

Mesoblast

Adults only

MSB aims to capitalise on its patents around adult MPCs. More than 1m of the 5.6m fractures occurring annually in the US are associated with healing difficulties and MSB's product has the potential to be helpful in these types of fractures. Buy.

Key forecasts

	FY05A	FY06A	FY07F	FY08F	FY09F
EBITDA (A\$m)	-1.44	-6.75	-8.19	-9.87	-11.9
Reported net profit (A\$m)	-1.47	-8.30	-10.2	-12.1	-14.3
Normalised net profit (A\$m) ¹	-1.47	-8.30	-10.2	-12.1	-14.3
Normalised EPS (c) ¹	-1.48	-8.28	-10.0	-11.3	-12.7
Normalised EPS growth (%)	n/a	458.2	21.2	12.4	13.0
Dividend per share (c)	0.00	0.00	0.00	0.00	0.00
Dividend yield (%)	0.00	0.00	0.00	0.00	0.00
Normalised PE (x)	n/m	n/m	n/m	n/m	n/m
EV/EBITDA (x)	n/m	n/m	n/m	n/m	n/m
Price/net oper. CF (x)	-319.5	-61.4	-24.3	-20.8	-17.9
ROIC (%)	n/a	-115.5	-141.9	-123.6	-62.3

1. Pre goodwill amortisation and exceptional items

Accounting Standard: IFRS

Source: Company data, ABN AMRO forecasts

year to Jun, fully diluted

MSB – the adult mesenchymal precursor cell company

Mesoblast (MSB) aims to capitalise on its patents that relate to the identification, extraction and culture of adult mesenchymal precursor cells (MPCs). The company hopes to develop therapeutic approaches for patients with: 1) bone and joint diseases – this includes adult stem-cell therapy for bone fractures and spinal disease, and as an aid to orthopaedic surgery; and 2) cardiovascular disease – MSB has also acquired a 33.3% interest in Angioblast, a US company developing platform MPC technology for the treatment of cardiovascular diseases, including the repair and regeneration of blood vessels and heart muscle after heart attack.

MPCs are a potential paradigm shift in bone-graft substitute technology

Having analysed the literature and market, and after discussions with our industry contacts, we believe the potential inclusion of MPCs in bone-graft substitutes is a step change in the technology of these substitutes. We believe this should make a synthetic bone graft much more likely to ingrow into existing bone.

Strong growth rates in volume and pricing of bone-graft technology

Our analysis of bone-graft-substitute technology suggests pricing for these products will remain strong, driven by a lack of supply in a market with high barriers to entry. Indeed, discussions with industry contacts suggest that a bone-graft substitute is the most expensive element in a revision joint replacement. The current price is A\$10,000 for a 10cc vial and up to two vials of bone-graft substitute may be used in a single revision joint replacement.

We initiate coverage with a Buy for clients with a higher risk appetite

Our valuation and 12-month target price for MSB is A\$2.48 per share. Over the medium term, we believe the company is most likely to partner with an orthopaedic firm to take an MPC to market. We think the most likely partners are those with existing market share in orthobiologicals. Should the technology prove scaleable, we believe MSB may become an acquisition target for a large orthopaedic company, one that might include MSB's technology in its bone-graft-substitute offering.

Important disclosures and analyst certifications regarding companies can be found in the Disclosures Appendix.

Priced at close of business 1 August 2007.

ABN AMRO Equities Australia Ltd, ABN 84 002 768 701, AFS Licence 240530
Level 29, ABN AMRO Tower, 88 Phillip Street, Sydney NSW 2000, Australia

Buy

Absolute performance

n/a

Short term (0-60 days)

Pharmaceuticals & Biotechnology
Australia

Price

A\$1.95

Target price

A\$2.48

Market capitalisation

A\$200.59m (US\$168.53m)

Avg (12mth) daily turnover

A\$0.22m (US\$0.18m)

Reuters

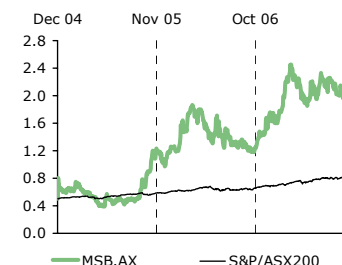
MSB.AX

Bloomberg

MSB AU

Price performance (1M) (3M) (12M)

	1M	3M	12M
Price (A\$)	2.0	2.2	1.3
Absolute %	-3.5	-11.0	47.7
Rel market %	2.0	-7.9	23.9
Rel sector %	-3.9	-6.1	44.1



Stock borrowing: Easy onshore,
Impossible offshore

Volatility (30-day): 39.36%

Volatility (6-month trend): ↓

52-week range: 2.49-1.10

S&P/ASX200: 5941.20

BBG AP Pharm & Biotech: 160.12

Source: ABN AMRO, Bloomberg

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The Basics

Key assumptions

Mesoblast (MSB) aims to capitalise on its patents that relate to the identification, extraction and culture of adult mesenchymal precursor cells (MPCs). MPCs are not fixed as to potential cell-line development (ie, they can become any type of cell, rather than being a mixture of committed type of cells). MSB hopes to develop treatments for bone/joint and cardiovascular diseases. Given the ageing of the Western World population, this is an attractive market segment. We have identified few competitors to MSB, the closest and most advanced being Osiris Therapeutics (OSIR – NASDAQ), with its Osteocel and cardiac MPC technology.

In the orthopaedic market, we believe the value of osteoinductive agents (MPCs are a sub-class of this market) will continue to grow in the years to come because orthopaedic surgeons are being forced to deal with increasingly large bony defects as a part of revision joint surgery.

Valuation and target price

MSB plans to expand the allogeneic cells it extracts using its proprietary technology. This translates into potential revenue of A\$31.5m per donation. Our valuation and 12-month target price for MSB is A\$2.48 per share. There is no current consensus data for MSB.

Catalysts for share price performance

We believe there are a number of near-term catalysts for the stock. Should these turn out to be positive, this would imply a further confirmation of MSB's technology and business model. Hence, we would expect the share price to react positively.

- **Autologous cardiovascular trials at John Hunter Hospital in Newcastle, Australia** – MSB is performing trials to test the regenerative effect of MSB's allogeneic stem cells on damaged cardiac cells. The results of these trials are expected within the next six months.
- **Allogeneic cardiac program of MSB's US-based sister company, Angioblast Systems** – Like the Australian trials, MSB is undertaking trials in the US to test the regenerative effect of MSB's allogeneic stem cells on damaged cardiac cells. The results of these trials are also expected in the near term.
- **Clinical trial results by researchers at the Department of Orthopaedics at the Royal Melbourne Hospital** – Recently, MSB released positive interim results on the use of its technology in the treatment of long bone fractures. We expect the final results of these trials by the end of 2007.

Risks to central scenario

On an industry-wide basis, the chances of getting a product to market from the investigational new drug (IND) stage are in the order of 10-20%. The reasons for this low rate are numerous. As a result, we believe the risk that MSB will be unable get a product to market are not inconsiderable. MSB's patent position is strong, but we think the company is unlikely to be cash flow positive before 2011. Hence, we believe MSB is an investment opportunity for investors with a higher risk appetite.

Key events

Date	Event
Aug 07	FY07 results - TBA
Nov 07	AGM - TBA

Source: Company

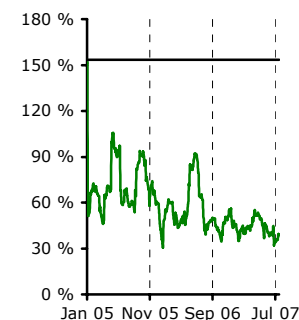
Forced ranking*

Company	Rec	Upside/ Downside
Alchemia	Buy	146%
Avexa	Buy	145%
Ventracor	Buy	65%
Peplin	Buy	62%
Tissue Therap	Buy	40%

* By difference to target price as at time of publication. Recommendations may lie outside the structure outlined in the disclosure page.

