Health	RHT	96	80.0%	275.0%	\$0.225
Allegra Orthopaedics	AMT	20	73.9%	0.0%	\$0.200
Medical Developments	MVP	574	73.3%	98.9%	\$8.750
Admedus	AHZ	59	66.7%	61.3%	\$0.100
Cogstate	CGS	66	62.5%	-35.0%	\$0.390
Total Brain	TTB	80	61.5%	154.5%	\$0.084

### Outperformers

Tali Digital (TD1), formerly Novita Healthcare, recorded the largest gain for stocks in the Bioshares Index in the December quarter. Tali's 467% increase came off a low base of \$0.009 at September 30, 2019. The company's share price peaked at \$0.105 on November 6, ahead of a \$6.2 million capital raising completed at \$0.062 on November 25. PAC Partners managed the capital raise. An earlier rights issue in August (at \$0.01) raised \$2 million. Tali Digital is commercialising digital assessment and training programs for children with attention problems.

Three surprising outperformers in the December quarter were stocks that recovered following earlier setbacks and periods of weakness. In May, Actinogen Medical (+300%) reported negative results for its Phase II trial of Xanamem for the treatment of mild to moderate cognitive impairment in patients with Alzheimer's disease. New data released on October 1 showed that Xanamem at a 20mg dose delivered a statistically significant improvement in cognitive function in healthy elderly subjects. The unsuccessful Phase II study trialed a 10mg dose.

Oncosil Medical (+162%) shares appeared to respond to announcements made by the company that indicated that its CE Marking process was moving forward positively with its Notified Body, the British Standards Institute.

In late November, Simavita (+150%) received a CE Mark for its Smartz platform, a digitally connected sensor technology which is incorporated into incontinence products.

### Underperformers

Botanix Pharmaceuticals shares suffered the greatest decline of stocks (-67%) in the Bioshares Index in the December quarter. The company's Phase II trial of BTX1503, a formulation of cannabidiol for treating acne, failed to meet its primary endpoint of absolute change, by number, from baseline to week 12 in inflammatory lesion count.

GI Dynamics (-61%), which has continued with the commercialisation of the Endobarrier device for treating obesity and diabetes despite its withdrawal from Australia and European markets, saw its share price fall back over the quarter. The company's major shareholder (Crystal Amber Fund Ltd) exercised warrants to bring its ownership stake to 73%.

## Bioshares Index – Bottom 10 Underperformers – Dec. Quarter

Company	Code	Cap. \$m	Change - Quarter	Change - Year	Price 31/12/19
Botanix Pharmaceuticals	BOT	79	-67.2%	17.1%	\$0.082
GI Dynamics	GID	31	-61.4%	6.3%	\$0.017
Benitec Biopharma	BLT	11	-50.0%	-66.7%	\$0.035
Imagion Biosystems	IBX	13	-49.0%	-16.7%	\$0.025
Bionomics	BNO	42	-42.2%	-25.7%	\$0.078
Suda Pharmaceuticals	SUD	8	-42.0%	-61.3%	\$0.058
Dorsavi	DVL	6	-39.5%	-58.1%	\$0.026
Lifespot Health	LSH	3	-38.2%	-43.3%	\$0.034
Next Science	NXS	340	-36.5%	75.9%	\$1.880
Osprey Medical	OSP	13	-36.2%	-73.9%	\$0.030

During the quarter gene therapy Benitec Biopharma (-50%) said it would re-domicile to US. The company's lead program, BB-301 for Oculopharyngeal Muscular Dystrophy, is currently undergoing IND-enabling studies. The company's pre-clinical HBV program is available for licensing. The company has been listed on the ASX since 2002 and the Nasdaq since 2015. Despite years of development, the company's highly complex gene technology is still far from being validated as a clinical and economically viable technology, with attempts in treating HIV and HCV unsuccessful.

After announcing cost management actions, Imagion Biosystems (-49%) shares weakened ahead of a capital raising in October, slumping to a low of \$0.017 in the quarter before recovering to \$0.035 at the close of the quarter. The company held \$1.5 million in cash at September 30, 2019. Imagion completed a rights issue in November (at \$0.02) which raised \$3.6 million. The company expects to spend \$1.2 million on manufacturing GMP-grade of its proprietary nano-particles used in imaging studies, taking 7-8 months to complete.

### Capital Raisings

The December quarter 2019 was an exceptional quarter for capital raisings by ASX-listed life science companies, with 40 companies partially or fully completing placements, rights issues and convertible note offerings which raised \$547 million.

The largest funding round was conducted by Avita Medical, which raised \$120 million, followed by Mesoblast (\$75 million), Opthea (\$50 million), and Genetic Signatures (\$37.5 million).