Source: ABN AMRO forecasts

30-day volatility



Source: Bloomberg

Key assumptions and sensitivities

Table 1 : MSB – financial summary

Year to 30 Jun (A\$m)	AIFRS 2005A	AIFRS 2006A	AIFRS 2007F	AIFRS 2008F	AIFRS 2009F	Closing price (A\$)	1.95	Price target (A\$)	2.48	
Income statement						Valuation metrics				
Divisional sales	0.0	0.0	0.0	0.0	0.0	Preferred methodology	DCF	Val'n (A\$)	\$ 2.48	
Total revenue	0.0	2.2	2.2	2.2	2.2	DCF valuation inputs				
EBITDA	-1.4	-6.8	-8.2	-9.9	-11.9	Rf	5.75%	10-year rate	5.75%	
Associate income	-0.4	-1.9	-1.9	-1.9	-1.9	Rm-Rf	4.50%	Margin	2.0%	
Depreciation	-0.1	-0.1	-0.1	-0.1	-0.1	Beta	1.50	Kd	7.75%	
EBITA	-1.5	-6.9	-8.3	-10.0	-12.0	CAPM (Rf+Beta(Rm-Rf))	12.5%	Ke	12.5%	
Amortisation/impairment	0.0	0.0	0.0	0.0	0.0	E/EV*Ke+D/EV*Kd(1-t)	NPV cash flow (A\$m)			243.5
EBIT	-1.5	-6.9	-8.3	-10.0	-12.0	Equity (E/EV)	100.0%	Minority interest (A\$m)	0.0	
EBIT(Incl associate profit)	-1.9	-8.8	-10.2	-11.9	-13.9	Debt (D/EV)	0.0%	Net debt (A\$m)	-7.9	
Net interest expense	0.4	0.4	0.1	-0.1	-0.4	Interest rate	7.75%	Investments (A\$m)	0.0	
Pre-tax profit	-1.5	-8.3	-10.2	-12.1	-14.3	Tax rate (t)	30.0%	Equity market value (A\$m)	251.4	
Income tax expense	0.0	0.0	0.0	0.0	0.0	WACC	12.5%	Diluted no. of shares (m)	101.3	
After-tax profit	-1.5	-8.3	-10.2	-12.1	-14.3	DCF valuation (A\$)				2.48
Minority interests	0.0	0.0	0.0	0.0	0.0	Multiples				
NPAT pre significant items	-1.5	-8.3	-10.2	-12.1	-14.3	Enterprise value (A\$m)	2006A	2007F	2008F	2009F
Significant items	0.0	0.0	0.0	0.0	0.0	EV/Sales (x)	189.7	201.4	201.3	217.9
Reported NPAT	-1.5	-8.3	-10.2	-12.1	-14.3	EV/EBITDA (x)	-28.1	-24.6	-20.4	-18.4
Cash flow statement						EV/EBIT (x)				
EBITDA	-1.4	-6.8	-8.2	-9.9	-11.9	EV/EBIT (x)	-27.6	-24.2	-20.1	-18.2
Change in working capital	0.0	0.0	0.0	0.0	0.0	PE (normalised) (x)	-23.5	-19.4	-17.3	-15.3
Net interest (pd)/rec	0.5	0.6	0.1	-0.1	-0.4	PEG (normalised) (x)	At target price			
Taxes paid	0.0	0.0	0.0	0.0	0.0	EV/EBITDA (x)	2006A	2007F	2008F	2009F
Other oper cash items	0.0	0.0	0.0	0.0	0.0	PE (normalised) (x)	-36.1	-31.2	-25.8	-22.9
Cash flow from ops (1)	-0.6	-3.2	-8.1	-10.0	-12.3	Comparable company data (x)				
Capex (2)	0.0	0.0	-0.1	-5.0	-0.1	Year to 30 Jun	2007F	2008F	2009F	
Disposals/(acquisitions)	-4.7	-4.1	-3.5	-3.8	-4.2	Alchemia	EV/EBITDA	-8.2	-8.5	-151.7
Other investing cash flow	-0.2	0.1	0.0	0.0	0.0	Year to 30 Jun	EV/EBIT	-7.5	-7.7	-54.4
Cash flow from invest (3)	-5.0	-4.1	-3.6	-8.9	-4.3	PE	PE	-8.9	-10.4	-121.4
Incr/(decr) in equity	22.7	0.0	0.0	20.0	0.0	PEG	PEG	-2.6	-3.0	-34.7
Incr/(decr) in debt	0.0	0.0	0.0	0.0	0.0	Peplin	EV/EBITDA	-6.6	-8.4	-9.4
Ordinary dividend paid	0.0	0.0	0.0	0.0	0.0	Year to 30 Jun	EV/EBIT	-6.5	-8.2	-9.3
Preferred dividends (4)	0.0	0.0	0.0	0.0	0.0	PE	PE	-7.0	-7.1	-7.1
Other financing cash flow	-2.0	0.0	0.0	-1.0	0.0	PEG	Per share data			
Cash flow from fin (5)	20.7	0.0	0.0	19.0	0.0	No. shares	2006A	2007F	2008F	2009F
Forex and disc ops (6)	0.0	0.0	0.0	0.0	0.0	EPS (cps)	101.3	101.3	112.4	112.4
Incr/(decr) cash (1+3+5+6)	15.1	-7.2	-11.7	0.1	-16.6	EPS (normalised) (c)	-8.3	-10.0	-11.3	-12.7
Equity FCF (1+2+4)	-0.6	-3.2	-8.2	-15.0	-12.4	Dividend per share (c)	0.0	0.0	0.0	0.0
Balance sheet						Dividend payout ratio (%)				
Cash & deposits	15.1	7.9	-3.9	-3.7	-20.3	Dividend yield (%)	0.0	0.0	0.0	0.0
Trade debtors	0.2	0.2	0.2	0.2	0.2	Growth ratios				
Inventory	0.0	0.0	0.0	0.0	0.0	2006A	2007F	2008F	2009F	
Investments	5.4	7.5	7.5	7.5	7.5	Sales growth	na	na	na	na
Goodwill	0.0	0.0	0.0	0.0	0.0	Operating cost growth	369.2%	21.2%	20.6%	20.1%
Other intangible assets	0.7	0.8	1.3	1.8	2.4	EBITDA growth	369.2%	21.2%	20.6%	20.1%
Fixed assets	0.0	0.0	0.0	4.9	4.9	EBITA growth	361.8%	21.1%	20.2%	19.8%
Other assets	0.0	0.0	3.0	6.3	9.9	EBIT growth	361.8%	21.1%	20.2%	19.8%
Total assets	21.5	16.4	8.1	17.0	4.6	Norm. NPAT growth (pre GW)	464.4%	22.5%	18.6%	18.8%
Short-term borrowings	0.0	0.0	0.0	0.0	0.0	Norm. NPAT growth	464.4%	22.5%	18.6%	18.8%
Trade payables	0.3	4.4	4.4	4.4	4.4	Norm. EPS growth (pre GW)	458.2%	21.2%	12.4%	13.0%
Long-term borrowings	0.0	0.0	0.0	0.0	0.0	Norm. EPS growth	458.2%	21.2%	12.4%	13.0%
Provisions	0.0	0.0	0.0	0.0	0.0	Operating performance				
Other liabilities	1.9	0.0	1.9	2.8	4.7	2006A	2007F	2008F	2009F	
Total liabilities	2.2	4.4	6.3	7.2	9.1	Asset turnover (%)	0.0	0.0	0.0	0.0
Preference shares						EBITDA margin (%)	na	na	na	na
Hybrid equity	0.0	0.0	0.0	0.0	0.0	EBIT margin (%)	na	na	na	na
Share capital	20.7	20.7	20.7	40.7	40.7	Net profit margin (%)	na	na	na	na
Other reserves	0.1	1.1	1.1	1.1	1.1	Return on net assets (%)	-57.5	-463.0	-102.8	262.2
Retained earnings	-1.5	-9.8	-19.9	-32.0	-46.3	Net debt (A\$m)	-7.9	3.9	3.7	20.3
Other equity	0.0	0.0	0.0	0.0	0.0	Net debt/equity (%)	-65.6	215.2	38.2	-444.6
Total equity	19.3	12.0	1.8	9.7	-4.6	Net interest/EBIT cover (x)	15.4	119.5	-75.3	-28.5
Minority interest	0.0	0.0	0.0	0.0	0.0	ROIC (%)	-115.5	-141.9	-123.6	-62.3
Total shareholders' equity	19.3	12.0	1.8	9.7	-4.6	Internal liquidity				
Total liabilities & SE	21.5	16.4	8.1	17.0	4.6	Current ratio (x)	1.8	-0.6	-0.5	-2.2
						Receivables turnover (x)	na	0.0	0.0	0.0
						Payables turnover (x)	na	1.9	2.2	2.7

Source: Company data, ABN AMRO forecasts

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Valuing the opportunity

Our valuation methodology for MSB is based on its manufacturing process, and our assumptions for revenues, royalties and EBIT. We also use a DCF methodology. We calculate a valuation and target price of A\$2.48 per share.

10 reasons why we think MSB is a Buy

In this section we outline why we think MSB warrants a Buy recommendation.

- **Ageing population** – The proportion of the Australian population aged over 65 is currently around 13%. This figure is forecast to double over the next 40 years. Demand for orthopaedic operations is directly linked to demographic trends, particularly in the aged population. As the aged population is having more orthopaedic operations, we believe there will be more demand for bone graft and bone-graft substitute, which MSB can deliver.
- **More revision orthopaedic surgery** – As there are generally more orthopaedic operations being performed, the corollary is that an increased amount of revision orthopaedic surgery will be required. This is because orthopaedic implants tend to wear out after 10-15 years of use. Revision orthopaedic surgery operations generally require larger amounts of bone graft or bone-graft substitute than the primary (initial) orthopaedic surgery.
- **MPCs are a paradigm shift in bone-graft substitute technology** – Having analysed the literature, and after discussions with our industry contacts, we believe the potential inclusion of MPCs in bone-graft substitutes is a step change in the technology of these substitutes. We think this is likely to make a synthetic bone graft much more likely to ingrow into existing bone.
- **Strong growth rates predicted in volume and pricing of bone-graft technology** – Our analysis of bone-graft technology suggests pricing for these products will remain strong, driven by a lack of supply in a market with high barriers to entry. Indeed, discussions with industry contacts suggest that in a revision joint replacement, a bone-graft substitute is the most expensive piece of equipment used. The current price is A\$10,000 for a 10cc vial, and up to two vials of bone-graft substitute may be used in a single revision joint replacement.
- **Free upside from heart research** – In developing our valuation for MSB, we have excluded any valuation of the company's development of a product to improve heart function. MSB's adult stem cells have been shown to result in significant improvement of heart function and to prevent heart-failure progression after heart attack. It is estimated that about 1m patients visit hospitals in the US each year with a heart attack.
- **Strong levels of cash** – After the equity raising of 20 July 2006, MSB has a net cash position of A\$25m. Due to the progression of a number of trials to IND status, MSB's cash burn in 2005 increased to A\$11.2m (from A\$1.9m in 2004). Going forward, we believe the cash requirements are likely to continue for MSB and may increase. At the rate of cash burn, and without further infusions of cash, this suggests MSB has enough cash to continue operations for the next two to three years. After that time, the company may conduct another capital raising or might have secured funding from a partner.

Demand for orthopaedic operations is directly linked to demographic trends, particularly in the aged population

MSB's adult stem cells have been shown to significantly improve heart function and to prevent heart-failure progression after heart attack

- **Strong levels of IP protection** – We believe MSB’s principal US patent is 7,122,178. This was issued on 17 October 2006 after first being filed on 7 July 2000. Hence, we believe the patent will not expire in the US before 2020. The patent relates to MPCs and is a method of enriching the cells, including the step of enriching for cells based on at least two markers. Recent advances have led to the development of novel monoclonal antibodies (MAbs), which recognise antigens on MPCs. MSB has developed and patented an identifying antibody for MPCs.
- **Management has international reputations in the field** – Chief scientific officer, Dr Itescu, has built an international reputation in the fields of immunology and transplant medicine. He holds professorships at Columbia University, New York, and the University of Melbourne.
- **MSB may develop strategic partnerships with orthopaedic companies** – We believe MSB is most likely to partner with an orthopaedic company to take any orthopaedic MPC to market. We think the most likely partners are those with existing market share in orthobiologicals. Should the technology prove scaleable, we believe MSB might become an acquisition target for a large orthopaedic company, one that would include MSB’s technology in its bone-graft substitute offering.
- **There are other opportunities in cartilage regeneration** – Going forward, we believe MPC technology can be applied to other types of cells other than bone and cardiac muscle. We see opportunities for MSB’s technology in cartilage regeneration, to name one potential application.

Dr Itescu has an international reputation in immunology and transplant medicine

Valuation methodology

In this section we develop our valuation methodology for MSB. We do this by:

- outlining the manufacturing strategy for MSB;
- developing our assumptions regarding this business in terms of revenue, royalty rates and EBIT assumptions; and
- finally, by developing a DCF valuation for MSB.

1. Manufacturing process

MSB plans to expand the allogeneic cells it extracts using its proprietary technology. The process MSB plans to use is outlined below. The major points of the manufacturing model are as follows:

MSB plans to expand the allogeneic cells it extracts using its proprietary technology

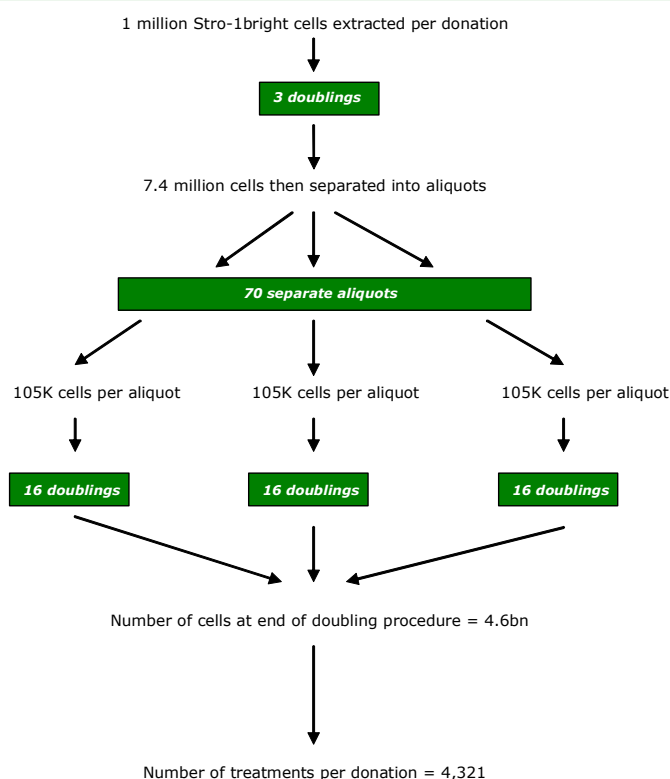
- **Amount of MPCs** – A 50mL sample of bone marrow typically holds 20m cells per ml. Of these cells, 0.1% are Stro-1Bright, a marker that defines multipotent adult stem cells known as mesenchymal precursor cells (MPCs). This means there are about 1m MPCs in a 50mL sample.
- **Leakage during doublings** – We assume that only 95% of the cells actually double during each doubling stage. This is conservative – experiments show that up to 100% of cells actually double.
- **Aliquots** – MSB plans to collate the number of cells after three doublings, then separate them into 70 aliquots (or portions) and grow these up separately. MSB believes it can achieve total doublings in the order of 19-20.
- **Number of MPCs per injection** – MSB plans to use 25-75m MPCs per treatment. We assume 75m MPCs are used.
- **Price per administration of BMP** – As developed in subsequent sections, we forecast the price of BMP in the US in FY11 will be US\$7,300 per injection. We assume price parity with the OP-1s in the market, although we believe MSB’s

product is likely to stimulate more bone growth than OP1 given it does not rely on existing bone cells for bone growth.

All this translates into possible revenue of A\$31.5m per donation, as shown in the following figure.

Possible revenue of A\$31.5m per donation

Figure 1 : Manufacturing model for MSB



Source: ABN AMRO

Finally, we provide a model showing the potential revenue per donor. This is shown in the following table.

Table 2 : Quantifying the manufacturing model for MSB

Extraction of bone marrow	
Amount of bone marrow extracted per patient (mL)	50
Cells per mL of bone marrow	20,000,000
Percentage Stro-1Bright MPC cells of bone marrow	0.1%
Stro-1Bright MPC cells at extraction	1,000,000
Preliminary doubling procedure	
Loss of Stro-1Bright MPC cell pool per doubling	5%
No of preliminary doublings prior to separation	3
No of Stro1-1BrightMPC cells after preliminary doublings	7,414,875
Aliquoting procedure	
Number of aliquots	70
Stro-1Bright MPC cells in each aliquot	105,927
Secondary doubling procedure	
Loss of Stro-1Bright MPC cell pool per doubling	5%
Doublings of each aliquot	16
Number of Stro-1Bright MPC cells in each aliquot at end of process	4,629,771,699
Treatment of patients	
Number of Stro-1Bright MPC cells per injection	75,000,000
Number of treatments per aliquot	62
Revenue model	
Number of treatments per donor	4,321
Price per administration of bone morphogenic protein (US\$ - FY11)	7,300
Potential revenue per donor (US\$)	31,544,178

Source: PubMed, company data, ABN AMRO estimates

2. Market share and royalty assumptions

These are shown below:

- **Market size in FY11** – As previously stated, we assume the market size will be US\$1.35bn in FY11. At our assumed price per injection, this translates into about 190,000 injections.
- **Assumption for MSB market share** – We assume MSB's orthopaedic product will gain 10% market share in FY11. This translates into 18,000 treatments. For FY11, we assume MSB will extract 50mLs of bone marrow from four donors, which translates into 17,284 treatments, equivalent to 9.1% market share.
- **Royalty assumptions** – We assume MSB will receive a 20% royalty rate on sales of its orthopaedic product. This is in line with our assumptions on royalty rates that have been recently negotiated between biotech companies and global pharmaceutical companies.
- **EBIT assumptions** – In line with most pharmaceutical companies, we assume MSB achieves a steady-state EBIT margin of about 20%.

We assume MSB's orthopaedic product will gain 10% market share in FY11

3. Other model assumptions

These include:

- **Risk-free rate** – We assume a risk-free rate of 5.75%, in line with ABN AMRO's forecast for the 10-year Australian bond rate.
- **Equity beta** – Due to its inherent risks, MSB will have a higher beta than most other industrial companies. We assume the company's equity (and asset) beta is 1.50, in line with the average beta for higher-risk biotech opportunities.
- **Equity market-risk premium** – We assume 4.5%, in line with ABN AMRO's forecast for the Australian equity market-risk premium.
- **Nominal long-run growth rate** – Given the potentially high growth rate of this business, and in line with other high-growth companies in the market, we assume a nominal long-run growth rate of 6% and a real long-run growth rate of 3.5%.
- **Target D/DE ratio** – We assume MSB will be wholly equity funded given it is not expected to generate a steady rate of positive net cash flow for several years. Accordingly we assume a target ratio of debt to debt plus equity of zero.

DCF valuation

On a DCF analysis, we value MSB at A\$2.48 per share, using a WACC of 12.5%. Our key assumptions are outlined below.

Table 4 : DCF valuation parameters

	2008F
EBITDA incl abnormals	-9.9
EBITDA growth	20.6%
Capex	-8.3
DCF operating cash flows	0.0
Tax rate	30%
Taxed DCF cash flow	0.0
NPV of cash flows	69.5
Terminal value	166.1
Net debt	-7.9
Investments	0.0
Total equity value	252.1
Shares on issue	101.3
Value per ordinary share (including R&D)	A\$2.48

Source: ABN AMRO forecasts

Table 3 : WACC assumptions

Asset beta	1.50
Target D/DE ratio	0.0%
Statutory tax rate	30.0%
Nominal long-run grth rate	5.0%
Risk-free rate	5.8%
Equity beta	1.50
Equity risk premium	4.5%

Source: ABN AMRO estimates

Free cash flow

We forecast free cash flow to equity of -A\$15.0m for FY08. Going forward, MSB's cash-flow profile is largely dependent on up-front fees from licensing arrangements.

Risks to our DCF assumptions

Key individual drivers of our DCF valuation include the following:

- **Financing costs** – As with all DCF valuations, rising market interest rates would cause downward pressure due to an increasing risk-free rate and WACC.