### Other Capital Inflows

Two other capital inflows of note related to transactions executed by Admedus and Ellex Medical Lasers. In October, Admedus sold the distribution rights for its CardioCel and VasuCel tissue patch product to LeMaitre Vascular for upfront net cash proceeds of \$21.2 million, and up to \$11.4 million in earn-out payments.

On December 24, Ellex Medical Lasers sold its lasers and ultrasound business to French company Lumibird Group SA for \$100 million in cash (net \$97 million), allowing the company to focus on the development and sale of its 2RT and iTrack products to treat glaucoma and macular degeneration. The transaction is expected to be settled in late March, with the Ellex board "committed to returning a majority of net funds received to shareholders."

## Capital Raisings by Australian-listed Biotech Companies Q4 2019

Company	Code	Investment Manager or Investor	Type of Raising	Funds Raised (\$M)
Avita Medical	AVH	Bell Potter	Placement	\$120.0
Mesoblast	MSB	Bell Potter	Placement	\$75.0
Opthea	OPT		Placement	\$50.0
Genetic Signatures	GSS	Bell Potter	Placement	\$35.0
Genetic Signatures	GSS		SPP	\$2.5
Palla Pharmaceuticals	PAL		Rights Issue (Instit.)	\$12.2
Palla Pharmaceuticals	PAL		Rights Issue	\$10.1
Palla Pharmaceuticals	PAL		Placement	\$8.4
Imugene	IMU			\$24.6
PYC Therapeutics	PYC		Rights Issue (Instit.)	\$14.3
PYC Therapeutics	PYC		Rights Issue	\$12.3
Mach7 Technologies	M7T	Morgans / WG Partners / Taylor Collison	Placement	\$20.0
Micro-X	MX1	Morgans	Placement	\$16.5
Alcidion	ALC	Henslow Pty Ltd	Placement	\$16.2
Orthocell	OCC		Placement	\$13.0
Orthocell	OCC		SPP	\$1.4
IMEXHS	IME	Canaccord Genuity / Forrest Capital	Placement	\$10.0
Cyclopharm	CYC	Bell Potter	Placement	\$9.8
Bluechiip	BCT	CCZ Statton Equities	Placement	\$4.6
Bluechiip	BCT		SPP	\$4.5
Total Brain	TTB	Bell Potter	Placement (T1)	\$8.1
Vectus Biosystems	VBS		Convertible Notes	\$7.0
Cogstate	CGS	Taylor Collison	Rights Issue	\$4.0
Cogstate	CGS		Rights Issue (Instit.)	\$2.9
Recce	RCE	Shaw and Partners	Placement	\$6.8
TALI Digital	TD1	PAC Partners	Placement	\$6.2
IM Health	IHL	Peloton Capital	Placement	\$5.0
Medlab Clinical	MDC	Acova Capital / Morgans	Placement	\$5.0
Genetic Technologies	GTG		Rights Issue	\$4.5
Kazia Therapeutics	KZA		Placement	\$4.0
Imagion Biosystems	IBX	CPS Capital Group	Rights Issue	\$3.6
Proteomics Int.	PIQ	Alto Capital	Placement	\$3.0
Visionearing	VTI	Thorney Investment Group	Placement	\$3.0
Creso Pharmaceuticals	CPH	EverBlue Capital	Placement	\$1.6
Creso Pharmaceuticals	CPH	EverBlue Capital	Convertible Notes	\$1.4
Memphasys	MEM		Placement (T2)	\$2.6
Dimerix	DXB	Taylor Collison / Westar Capital	Placement	\$2.5
Cellmid	CDY	XEC Partners	Placement	\$1.5
Cellmid	CDY		SPP	\$1.0
GI Dynamics	GID	Crystal Amber	Warrants	\$2.1
Sienna Diagnostics	SDX		Placement	\$1.7
Sienna Diagnostics	SDX		Rights Issue	\$0.3
Dorsavi	DVL		Convertible Notes	\$1.2
Dorsavi	DVL	Shaw and Partners	Placement	\$0.6
Heramed	HMD		Placement	\$1.4
Adherium	ADR	Trudell Medical	Secured Notes	\$1.1

Cont'd over

**Bioshares Model Portfolio (3 January 2020)**

Company	Code	Price (current)	Price added to portfolio	Recommendation	Cap'n (\$M)	Date added
Opthea	OPT	\$2.860	\$0.160	Spec Buy A	\$770	November 2014
Volpara Health Technologies	VHT	\$1.880	\$0.375	Spec Hold A	\$410	June 2017
Telix Pharmaceuticals	TLX	\$1.580	\$0.910	Spec Hold A	\$400	May 2019
Somnomed	SOM	\$2.860	\$0.94	Spec Buy A	\$180	January 2011
Immutep	IMM	\$0.260	\$0.320	Spec Buy A	\$101	March 2019
Cyclopharm	CYC	\$1.335	\$1.35	Spec Buy A	\$104	September 2019
Cogstate	CGS	\$0.460	\$0.24	Spec Buy A	\$75	April 2019
Pharmaxis	PXS	\$0.150	\$0.260	Spec Buy A	\$59	December 2016
Micro-X	MX1	\$0.195	\$0.38	Spec Buy A	\$48	May 2017
Rhinomed	RNO	\$0.210	\$0.24	Spec Hold B	\$36	Jun-19
AcruX	ACR	\$0.185	\$0.31	Spec Buy A	\$31	July 2017
Dimerix	DXB	\$0.140	\$0.09	Spec Buy B	\$22	December 2018

**Portfolio Changes – 3 January, 2020**

**IN:**  
No changes

**OUT:**  
No changes

**Stocks Removed from Bioshares Portfolio in TTM**

Date removed	Stock
September 2019	1AD, ALC, BCT
June 2019	CUV
March 2019	CGS, CYP, MGZ
February 2019	RNO

**Selected Clinical Trial Developments - Q4 2019**

Company	Code	Product/Therapeutic	Event
Antisense Therapeutics	ANP	ATL1102 (Duchenne Muscular Dystrophy)	Reported final results from 9 pt trial. No SAEs reported. 7 of 9 subjects demonstrated either increases or no change in PUL2.0 scores from baseline, and an overall mean change of 0.9
Botanix Pharmaceuticals	BOT	BTX 1503 (moderate to severe acne)	Phase II trial did not achieve statistical significance for the primary endpoint of absolute change from baseline of inflammatory lesions, for the 5% qd dose
Invex Therapeutics	IXC	exenatide (idiopathic intracranial hypertension)	Enrolled and dosed 12th of 16 pts in Phase II study
Mesoblast	MSB	Revescor (allogeneic mesenchymal precursor stem cells - MPCs) (advanced chronic heart failure)	Reported surpassing the number of primary endpoint events needed for completion of 566 pt Phase III trial. Primary endpoint is reduction in heart-failure related hospital admissions, secondary endpoint is reduction in cardiac deaths
Neuren Pharmaceuticals	NEU	trofinetide (Rett syndrome)	Partner ACADIA Pharmaceuticals initiated Phase III trial: double blinded, placebo controlled, 180 girls and young women
Noxopharm	NOX	NOX66 added to low dose palliative radiotherapy (late stage prostate)	At six months, across three doses, 25 pts: 1 partial response, 9 stable disease, 5 progressive disease; 5/16 pts had a >50% fall from baseline of PSA
Prescient Therapeutics	PTX	PTX-200 (locally advanced, HER2-negative breast cancer)	Overall response rate of 90% and 2 CRs in Phase IIa trial in 11 women; 9 of 10 evaluable pts free of disease progression, ranging from 6.7 months to 40 months
Starpharma	SPL	AZD0466 (DEP formulated agent targeting Bcl2 and Bcl/xL)	Partner AstraZeneca initiated Phase I trial in a range of cancers
Zelira Therapeutics	ZLD	cannabinoid extract (sub-lingual) (insomnia)	Complete dosing of last pt in 24 pt trial

**– Capital Raisings cont'd**

InvitroQue	I/Q	Convertible Notes	\$1.1
Uscom	UCM	Placement	\$1.0
CardieX	CDX	Placement	\$1.0
Regeneus	RGS	Rights Issue Shortfall	\$0.8
Neurotech	NTI	Convertible Notes	\$0.6

<b>Total raised in Q4 2019</b>	\$546.8
<b>Total raised in Q3 2019</b>	\$201.3
<b>Total raised in Q2 2019</b>	\$275.4
<b>Total raised in Q1 2019</b>	\$36.2
<b>Total raised CY 2019</b>	\$1,059.7

## The ASX-Listed Life Sciences Sector

**December 31, 2019: Capitalisation \$191 billion, 145 companies**

### Bioshares Large Cap. Index

Company	Code	Cap. \$m	Principal Activities	Change - Quarter	Change - Year	Price 31/12/19
CSL	CSL	125,164	Manufactures pharmaceutical products including vaccines and human plasma fractions	18%	49%	\$275.76
Resmed Inc.	RMD	31,485	Manufactures diagnostic and treatment equipment for sleeping disordered breathing	10%	38%	\$21.90
Cochlear	COH	12,996	Manufactures cochlear hearing implants	8%	29%	\$224.73
Nanosonics	NAN	1,908	Developing a novel disinfection technology, the first product is a point of care ultrasound probe disinfection unit, branded Trophon EPR	0.6%	123.6%	\$6.350
Blackmores	BKL	1,475	Manufactures vitamin, mineral and herbal supplements and skin & hair products in Australia and N.Z.	-1%	-30%	\$84.80