Table 5 : DCF valuation sensitivity to WACC & terminal growth rate

		Weighted Average Cost of Capital (WACC)					
		\$2.48	11.50%	12.00%	12.50%	13.00%	13.50%
Terminal growth rate	5.0%		2.68	2.45	2.26	2.09	1.94
	5.5%		2.83	2.58	2.36	2.18	2.01
	6.0%		3.02	2.73	2.48	2.28	2.10
	6.5%		3.24	2.91	2.63	2.40	2.20
	7.0%		3.51	3.12	2.80	2.54	2.32

Source: ABN AMRO forecasts

- **Capex** – If our assumed capex were to rise further, this would negatively affect our valuation.

Forecast EPS

We forecast normalised EPS (fully diluted) of -0.10c per share in FY07 and -0.11c per share in FY08 (see Table below).

Table 6 : Forecast normalised EPS

(A\$)	2006A	2007F	2008F	2009F	2010F	2011F	2012F
Diluted normalised EPS (c)	-0.08	-0.10	-0.11	-0.13	-0.14	0.00	0.03

Source: Company data, ABN AMRO forecasts

Relative valuations

We compare MSB with its listed competitors and peers in the following table.

Table 7 : International comparables

Company name	Currency	Mkt cap (Local m)	Mkt cap (US\$m)	EV/EBITDA (x)				PE (x)				EPS growth		
				Actual	FY1	FY2	FY3	Actual	FY1	FY2	FY3	FY1	FY2	
Mesoblast limited	AUD	210	180	-	-	-	-	-	-	-	-	-	-	-
Osiris Therapeutics, Inc.	USD	335	335	-	-	-	-	-7.4	-7.7	-10.0	-14.0	-4.4%	-23.2%	
Athersys, Inc	USD	65	65	-	-	-	-	-	-	-	-	-	-	

Source: Reuters data

We provide an overview of MSB's comparables in the next section.

- **Osiris Therapeutics** – We believe Osiris Therapeutics is also investigating the treatment of cardiac disease using MPCs. Osiris Therapeutics believes MPC integration in diseased or damaged tissue has the effect of favourably altering the inflammatory response. In cases where the damage involves ischemia (low oxygen), MPC treatment has demonstrated the ability to stimulate the formation of new blood vessels. At the resolution of the healing process, the therapy has shown a significant reduction in scar formation.

INVESTMENT VIEW

- **Athersys** – Established in 1995, and with its principal operations in Cleveland, Ohio, Athersys is a privately held biopharmaceutical company engaged in the development and commercialisation of therapeutic products based on proprietary adult stem-cell technology. Through internal efforts, strategic partnerships and collaborations with clinical and basic research institutions, the company is developing therapeutic approaches to treat cardiovascular disease, stroke, haematological and immune system disorders, and a range of other conditions.

What is Mesoblast?

MSB aims to capitalise on its patents that relate to the identification, extraction and culture of adult mesenchymal precursor cells (MPCs).

MSB hopes to develop therapeutic approaches for patients with the following conditions:

- **Bone and joint diseases** – This includes adult stem-cell therapy for bone fractures and spinal disease, and for the regeneration of damaged joint cartilage and intervertebral discs.
- **Cardiovascular disease** – MSB has also acquired a 33.3% interest in Angioblast, a US company developing platform MPC technology for the treatment of cardiovascular diseases, including the repair and regeneration of blood vessels and heart muscle.

MSB has acquired a 33.3% interest in Angioblast

What are mesenchymal precursor cells (MPCs)?

Bone marrow is a tissue containing blood-cell precursors and stroma. Marrow stroma includes a subpopulation of undifferentiated cells that are capable of becoming one of a number of cell types. These include stromal cells referred to as mesenchymal precursor cells (MPCs). MPCs contribute to the regeneration of tissues such as bone, cartilage, muscle, ligaments, tendons, fat and their supportive cells. There is scientific evidence that these MPCs are not fixed as to potential cell-line development (ie, MPCs can become any type of cell, rather than being a mixture of committed type cells). MPCs are a population of firmly adherent cells with:

- a high proliferative capacity; and
- the potential for self-renewal.

The identification of MPCs in the body has been difficult, partly because they have few unique products or molecular markers. MSB has patented a method for the identification, extraction and culture of adult MPCs.

Studies have shown that MSB's off-the-shelf MPCs do not induce allergic or other immune reactions when implanted into unrelated recipients. This is because MSB's products do not express immune markers that would make them susceptible to being destroyed by the body's defence mechanisms. This means multiple recipients are potential users of one batch of MSB's products.

Studies have shown that MSB's off-the-shelf MPCs do not induce allergic or other immune reactions

What is the opportunity?

MSB is pursuing four major opportunities.

- **Bone-regeneration product for the repair of long bone fractures** – More than 1m of the 5.6m fractures occurring annually in the US are associated with healing difficulties in which repair processes stop before a break is completely mended. Problems can occur due to ineffective mobilisation of the broken bone, disruption to the blood supply or infection. In preclinical trials, MSB's off-the-shelf

adult stem cells have shown a 90% greater rate of healing of these types of bone defects compared with controls.

Degenerative intervertebral disc disease affects up to 25% of the population

- **Bone-regeneration product for spinal fusion** – Degenerative intervertebral disc disease affects up to 25% of the population. In the later stages, the only treatment option is spinal fusion. More than 300,000 spinal fusion treatments are performed annually in the US and the American Academy of Orthopaedics expects this number to grow to more than 500,000 per year by 2009. Current fusion therapies use bone harvested from a patient’s own hip (termed autograft) that requires a complementary surgical procedure (done at the same time as the spinal fusion). In preclinical trials, MSB’s stem cells obtained from a single donor were highly successful in generating intervertebral spinal fusion in multiple recipients without the need for autograft.
- **Cartilage product for the repair of acute meniscal tears and for the regeneration of osteoarthritic knee cartilage** – Inflammatory disease of the joints, such as osteoarthritis, affects more than 43m people annually in the US alone. Osteoarthritis results in the loss of cartilage, which cannot repair itself after injury, interferes with mobility and causes pain. MSB is performing preclinical trials for cartilage repair and regeneration.
- **Cardiac product for the treatment of heart failure and heart attacks** – More than 500,000 new patients with heart failure and 1m new patients with heart attacks are treated annually in the US alone. Current therapies for heart failure offer only modest symptomatic benefit, do not result in the rebuilding of heart muscle, and do not prevent the progression of heart failure and long-term deterioration. In multiple preclinical models, MSB’s adult stem cells have been shown to result in significant improvements in heart function and to prevent heart-failure progression. Cells used to treat patients in a current trial are autologous (the patients’ own cells), that is they have been selected and cultured using MSB’s proprietary technology.

The timeline of MSB’s opportunities are shown in the following table.

Table 8 : Timeline and probability of MSB’s opportunities				
Trial stage	Preclinical	Investigational New Drug application	Phase II trials	Clinical III trials
General time until cashflow	7 years+	5-7 years	3-5 years	1-2 years
General probability of product getting to market	c10%	c10-20%	c30%	c70%
Cost of trials	cA\$1m	cA\$2-3m	cA\$10m	cA\$50m
MSB products - indications and stages of development				
Spinal Fusion				
Long bone fractures				
Congestive Heart failure (via Angioblast)				
Heart attack (via Angioblast)				
Osteoarthritis knee				
Knee cartilage tears				
Peripheral arterial disease (via Angioblast)				
Other indications				

Source: Company data, ABN AMRO estimates

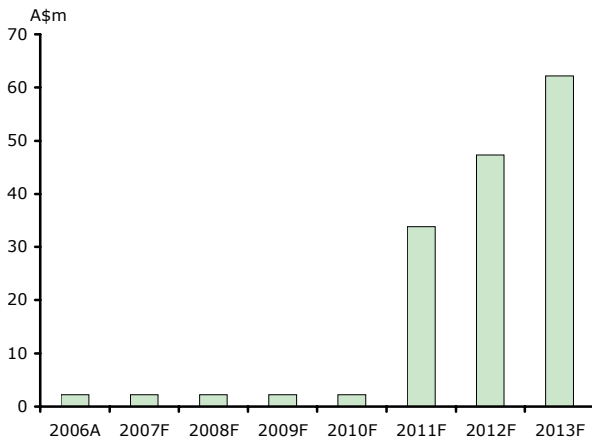
Recent clinical trial results by researchers at the Department of Orthopaedics at the Royal Melbourne Hospital suggest positive interim results in the use of MSB’s technology in the treatment of long bone fractures.

In addition, MSB has recently started trials on allogeneic stem cells in the US market for patients who require spinal fusion. The spinal fusion clinical trial will be undertaken at the Hospital for Special Surgery in New York. We believe this is confirmation of the potential for MSB’s bone-graft technology and indirect evidence of MSB’s ability to scale-up its manufacturing technologies.

Cash-flow positive in 2011

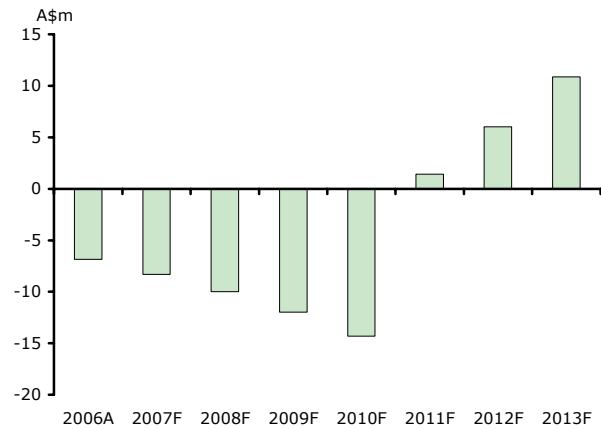
We believe MSB has potentially valuable opportunities, but we think it will have to either raise equity or partner to develop its products. In our view, MSB is unlikely to be cash flow positive until at least 2011. After the equity raising of 20 July 2006, MSB has a net cash position of A\$25m. Due to the progression of a number of trials to IND status, MSB’s cash burn in 2005 increased to A\$11.2m (from A\$1.9m in 2004). We provide an outline of forecast revenue and EBIT for MSB in the following charts.