**Capitalisation Total** 173,029

### Bioshares Index

Company	Code	Cap. \$m	Principal Activities	Change - Quarter	Change - Year	Price 31/12/19
Clinuvel Pharmaceuticals	CUV	1,406	Markets an analogue of the alpha-MSH protein, named Scenesse, as a photo-protective agent. Approved in Europe.	15.2%	57.2%	\$28.450
Avita Medical	AVH	1,366	Markets ReCell, a skin repair product	9.3%	696.3%	\$0.645
Polynovo	PNV	1,302	Developing novel polymer-based products for treating wounds and burns	-7.9%	231.1%	\$1.970
Mesoblast	MSB	1,116	Developing cellular medicines to treat advanced heart failure, chronic low back pain and acute graft versus host disease.	-2.8%	79.3%	\$2.080
Opthea	OPT	802	Developing OPT-302 to treat wet AMD (an eye disease)	-11.0%	413.8%	\$2.980
Mayne Pharma Group	MYX	693	Manufactures, develops and markets generic drugs, with operations in Australia and the USA	-16%	-44%	\$0.435
API	API	660	Pharmaceutical wholesaler	-0.7%	-2.9%	\$1.340
Sigma Pharmaceuticals	SIG	615	Pharmaceutical manufacturing and wholesaling	-3.3%	1.8%	\$0.580
Paradigm Biopharm.	PAR	577	Development of existing approved drug, pentosan polysulphate sodium to treat bone marrow oedema and joint pain	1.7%	179.0%	\$2.930
Medical Developments	MVP	574	Commercialising the Pentrox inhaler for temporary pain relief. Used widely in ambulances across Australia.	73.3%	98.9%	\$8.750
Starpharma Holdings	SPL	451	Developer of pharmaceutical chemical scaffolds known as 'dendrimers'	5.2%	2.1%	\$1.210
Clovercorp	CLV	449	Development and production of omega-3 food additives from tuna oil	-9.4%	97.1%	\$2.700
Volpara Health Technologies	VHT	400	Markets breast density assessment tools and analytics, for use with breast X-rays screening programs	11.6%	66.4%	\$1.830
Telix Pharmaceuticals	TLX	393	Development of molecularly-targeted radiation (MTR) therapies and diagnostics	-1.3%	138.5%	\$1.550
Next Science	NXS	340	Commercialisation of anti-biofilm products	-36.5%	75.9%	\$1.880
AFT Pharmaceuticals	AFP	302	Development and sale of pharmaceuticals in Australasia and Rest-of-World	10.7%	57.0%	\$3.100

## Bioshares Index

Company	Code	Cap. \$m	Principal Activities	Change - Quarter	Change - Year	Price 31/12/19
Neuren Pharmaceuticals	NEU	250	Developing neuroprotective therapeutics	22.8%	77.1%	\$2.480
Painchek	PCK	197	Commercialising a smartphone app which uses facial recognition technology to detect indications of pain. TGA cleared and CE Marked.	-35.6%	387.2%	\$0.190
Somnomed	SOM	184	Markets oral devices for the treatment of sleep apnea and snoring.	23.1%	60.1%	\$2.930
Alcidion	ALC	183	Specialist health IT solution provider	-33.9%	311.1%	\$0.185
PYC Therapeutics	PYC	182	Developing peptide compound libraries for use in human therapeutics. Formerly Phylogica.	40.9%	121.4%	\$0.062
ResApp Health	RAP	171	Developing digital healthcare solutions to diagnose and manage respiratory conditions	0.0%	133.3%	\$0.245
Probiotec	PBP	148	Manufacturer, marketer and distributor of a range of over the counter (OTC) pharmaceuticals, complementary medicines and speciality ingredients	7.0%	30.7%	\$1.980
Genetic Signatures	GSS	147	Development and sale of molecular diagnostics (MDx) kits and products.	-0.5%	28.8%	\$1.030
Compumedics	CMP	142	Develops, manufactures and markets sleep diagnostic and monitoring equipment.	30.1%	100.0%	\$0.800
Imugene	IMU	142	Developing a Her2 positive cancer vaccine technology. Acquiring an oncolytic virus technology, CF33, from the City of Hope Hospital	52.4%	77.8%	\$0.032
Mach 7 Technologies	M7T	127	Development and sales of an enterprise imaging management platform	14.9%	231.0%	\$0.695
Ellex Medical Lasers	ELX	111	Recently divested ophthalmic lasers business to Lumibird Broup, retaining focus on devices to treat glaucoma	40.9%	12.3%	\$0.775
Imricor	IMR	111	Design, manufacture and sales of MRI-compatible products for cardiac ablation procedures to treat arrhythmias	-8.8%		\$1.195
Oncosil Medical	OSL	107	Developing Oncosil, a brachytherapy for pancreatic cancer and liver cancer	161.5%	-8.1%	\$0.170
Cynata Therapeutics	CYP	107	Stell cell technology company aiming to produce unlimited uniform, pharmaceutical grade MSCs from a single donor.	-35.0%	-20.0%	\$1.040
Immutep	IMM	101	Developing immuno-oncology drug candidates IMP761 and IMP321 (eftilagimod alpha)	13.0%	-7.1%	\$0.260
SDI	SDI	99	Manufacture & distribution of amalgam (fillings) & other dental materials and product R&D	3.7%	27.5%	\$0.835
Resonance Health	RHT	96	Markets FerriScan, a non-invasive tool for measuring liver iron levels	80.0%	275.0%	\$0.225
Cyclopharm	CYC	92	A nuclear medicine company that markets the Technegas lung imaging system	2.6%	6.8%	\$1.180
Bluechiip	BCT	92	Development, manufacture and commercialisation of a tracking system for biological samples	-8.8%	187.0%	\$0.155
Orthocell	OCC	90	Developing and marketing regenerative medicine products	22.5%	237.9%	\$0.490
Medadvisor	MDR	89	Medication adherence software platform company. Completed a 7:1 share consolidation	11.8%	46.9%	\$0.360
Impedimed	IPD	84	Markets products that aid the diagnosis of secondary lymphoedema, muscle wasting and other disorders	-8.3%	-13.2%	\$0.165

## Bioshares Index

Company	Code	Cap. \$m	Principal Activities	Change - Quarter	Change - Year	Price 31/12/19
Total Brain	TTB	80	Development and commercialisation of functional brain analysis techniques. Formerly Brain Resource Corp.	61.5%	154.5%	\$0.084
Botanix Pharmaceuticals	BOT	79	Developing BTX1503 for the treatment of acne. BTX1503 combines synthetic cannabidiol with a transdermal drug delivery system, Permetrex.	-67.2%	17.1%	\$0.082
Osteopore	OSX	74	Manufacture of 3D bioresorbable implants. Three products are FDA cleared and CE Marked for cranio-facial indications	-24.0%		\$0.730
Invion	IVX	71	Development of Photosoft, a photosensitiser derived from chlorophyll, which it is believed can accumulate selectively in tumours and be manipulated for therapeutic purposes.	-13.3%	-27.8%	\$0.013
Cogstate	CGS	66	Markets cognitive performance diagnostic products	62.5%	-35.0%	\$0.390
Oventus	OVN	64	Developing an oral appliance to treat sleep apnea and snoring	-31.5%	81.5%	\$0.490
Pharmaxis	PXS	63	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.	-15.8%	-39.6%	\$0.160
Admedus	AHZ	59	Application of proprietary ADAPT technology to treat tissue used in the manufacture of cardiovascular prostheses	66.7%	61.3%	\$0.100
Respiri	RSH	54	Respiratory and pulmonary devices company. Markets Airsona, an ehealth product.	18.5%	1.1%	\$0.096
Recce	RCE	48	Development of broad spectrum antibiotics	2.9%	105.7%	\$0.360
Invex Therapeutics	IXC	47	Developing a novel formulation of the diabetes drug exanatide to treat intracranial pressure and other indications	32.3%		\$0.860
BARD1 Life Sciences	BD1	46	Developing cancer diagnostics and therapies. Lead program is the BARD1 lung cancer test.	-20.9%	54.5%	\$0.034
Kazia Therapeutics	KZA	43	Developing GDC-084 for the treatment of glioblastoma multiform (a brain cancer)	5.3%	64.4%	\$0.600
Bionomics	BNO	42	Discovery and development of drugs to treat CNS diseases	-42.2%	-25.7%	\$0.078
Emvision	EMV	42	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	22.5%	110.0%	\$0.735
Star Combo Pharma	S66	42	Develops, manufactures and markets nutritional and OTC products	-8.5%	-14.2%	\$0.485
Antisense Therapeutics	ANP	42	Developing antisense compounds to treat multiple sclerosis and Duchenne Muscular Dystrophy	15.4%	246.2%	\$0.090
Actinogen Medical	ACW	40	Developing Xanamem for the treatment of dementia in Alzheimer's disease patients	300.0%	-20.0%	\$0.036
TALI Digital	TD1	38	Software company developing tools for assessment and improvement of attention in children. Formerly Novita Healthcare.	466.7%	75.9%	\$0.051
LBT Innovations	LBT	38	Developer of innovative products which deliver productivity benefits across a range of life science settings	52.4%	79.8%	\$0.160
Vita Life Sciences	VLS	37	Development, manufacture and distribution of prescription and OTC medicines as well as complementary and alternative medicines, dietary supplements and health foods	4.7%	-30.9%	\$0.670
Noxopharm	NOX	37	Developing a cancer treatment, NOX66, a formulation of idronoxil, which targets NADH oxidase 2.	-29.1%	-33.3%	\$0.280
Memphasys	MEM	37	Developing a sperm separation technology, SpermSep	-27.5%	78.6%	\$0.050