Chart 1 : MSB – revenue forecast



Source: Company data, ABN AMRO forecasts

Chart 2 : MSB – EBIT forecast



Source: Company data, ABN AMRO forecasts

Going forward, we believe the company’s cash requirements are likely to continue and may increase. At the current rate of cash burn, and without further infusions of cash, this suggests MSB has enough cash to continue operations for only the next two to three years because ongoing trials with human volunteers are expensive to perform. The general costs of performing a trial are shown in the next table.

Table 9 : Trial stages and costs

Trial stage	Preclinical	Investigational new drug application	Phase II trials	Phase III trials
Approximate time until cash flow	Seven years-plus	Five to seven years	Three to five years	One to two years
Approximate probability of product getting to market	About 5%	10-20%	About 30%	About 70%
Cost of trials	About A\$1m	A\$2-3m	About A\$10m	About A\$50m

Source: ABN AMRO estimates

In order to be certified by regulatory agents worldwide, a new drug or treatment must go through these types of trials before it can get to market. The total cost of getting a new drug to market has been estimated at A\$70m-100m. As a result, we believe MSB will need more funds to progress its drugs through further trials. This could be achieved through either of the following:

- **Equity** – MSB might require another equity raising should management decide to further develop the opportunity for its drugs using internal funding.
- **Partnership** – MSB may decide to enter into an agreement with a larger pharmaceutical/orthopaedic partner that can provide the necessary funding and regulatory expertise to progress the trials through to the next stage of development. This would most likely be in exchange for part of the revenue stream of the business. We think it is probable that MSB would agree to a royalty from sales of the finished product. The royalty agreement would most likely include an up-front payment, which would probably make MSB cash flow positive in the year in which it occurs. We assume this will be in FY11.

We believe either means of raising cash is equally likely, although we note MSB has signed an agreement with an orthopaedic company in relation to its bone-regeneration product for the repair of long bone fractures and spinal fusion. We expect further news on this in the near future.

Need for partners

We note the company's strategy is to outsource manufacturing and all continuing research to specialist, best-of-breed partner organisations. Consequently, the company has incurred no major capital expenditure for the period and does not intend to incur substantial commitments for capital expenditure in the immediate future.

The company's strategy is to outsource manufacturing and all continuing research to specialist, best-of-breed partner organisations

Near-term catalysts for the stock

We believe there are a number of near-term catalysts for the stock. Should these be positive, this would imply a further confirmation of MSB's technology and business model. Hence, we would expect the share price to react positively.

- **Autologous cardiovascular trials at John Hunter Hospital in Newcastle, Australia** – MSB is performing trials to test the regenerative effect of MSB's allogeneic stem cells on damaged cardiac cells. The results of these trials are expected within the next six months.
- **Allogeneic cardiac program of MSB's US-based sister company, Angioblast Systems** – Like the Australian trials, MSB is undertaking trials in the US to test the regenerative effect of MSB's allogeneic stem cells on damaged cardiac cells. The results of these trials are also expected in the near term.
- **Clinical trial results by researchers at the Department of Orthopaedics at the Royal Melbourne Hospital** – Recently, MSB released positive interim results on the use of its technology in the treatment of long bone fractures. We expect the final results of these trials by the end of 2007.
- **US trials on allogeneic stem cells** – MSB recently started trials on allogeneic stem cells in the US market for patients who require spinal fusion. The spinal-fusion clinical trial is being undertaken at the Hospital for Special Surgery in New York. We expect results from these trials by mid-2008.
- **US FDA submission for an IND in heart attacks** – We expect an update on the FDA submission for an Investigational New Drug Application (IND) for MSB's US-based sister company, Angioblast Systems, regarding the use of MSB's stem cells in the treatment of heart attacks. We expect further news on this submission by mid-2008.

MSB recently started trials on allogeneic stem cells in the US market for patients who require spinal fusion

Finally, we enclose a potential timeline for further clinical and regulatory trials relevant for MSB below.

Table 10 : Near-term timeline for MSB future clinical trials

3Q2007	Pilot trial long bones fractures complete
3Q2007	Pilot trial coronary artery disease enrolment complete
3Q2007	Phase II allogeneic trial for heart attacks begins in the US
2008	Additional Phase II orthopaedic and cardiac trials commence
2008	Enrolment complete in allogeneic Phase II trial for spinal fusion (US)
2008	Enrolment complete in allogeneic Phase II trial for heart attacks (US)
2008+	Phase III registration trials commence in lead cardiac and orthopaedic indications (US)

Source: Company data

Risks of product not getting to market

On an industry-wide basis, the chances of getting a product to market from the IND stage are in the order of 10-20%. The reasons for this low rate are numerous. As a result, we believe the risks that MSB will be unable to get a product to market are not inconsiderable. To offset the risk that it may be unable to get a product to market, MSB is attempting to progress a number of products in the fields of orthopaedics and cardiac failure. However, to progress a product through the regulatory pathway involves the use of a considerable amount of funds. Going forward, MSB management will have to balance the use of funds to progress a number of projects through regulatory pathways against the increased cash flow this would entail.

Industry-wide, the chances of getting a product to market from the IND stage are 10-20%

Finally, given the large potential market size for the orthopaedic and cardiac treatments MSB is developing, manufacturing scale-up will be necessary. The company will have to develop a means of large-scale development of MPCs for commercial use. According to the current scientific literature in this area, a mechanism to ensure commercial scale-up of MPCs is yet to be developed.

MSB gets clearance from the FDA to start an IND

On 18 September 2006, MSB announced that the United States Food and Drug Administration (US FDA) had cleared its IND submission to commence a Phase 2 clinical trial for spinal fusion in the US. During the trial Mesoblast will continue to work closely with several major international medical-device companies with a view to establishing strategic alliances for product sales and distribution at the most appropriate time.

Risks of manufacturing process not being scalable

We believe the major risk to MSB's business model is the scalability of the manufacturing process. Over the medium term, the company plans to expand the allogeneic cells it extracts using its proprietary manufacturing technology.

MSB's manufacturing plan

MSB plans to collate the number of cells after three doublings, and then split them into 70 separate aliquots (or portions) and grow these up as individual units. The total number of doublings that MSB believes it can achieve is in the order of 19-20.

MSB has patented a manufacturing method that provides enrichment several orders of magnitude better than the best method previously developed. The company has shown that it can produce an enriched population in which up to 50% of the MPCs can form colonies. In contrast, other research citations indicate the best method known until now has achieved an enrichment of only up to 0.01% cells capable of forming colonies.

MSB has patented a manufacturing method that provides enrichment several orders of magnitude better than the best method previously developed

Going forward, MSB will be using Cambrex, a manufacturing facility in New Jersey, US, to expand its stem cells and manufacture its product. Cambrex has 10 stacks on which the product is developed. Donors go to Cambrex to have their marrow extracted:

- The cells are then immunoselected to the standard operating procedure that has been lodged with the FDA. immunise
- Cambrex then expands the number of cells (via cytokines, growth factors and a growth environment) and the final product is developed.
- MSB believes the challenge in manufacturing is standardisation to ensure a convergence of purity. In addition, it expects further standardisation to occur over the next couple of years.

- Finally, MSB believes it can measure the parameters for growth of its cells better than its competitors.

In terms of scale-up, Cambrex is a contract manufacturing facility only. At present, MSB needs only one room for its clinical trials but, when ready, it can access up to 20 rooms for commercial scale-up. Over the longer term, we believe MSB has a number of options regarding further manufacturing should demand for its products require this.

The literature has generally not caught up with MSB's claimed ability to expand its manufacturing process

Given the large potential market size for the orthopaedic and cardiac treatments MSB is developing, we believe manufacturing scale-up will be necessary. MSB will have to develop a means of large-scale development of MPCs for commercial use. According to the current scientific literature in this area, a mechanism to ensure commercial scale-up of MPCs is yet to be developed.

Our analysis of the literature suggests MSB's claimed ability to expand the allogeneic cells it extracts has not been replicated to the same degree. A number of issues have been identified in the literature regarding the expansion of adult stem cells. These are as follows:

- **False claims regarding adult stem cells** – A US-based team has recently been investigated by the prestigious journal *Nature* for submitting possibly false results of trials describing a population of stem cells from the bone marrow of mice that seemed able to grow into most of the body's tissues. This was unusual, because adult stem cells can generally form only a narrow range of tissue types. Other researchers have found it difficult to replicate the work.
- **Ageing of the sample** – Recent research suggests even protocols that involve minimal expansion from a base number of MPCs induce a rapid ageing of MPCs, with losses equivalent to about half their total replicative lifespan. This may be due to poor selection techniques on the part of the researchers.
- **Certain adult stem cells may stimulate tumour growth** – Recent research suggests certain adult stem cells grown under specific conditions for far longer than MSB grows its MPCs were found to significantly enhance the growth rate of some strains of breast cancer in a laboratory setting, but this has not been replicated in tests performed in the human body.