## Bioshares Index

Company	Code	Cap. \$m	Principal Activities	Change - Quarter	Change - Year	Price 31/12/19
Rhinomed	RNO	36	Developing nasal stent technologies with applications for sport performance, sleep and drug delivery	-22.2%	10.5%	\$0.210
Micro-X	MX1	35	Development of a mobile medical x-ray imager for hospitals, a version for deployed military use and a mobile security back-scatter imager	-33.3%	-32.2%	\$0.200
IMEXHS	IME	35	Markets a radiology and imaging platform, in Latin and South America, and uses SaaS and PaaS revenue models.	-19.1%		\$0.038
Invitroque	IVQ	35	Singapore-based analytical services company (life sciences)	0.0%	-23.1%	\$0.060
G Medical	GMV	34	Developing next generation mobile health and e-health devices, and cloud and medical call centres.	3.7%	-68.9%	\$0.084
Universal Biosensors	UBI	34	Development, manufacture and commercialisation of a range of in vitro diagnostic tests for point-of-care use	-5.0%	-13.6%	\$0.190
IDT Australia	IDT	33	Manufacturer of pharmaceutical ingredients to international standards for major pharmaceutical groups.	-20.0%	-3.4%	\$0.140
Anteo Diagnostics	ADO	33	Developer of a biological coatings technology that can be applied to immunoassays, bio-separations, drug delivery and other medical devices	57.1%	29.4%	\$0.022
PharmAust	PAA	32	Developing a veterinary anti-parasitic compound (PPL-1) as a human and animal cancer therapy. Also operates Epichem, a medicinal chemistry service business.	-28.7%	167.5%	\$0.107
Acrux	ACR	32	Developer of topical generic drugs	5.6%	5.6%	\$0.190
Biotron	BIT	31	Developing a drug to treat HIV	-28.8%	-54.8%	\$0.052
GI Dynamics	GID	31	Commercialising the Endobarrier, an implantable polymer liner for the management of obesity and diabetes	-61.4%	6.3%	\$0.017
Asian American Medical Group	AJJ	27	Manages liver treatment centres in Asia; expanding into radiation oncology	12.7%	-38.5%	\$0.080
Regeneus	RGS	24	Commercialisation of autologous adipose derived stem cells and factors. Markets HiQCell for human use and CryoShot for veterinary use.	19.2%	-51.7%	\$0.087
Prescient Therapeutics	PTX	24	Developing compounds to treat various cancers	17.3%	-11.6%	\$0.061
Bio-Gene Technology	BGT	23	Commercialisation of the insecticides Flavocide (synthetic) and Qcide (plant-derived), in the fields of human health and crop protection.	17.6%	100.0%	\$0.200
Proteomics International	PIQ	22	Provider of protein chemistry analytical services. Seeking to commercialise a diabetic kidney disease diagnostic.	-16.9%	-28.9%	\$0.270
Patrys	PAB	21	Developing novel antibody therapies for a range of oncology indications. Focussed on 3E10, a cell penetrating antibody.	-4.8%	-25.9%	\$0.020
CardieX	CDX	21	Development of wearable blood pressure measurement devices	-3.4%	-3.4%	\$0.028
Exopharm	EX1	21	Development of technology for improving the purification of exosomes, which are extra-cellular vesicles which transport bioactive molecules through out the body.	-35.0%	-52.7%	\$0.260
Visioneering Technologies	VTI	21	Markets a next-generation contact lens	-23.5%	-66.5%	\$0.052
Race Oncology	RAC	21	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.	52.0%	153.3%	\$0.190
Dimerix	DXB	21	Developing a combination therapy, DMX200, to treat chronic kidney disease.	36.8%	46.1%	\$0.130

## Bioshares Index

Company	Code	Cap. \$m	Principal Activities	Change - Quarter	Change - Year	Price 31/12/19
Genetic Technologies	GTG	20	Markets cancer risk tests	0.0%	-16.7%	\$0.005
Cellmid	CDY	20	Develops and markets therapies and diagnostic tests for fibrotic diseases, cancer, ischemic diseases of the heart and hair loss.	-6.4%	-21.4%	\$0.220
Allegra Orthopeadics	AMT	20	A developer and manufacturer of prosthetic implants and medical devices.	73.9%	0.0%	\$0.200
Adalta	1AD	19	Developing AD-214 for the treatment of idiopathic pulmonary fibrosis (IPF) and other human fibrotic diseases	-17.9%	-50.0%	\$0.115
Immuron	IMC	19	Sales and development of hyper-immune bovine colostrum products for therapeutic use	18.2%	-35.0%	\$0.130
Holista Colltech	HCT	18	Extracts collagen from sheepskins and markets natural healthcare products.	25.4%	36.2%	\$0.079
Optiscan Imaging	OIL	18	Manufactures confocal microscopes for clinical diagnosis	-17.4%	-15.6%	\$0.038
Alterity Therapeutics	ATH	17	Developing PBT434 for synucleinopathies. Formerly Prana Biotech	-31.0%	-39.4%	\$0.020
USCOM	UCM	17	Markets Uscom, a non-invasive heart output function monitor, BP+ non-invasive central blood pressure product and digital ultrasonic spirometry products	0.0%	-17.2%	\$0.120
Heramed	HMD	16	Commercialising a home pregnancy monitoring technology	0.0%	36.2%	\$0.160
Vectus Biosystems	VBS	14	Developing an anti-fibrotic compound, VB0004, with applications in heart and kidney disease	-20.3%	0.0%	\$0.590
Rhythm Biosciences	RHY	13	Developing Colostat, a blood test for the early detection of colorectal cancer	-23.5%	-7.1%	\$0.130
Osprey Medical	OSP	13	Markets DYEVERT, a device which reduces the amount of dye needed in imaging procedures	-36.2%	-73.9%	\$0.030
Imagion Biosystems	IBX	13	Developing MagSense, a diagnostic technology which exploits the principles of superparamagnetic relaxometry	-49.0%	-16.7%	\$0.025
Anatara Life Sciences	ANR	12	Developing a gastrointestinal dietary supplement	4.3%	-47.8%	\$0.240
Benitec Biopharma	BLT	11	Developing innovative therapies based on a combination of gene therapy with ddRNAi gene silencing technology	-50.0%	-66.7%	\$0.035
Neuroscientific Biopharm.	NSB	11	Developing EmtinB, an LRP-1 receptor agonist for the treatment of Alzheimer's disease	-22.4%	46.2%	\$0.190
Analytica	ALT	11	Markets the Pericoach product to aid in the management of female urinary incontinence.	-25.0%	-40.0%	\$0.003
Simavita	SVA	10	Commercialising an incontinence assessment technology.	150.0%	31.6%	\$0.025
Sienna Cancer Diagnostics	SDX	10	Development of pancreatic cancer diagnostic (with Minomic Int.) and an exosome based therapeutic to treat CLI (with VivaZome)	-5.0%	-36.7%	\$0.038
Medibio	MEB	10	Commercialising a test for depression and anxiety	-16.7%	-52.4%	\$0.010
Living Cell Technologies	LCT	9	Development of NTCELL for the treatment of Parkinson's Disease, and potentially for eye and ear diseases	-27.3%	-63.6%	\$0.016
StemCell United	SCU	9	Applies a proprietary stem cell technology to culture and grow plant extracts for use in Traditional Chinese Medicine.	-6.7%	-26.3%	\$0.014
Bioxyne	BXN	9	Sale and distribution of probiotics	-22.2%	-57.6%	\$0.014