However, recent research may also go some way to confirming some aspects of MSB's claims. We note the following:

- **Recent research suggests other researchers may have confirmed MSB's findings** – Recent research has established a protocol for safe and accelerated expansion of MPCs to be used in cell and tissue therapy after optimisation not unlike MSB's process.
- **It also suggests MPCs can be identified and expanded in those with diabetes** – Results suggest a therapeutic potential for MPC patients with type-1 diabetes.

Given the publication of research that partly confirms some aspects of the scalability of MSB's manufacturing process, we believe the company will be able to scale-up its manufacturing process. Going forward, we will be looking for more evidence of the scalability of this process, from both MSB and the scientific literature.

Our analysis of the literature suggests MSB's claimed ability to expand the allogeneic cells it extracts has not been replicated to the same degree

Analysis of patents

The critical intellectual property for a biotech company includes its patents. Hence, we have analysed MSB's patent situation.

US and EU patents

We believe MSB's principal US patent is 7,122,178, which was issued on 17 October 2006. This patent was first filed on 7 July 2000. Hence, we do not expect it to expire in the US before 2020 due to a US statute (35 USC – 154) that states:

'A patent filed on or after June 8, 1995, has a term of 20 years from its earliest filing date. A patent filed before June 8, 1995, now has a term the longer of: (1) 20 years from its earliest filing date, or (2) 17 years from its date of issuance.'

The patent relates to the identification of MPCs via a novel monoclonal antibody and to a method of enriching MPCs including the step of enriching for cells based on at least two markers. Recent advances have led to the development of novel monoclonal antibodies (MAbs) that recognise antigens on MPCs. MSB has developed and patented an identifying antibody for MPCs.

This recently granted US patent enables MSB to continue commercialising its MPCs. Specifically, it serves to enhance the following:

- Further commercialisation of MSB's existing technology.
- The manufacturing strategy for MPCs.
- Development of MPCs that can be used in wide populations because those MPCs do not promote an immune response.
- MSB's attractiveness to a partner.

Given our analysis of MSB's EU patents, we believe the company is also aiming to generate patent protection for its technology in the EU. We expect further news on this soon.

We believe MSB is also aiming to generate patent protection for its technology in the EU

Management

Considering the relative youth of the company and the relatively small market capitalisation of the business, MSB has a board and management team with an impressive track record. The directors have a long history of successfully developing medical businesses, and the Australian companies they have worked for include Ventracor, Cochlear, Sunshine Heart, Atcor Medical and FH Faulding.

In addition, the chief scientific officer, Dr Itescu, has built an international reputation in the fields of immunology and transplant medicine. He holds professorships at Columbia University, New York, and the University of Melbourne. Dr Itescu holds 37m MSB shares in escrow until February 2008. The current share base for MSB is 107.7m.

The most advanced opportunity – synthetic bone-graft stimulator

Synthetic bone grafts are replacing autograft bones (ie, bone grafts derived from the patient) as the standard for the treatment of bone defects.

What is a bone graft?

A bone graft is surgery to place new bone into spaces around a broken bone or in between holes and defects in bone. In many orthopaedic surgical procedures, it may be necessary to transplant/implant bone or a bone-graft substitute to restore skeletal integrity and to enhance bone healing. Bone grafts help with:

- support;
- filling voids; and
- enhancing the biological repair of skeletal defects.

The new bone can be taken from the patient's own healthy bone (this is called an autograft), from frozen, donated bone (allograft), or from synthetically derived materials. A cut is made over the bone defect and the bone graft is shaped and inserted into and around the defect. The graft is held in place with pins, plates or screws. The incisions are stitched closed. A splint or cast is usually used to prevent injury or movement while healing.

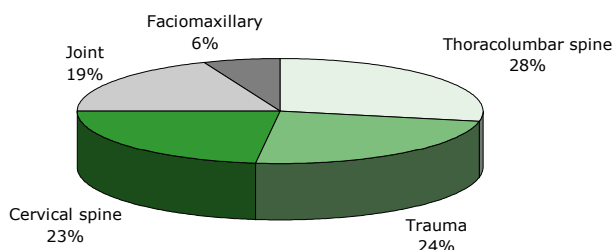
Bone grafts serve a mechanical and a biological function, and in certain applications one function may be more important to the clinical outcome than the other. For example, a large proximal femoral graft used in a revision total hip arthroplasty is primarily required for mechanical support, whereas demineralised bone matrix used in a posterior lateral spinal fusion may be required to stimulate bone formation without a significant mechanical role. In most cases, the two functions are intertwined.

The placement of synthetic bone grafts significantly reduces the time required in the operation theatre and rehabilitation. Further, it is cheaper and has less infective and ethical issues than traditional allograft procedures (ie, bone grafts derived from cadavers). In 2002, the total number of bone-graft procedures in the US was 1.6m. The split of types of grafts is shown in the following chart.

A bone graft places new bone into spaces around a broken bone or in between holes and defects in bone

Bone grafts serve a mechanical and a biological function

Chart 3 : Anatomic split of bone grafts in the US, 2002



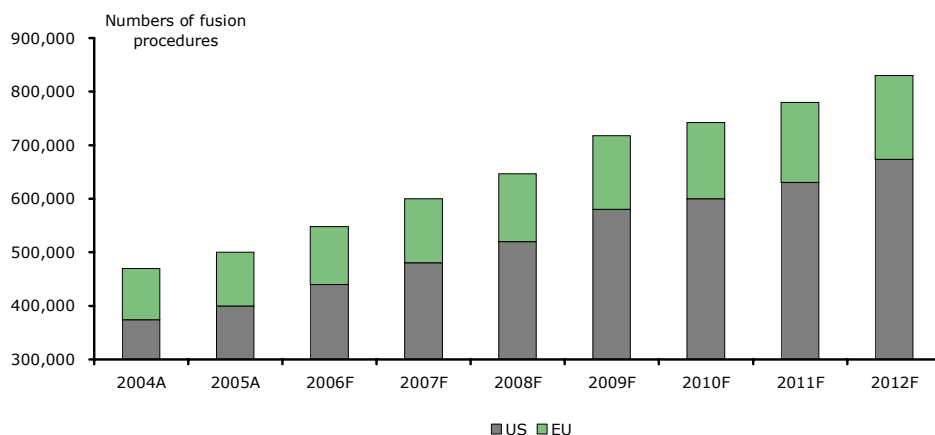
Source: PubMed

The biological activity of a bone graft is a combination of a number of factors that include the graft’s inherent bioactivity (living cells, such as osteocytes and osteoblasts within the bone-graft matrix), its capacity to activate surrounding host tissues to relevant biological activity (mediated by bioactive factors in the bone-graft matrix) and its ability to support the in-growth of new bone. In addition, the mechanical environment of the graft site needs to be considered as bone grafts remodel in response to mechanical stimuli.

Bone grafts remodel in response to mechanical stimuli

As an example of the growth in the use of bone grafts, we present an outline of the actual and forecast numbers of spinal fusions below.

Chart 4 : Forecast numbers of spinal fusion procedures



Source: PubMed, Stryker data

In terms of biological response, an ideal bone graft is required to be osteogenic, osteoinductive and osteoconductive.

An ideal bone graft must be osteogenic, osteoinductive and osteoconductive

- **Osteogenic materials** – These have the inherent capacity to form bone, and so comprise of living cells such as osteoblasts (bone-forming cells) or their precursors.
- **Osteoinductive materials** – These stimulate cells in the wound or the local environment to undergo conversion to osteoprogenitor cells capable of forming bone in osseous and non-osseous sites, eg, in skeletal muscle tissue.
- **Osteoconductive materials** – These provide bioactive surfaces that local osseous tissue can use to regenerate bone.

However, many surgeons remain unconvinced of the potential benefits of using synthetic bone grafts, so manufacturers are challenged to prove the clinical efficacy of this method by producing synthetic materials capable of providing osteoconduction and osteoinduction.

Many surgeons remain unconvinced of the potential benefits of using synthetic bone grafts

What are the market segments?

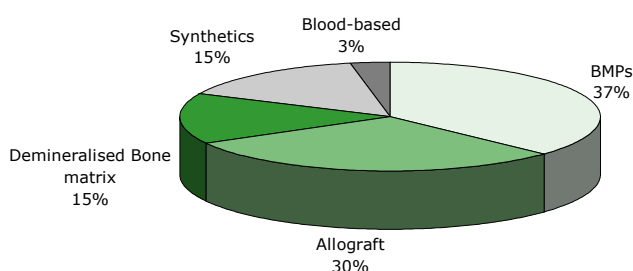
In effect, most synthetic bone grafts consist of the following:

- **A bony matrix** – A structural matrix is implanted into the defect. The bone-like element is implanted by the surgeon and provides a template for growth onto the matrix of the patient’s own bone cells. This may or may not be combined with an osteoinductive agent (see below).
- **An osteoinductive agent** – This stimulates faster bone growth than would be expected with the implantation of a bony matrix alone. Recent studies suggest a bony matrix implanted with an osteoinductive agent will have a more advanced take-up than an implant of a bony matrix alone.

The market size is shown below. The BMP subsector of the orthobiologics market was worth US\$200m pa in 2005. Stryker has estimated the entire orthobiologics market is growing at 25% per annum, as shown in the next chart.

The BMP subsector of the orthobiologics market was worth US\$200m pa in 2005

Chart 5 : Orthobiologics market



Source: ABN AMRO, Stryker

There are four major market segments in the bone-graft market. These include the following:

1. Osteogenic materials – made by the patient, these stimulate bone growth

- **Autologous bone marrow.**
- **Autologous bone** – Autologous bone has been the implant of choice for most grafting procedures. It involves harvesting bone from one site within a patient and implanting it into the site where it is required in the same patient.
- **Allogeneic bone** – Allograft is a common alternative to autograft bone and is used to either replace or extend autograft volume. Allografting involves procuring bone from one human donor and implanting it into another. It is continuously harvested from cadavers of individuals who have donated their bones for the treatment of living patients.
- **Autologous blood concentrates** (eg, AGF, Symphony).