## Bioshares Index

Company	Code	Cap. \$m	Principal Activities	Change - Quarter	Change - Year	Price 31/12/19
Suda Pharmaceuticals	SUD	8	Developing drugs for oro-mucosal administration. Recently acquired IP for anagrelide, with intent to develop it as an anti-cancer therap. Completed 25:1 consolidation.	-42.0%	-61.3%	\$0.058
Avecho Biotechnology	AVE	6	Commercialising a drug delivery system. Formerly Phosphagenics	-33.3%	-20.0%	\$0.004
TBG Diagnostics	TDL	6	Development of HLA SSA and SBT diagnostic kits and related services	-10.0%	-52.6%	\$0.027
Dorsavi	DVL	6	Commercialising a wireless sensor movement monitoring system and products for use in the Elite Sports, OH&S and medical/physiotherapy markets	-39.5%	-58.1%	\$0.026
Jayex Healthcare	JHL	5	Commercialisation of the Enlighten patient workflow platform	0.0%	57.9%	\$0.030
Adherium	ADR	5	Commercialising personal digital medication monitoring systems to improve patient compliance and medication efficacy	12.0%	-24.3%	\$0.028
Amplia Therapeutics	ATX	4	Developing drug candidates to treat fibrotic cancers and fibrosis. Formerly Innate Immunotherapeutics.	-16.3%	-52.1%	\$0.067
Medigard	MGZ	3	<b>SUSPENDED FROM TRADING</b>	0.0%	0.0%	\$0.020
Lifespot Health	LSH	3	Commercialising the Bodytel diagnostic software, which is deployed with its Medihale medical cannabis vaporiser system, as well as with patients with metabolic syndrome	-38.2%	-43.3%	\$0.034
Factor Therapeutics	FTT	3	Business under review following the failure of wound therapy VT001 to meet endpoints in Phase II trial	0.0%	50.0%	\$0.003
Cryosite	CTE	2	Provides specialised storage services, especially for umbilical cord blood	20.5%	17.8%	\$0.053
Neurotech International	NTI	2	Development and sales of Mente (and platform), a treatment for improving behaviours of people with autism and other neurological conditions	14.3%	-64.4%	\$0.016
OBJ	OBJ	2	Developing transdermal drug delivery technologies	-6.3%	-16.7%	\$0.015

**Capitalisation Total**                      **16,729**

## Listed Biotech Investment Funds or Companies

Company	Code	Cap. \$m	Principal Activities	Change - Quarter	Change - Year	Price 31/12/19
BTC Health	BTC	31	Provides capital and management expertise to high-growth Australian biotech, medtech and pharmaceutical companies	0%	-11%	\$0.125

**Capitalisation Total**                      **31**

**Botanical Product Companies (Cultivated Production)**

Company	Code	Cap. \$m	Principal Activities	Change - Quarter	Change - Year	Price 31/12/19
Palla Pharma	PAL	133	Licensed poppy producer. Narcotic raw material processor. Holds Australian ODC cultivation (MC) and research license (CR). Formerly TPI Enterprises.	6.6%	-8.3%	\$1.055
Cann Group	CAN	90	Medicinal cannabis company focused on the breeding, cultivation and production stages. Holds Australian ODC cultivation (MC) and research license (CR).	-60.0%	-69.3%	\$0.630
Althea Group	AGH	87	Supply of branded medicinal cannabis products in Australia. To cultivate, extract and manufacture medicinal cannabis. Holds ODC manufacturing license.	-49.0%	53.1%	\$0.375
Auscann Group Holdings	AC8	86	Developing medical cannabis products for the Australian market. Holds Australian ODC cultivation (MC) and manufacture license and TGA manufacture license.	-22.9%	-53.0%	\$0.270
Elixinol Global	EXL	78	A supplier of hemp and medicinal cannabis products	-72.2%	-77.4%	\$0.565
Medlab Clinical	MDC	71	Development, production and marketing of nutraceuticals. Also developing cannabis product to treat cancer patients with intractable pain.	-32.2%	-17.6%	\$0.305
THC Global Group	THC	53	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).	-15.6%	-18.3%	\$0.380
MGC Pharmaceuticals	MXC	44	A medical and cosmetic cannabis company with growing operations in Slovenia.	-17.9%	-20.0%	\$0.032
IM Health	IHL	43	Seeking to obtain Commonwealth and state licenses to import, store, distribute and export medicinal cannabis, while diversifying from its dental products business	-27.1%	287.5%	\$0.062
Zelira Therapeutics	ZLD	42	Merged with Ilera Therapeutics. Formerly Zelda Therapeutics	-34.5%	5.8%	\$0.055
Cann Global	CGB	28	Operates a hemp seeds business and conducts medical cannabis research	-53.3%	-62.2%	\$0.014
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.	-33.3%	-23.1%	\$0.300
Creso Pharma	CPH	22	Development of cannabis and hemp derived therapeutic, nutraceutical, and life style products with wide patient and consumer reach for human and animal health.	-67.3%	-74.5%	\$0.125
CannPal Animal Therap.	CP1	11	Research and development of cannabis-based therapeutics for companion animals	-14.3%	-11.1%	\$0.120
Affinity Energy and Health	AEB	9	Investor in Uruguayan company Biogenics. Has applied to the Australian ODC to cultivate and produce medicinal cannabis.	0.0%	-30.8%	\$0.009
Fiji Kava	FIJ	5	Cultivation and development of kava (piper methysticum) as an alternative treatment for anxiety, pain and insomnia.	-24.2%	-37.5%	\$0.075
eSense Health	ESE	2	Specialises in phytochemical profiling of plants to develop and reverse engineer terpenes for medical and other applications.	-27.8%	-51.9%	\$0.013

**Capitalisation Total** 831

**Capitalisation Total - All Indices** 190,619

**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**

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