2. Osteoconductive materials – these act as the template for further growth

- **Calcium phosphates** (eg, Interpore, Norian SRS) – Norian SRS is an injectable, fast-setting carbonated apatite cement.
- **Collagen/calcium phosphate composites** (eg, Collagraft, Healos) – This is a haemostatic bone-substitute material. It is composed of a collagen matrix in which ceramised hydroxyapatite granules are dispersed. The synthetic hydroxyapatite granules give the material its osteoconductive properties.
- **Calcium sulphates** (eg, Osteoset) – These are harvested from marine coral exoskeletons that are hydro-thermally converted to hydroxyapatite. This interconnected porous structure closely resembles the porosity of human cancellous bone.
- **Demineralised bone matrix** (eg, Grafton, Dynagraft) – Derived from cadaveric bone, DBM is manufactured in a process where, first, the bone marrow is removed, then the bone is defatted and, finally, the mineral contents are decalcified with hydrogen chloride.
- **Combined osteoconductive materials** (eg, Allomatrix injectable, Allomatrix C).

The following table summarises the autograft and allograft bone-graft options.

Table 11 : Comparative properties of autografts and allografts

Bone graft	Structural integrity	Osteoconduction	Osteoinduction	Other properties
Autografts				
Cancellous	++	+++	+++	Osteoprogenitor cells Rapid incorporation
Cortical	+++	+++	++	Osteoprogenitor cells Relatively slow incorporation compared to cancellous autograft Principal harvest sites – iliac crest or vertebral body
Allografts				
Cancellous (frozen or freeze dried)	No	++	+	No osteoprogenitor cells Freezing or freeze drying reduces risk of disease transmission
Cortical (frozen or freeze-dried)	+++ (Frozen) +(Freeze-dried)	++	+	No osteoprogenitor cells
DBM	No	+	++	Made by extracting proteins from cortical and/or cancellous allografts Osteoprogenitor cells Poor mechanical properties-used as an extender to other bone grafts

Source: ABN AMRO estimates

3. Peptide-signalling molecules – these stimulate bone growth

- Fibroblast Growth Factor (FGF).
- Others (PDGF, VEGF).
- Thrombin peptides (eg, Crysallin).
- Prostaglandin agonists.

4. Osteoinductive molecules

- Osteogenic Protein-1 (OP-1 to 3, BMP 2 to 7) – osteogenic proteins (OP) are elements of a class of natural growth factors called bone-morphogenic proteins (BMP).
- Bone Morphogenetic Protein-2 (BMP-2).
- MPCs.

The following table summarises the peptide-signalling and osteoinductive molecules.

Table 12 : Comparative properties of synthetic bone grafts

Bone graft	Structural integrity	Osteoconduction	Osteoinduction	Other properties
Factor-based	No	No	+++(+)	No osteoprogenitor cells Poor mechanical properties-used as an extender to other bone grafts
Cell-based	No	No	+++	Osteoprogenitor cells Cells typically seeded on scaffolds prior to implantation
Synthetic	+	++	No	No osteoprogenitor cells
Synthetic with bone marrow aspirate	+	++	+(+)	No osteoprogenitor cells Growth factors
Synthetic with platelet-rich plasma (PRP)	+	++	++	No osteoprogenitor cells Growth factors

Source: ABN AMRO estimates

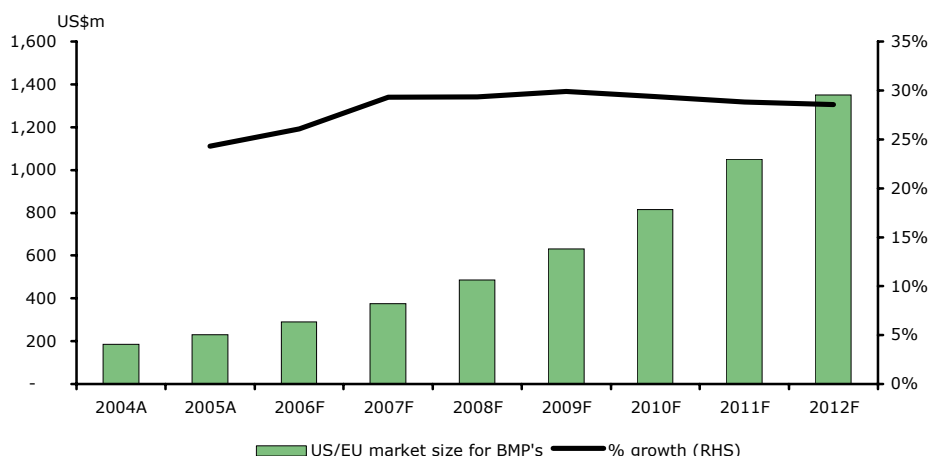
Market opportunity in osteoinductive agents

A number of key market opportunities for bone morphogenic proteins have been identified. These include the following:

- An increased incidence of degenerative diseases of the spine** – An increase in the ageing population has resulted in a dramatic increase in the number of individuals over the age of 65. Since the incidence of degenerative diseases increases significantly for people over 50, the number of patients expected to ultimately become eligible for lumbar spine fusion will increase. Degenerative diseases of the lower back are also common among individuals who lead active lives and in those who engage in manual labour. These and other factors are the causes for the increase in the incidence of degenerative diseases and the growing market opportunities for the introduction of the new and innovative class of natural BMPs.
- Reduction in patient morbidity associated with autografting drives application of BMPs for use in spinal fusion** – Currently the gold standard for spine fusion is the use of autograft harvested from the patient's iliac crest. Autografting increases anaesthetic time, the risk of infection and intra-operative blood loss. In addition, sufficient quantities of autograft bone may not be available or are likely to require multiple donor sites and damage to donor site could result in unacceptable patient mortality. These principle disadvantages in autografting are overcome by the use of BMPs.
- BMPs as a novel technology for spinal-fusion procedures helps stimulate interest in the bone-graft substitute market** – BMP research is an exciting and new opportunity for surgeons and patients alike that, over time, could revolutionise the way patients are treated for degenerative back problems.
- The creation of a lucrative private healthcare spinal-fusions market** – Lower back pain can be excruciating and is a debilitating medical problem that accounts for a high proportion of sick days from the work place. Many individuals who have occupational private healthcare insurance opt to have spinal fusion in private institutions, thereby avoiding long waiting lists. This has created a lucrative private healthcare market in Europe.

The forecast market size for BMPs is shown in the following chart.

Chart 6 : US/EU market size for BMPs



Source: PubMed, ABN AMRO forecasts

What is the competition? How advanced is it?

We believe it is MSB’s aim to partner with a maker of synthetic bone-graft matrix so that MSB’s MPCs can eventually be implanted as part of a bone-graft solution, for example:

- a synthetic bone-graft matrix as an osteoconductive agent, combined with;
- MSB’s MPCs as the osteoinductive agent.

The only osteoinductive agents commercially available in large quantities are the BMPs. Implantation of recombinant human BMP (rhBMP) induces bone formation by causing the differentiation of mesenchymal cells into chondroblasts (cartilage-forming cells) and osteoblasts (bone-forming cells). The advantages of BMPs include that they are very osteoinductive (some studies report BMPs are more osteoinductive than autografts). We identify the market drivers in the next table.

Table 13 : Market drivers and restraints

Drivers	Restraints
Reduction of patient morbidity	High price and reimbursement uncertainties
Reduction of surgical time	Safety concerns – one of the major concerns with the use of BMPs is the unintentional formation of bone away from the fusion site. In addition, there is concern about possible excessive bone formation that may impinge on neural structures
Increased biological activity accelerates the healing process	Convincing surgeons to adopt new technology is a major challenge
BMPs are more osteoinductive than DBMs and synthetic bone-graft substitutes	The lack of test standardisation and clinical data for BMPs may restrict market expansion
Novelty –BMPs are a relatively new technology compared to DBMs and synthetic bone-graft substitutes. Novelty can generate significant interest in the orthopaedics world	The development of non-fusion technologies for the spine. Orthopaedic surgeons have access to several devices that offer a non-fusion option to the patient. These devices exist in different forms, such as, nucleus replacement, annular repair, artificial discs, and dynamic stabilisation

Source: ABN AMRO

In this section we review the commercially available BMPs. Over the past 20 years three randomised clinical trials have supported the use of recombinant human (rh) BMPs. Based on these studies two preparations of rhBMPs are now clinically available, these are as follows:

- **Osteogenic Protein-1 (OP-1)** – Marketed by Stryker, in 2001 the US FDA issued a Humanitarian Device Exemption for the application of the OP-1 implant as "an alternative to autograft in recalcitrant long bone non-unions where use of

autograft is unfeasible and alternative treatments have failed." A variety of regulatory agencies in Europe, Australia and New Zealand have also provided language permitting the use of this implant in specific settings, such as tibial non-unions, or more general settings such as long-bone non-unions. OP-1 putty also is indicated in revision spinal fusions where autograft is not feasible. This limits the putty's use in the US to a patient population of 4,000 per year. OP-1 makes no significant contribution to current earnings. In June 2006, Stryker submitted an application to the FDA seeking wider approval for OP-1. OP-1 putty is now undergoing a clinical trial comparing its safety and effectiveness with the iliac-crest autograft in uninstrumented posterolateral lumbar fusions. According to Stryker's website, this will take three years.

- **Recombinant human BMP-2** – In 2001, the Orthopaedic and Rehabilitation Devices Advisory Panel of the FDA recommended the approval of an InFUSE (marketed by Medtronic, but developed by Wyeth), a combination of rhBMP-2 on an absorbable collagen sponge delivered in a device for single-level interbody fusions of the lumbar spine, and for tibial bone fractures that have failed to unite. This is part of Medtronic's Spinal division, which earned about US\$2bn in FY05 and is growing at 25% pa. The average price of the Medtronic InFUSE BMP dosage per fusion level was reported to be close to US\$9,000 in 2004.

The average price of the Medtronic InFUSE BMP dosage per fusion level was reported to be close to US\$9,000 in 2004

In addition, a number of companies are aiming to develop an osteoinductive agent. These include the following:

- **MP52** – In 2003, a J&J subsidiary, DePuy, licensed a BMP technology portfolio known as MP52 from Biopharm Germany. DePuy is continuing to pursue the development of BMP across the areas of bone, cartilage and soft-tissue repair. While there are no products at present, future products are designed to address clinical needs in spine, trauma, joint reconstruction and sports medicine. The collaboration for product development will combine the recombinant MP52 growth factor or derivatives with proprietary bio-engineered scaffolds from DePuy. Although the MP52 is a few years away from receiving market authorisation, we believe it is likely to be commercialised as a combination with the synthetic bone-graft substitute Healos.
- **Osteocel** – Made by Osiris Therapeutics, Osteocel relies on proprietary MPC technology to produce a viable bone-matrix product containing stem cells. It is similar to autograft, not only because it is biologically active, but also because it is the only product available that provides the three beneficial properties of autograft: osteoconduction, osteoinduction and osteogenesis. Processing methods include selective immunodepletion such that Osteocel contains a stem-cell population of high cellular purity for universal use.

Pricing for BMPs

The principle supplier of BMP products (Medtronic Sofamor and Danek [a division of Medtronic], which has worldwide exclusive rights with Wyeth and Yamanouchi Pharmaceuticals to promote InFUSE/InductOS, and Stryker with its product, OP-1) is aware that per-dosage prices for BMPs are already high and could come under increased competitive activity from DePuy Spine and its MP52 product.

DePuy claims its manufacturing costs for MP52 will be at least a factor of 10 less expensive than for Medtronic's InFUSE and Stryker's OP-1. This is because MP52 is manufactured using a bacterial fermentation process as opposed to using the mammalian cell culture technique used by Stryker and by Wyeth, which supplies rhBMP-2 for InFUSE.

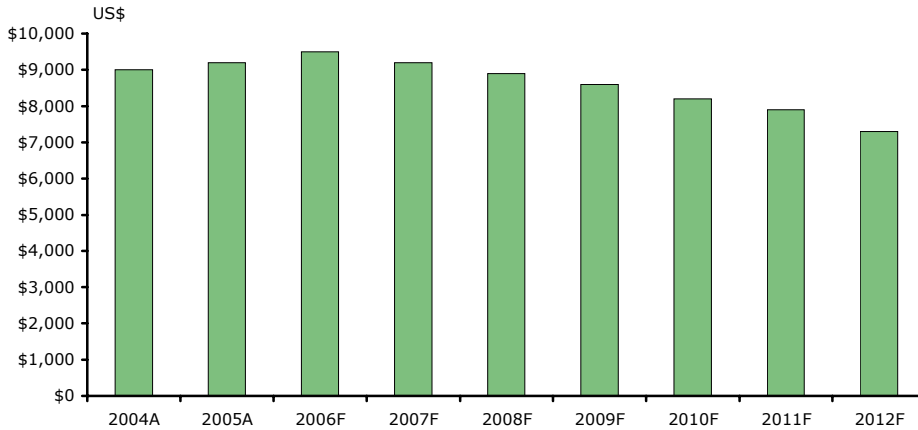
DePuy claims its manufacturing costs for MP52 will be at least a factor of 10 less expensive than for Medtronic's InFUSE and Stryker's OP-1

The predicted low manufacturing costs of MP52 will cause a decline in the selling prices of the other two products. As a result of the anticipated introduction of MP52, once marketing authorisation has been approved, the price per dosage should fall progressively.

Some market estimates believe that by 2012 the average selling price per dose will have fallen to about US\$7,300. This is shown in the following chart.

Some estimate that by 2012 the ASP per dose will have fallen to about US\$7,300

Chart 7 : Pricing forecast for BMPs



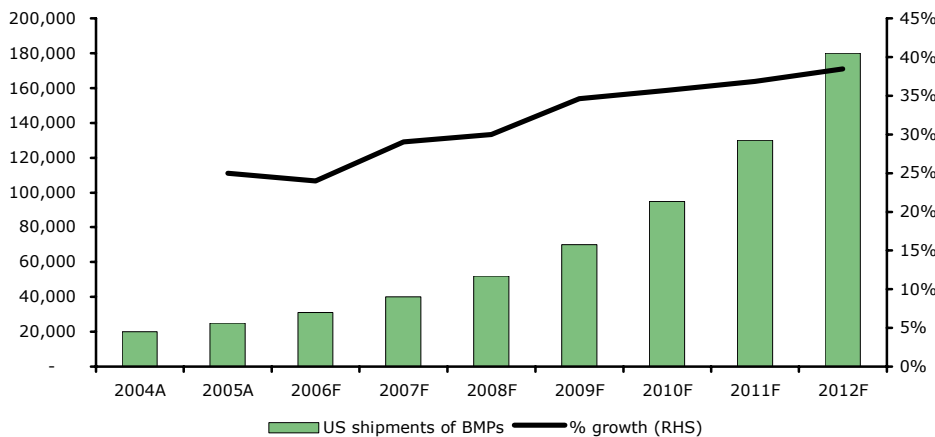
Source: PubMed, industry data

Analysis of unit shipment of BMPs in the US

Based on revenues for Medtronic’s InFUSE and Stryker’s OP-1, industry estimates suggest that 20,555 units of InFUSE and OP-1 were used in the US in 2004. Fuelled by increased demand for bone-graft substitutes, we forecast the number of BMP units shipped in the US will see a 31.7% CAGR over 2004-12. Based on the market drivers and restraints for BMPs, we anticipate the number of BMP units shipped will reach 184,931 by 2012. This is shown in the following chart.

We forecast the number of BMP units shipped in the US will see a 31.7% CAGR over 2004-12

Chart 8 : US shipments of BMPs



Source: PubMed, industry data

Possible partners for MSB

We believe MSB is most likely to partner with an orthopaedic company to take any orthopaedic MPC to market. We think the most likely partners are those with existing market share in orthobiologicals. These are shown in the next table.

We believe MSB is most likely to partner with an orthopaedic company to take any orthopaedic MPC to market

Table 14 : Market share – orthobiologicals market, 2006

Company	Estimated market share
Medtronic	31%
Synthes	16%
J&J (DePuy)	7%
Osteotech	5%
Stryker	4%
Wright Medical	3%
Other	34%

Source: Company data, ABN AMRO estimates

In our opinion, the companies likely to use MSB's technology are those that are currently without osteoinductive agents to offer with their osteoconductive agent. These include the following:

- **Synthes** – Based in Switzerland, Synthes is a global medical device company that develops instruments, implants and biomaterials for the surgical fixation, correction and regeneration of the human skeleton.
- **Osteotech** – Since its formation in 1986, US-based Osteotech has become the world's largest processor of aseptic allograft bone tissue and has been used in more than 2.3m grafts.
- **Wright Medical** – Wright Medical is an orthopaedic medical-device company headquartered in Arlington, Virginia, specialising in the design, manufacture and marketing of reconstructive joint devices.

What do the end-users of the product say?

The orthopaedic surgeons we spoke to were not aligned with MSB. They believe the osteoinductive agent market will become large in the years to come because orthopaedic surgeons are being forced to deal with larger and larger bony defects as a part of revision joint surgery. Given the increasing prevalence of joint replacement in the community and the advanced aged of some the joint replacements that were implanted in ever growing numbers from the 1970s, the need to address the problem of bony defects caused by the failure of joint replacement continues to increase.

Orthopaedic surgeons are being forced to deal with larger and larger bony defects as a part of revision joint surgery

On a global basis, allograft bone banks continue to suffer from a lack of donations and we think this is likely to continue. We believe most orthopaedic surgeons currently use BMPs in association with autograft, allograft and synthetic graft in order to ensure that the bone graft knits with existing bone.

We understand OP-1 is the most expensive piece of equipment used in a revision joint replacement. The current price is A\$10,000 for a 10cc vial and up to two vials of OP-1 may be used in a single revision joint replacement.

Given the clinical need, we believe orthopaedic surgeons would welcome a product that does not relying on existing bone cells (as in OP-1). They would probably be enthusiastic about a product that carries its own bone-generating cells.

Heart-muscle regeneration

MSB's adult stem cells have been shown to result in significant improvement of heart function and to prevent heart-failure progression after heart attack.

What is heart failure?

Heart failure, also called congestive cardiac failure (CCF), is a life-threatening condition in which the heart can no longer pump enough blood to the rest of the body. Heart failure is almost always a chronic, long-term condition, although it can sometimes develop suddenly. This condition may affect the right side, left side or both sides of the heart. As the heart's pumping action is lost, blood may back up into other areas of the body, including:

- the liver;
- the gastrointestinal tract and extremities; and
- the lungs.

With heart failure, many organs receive insufficient oxygen and nutrients, leading to damage and reducing their ability to function properly. Most areas of the body can be affected when both sides of the heart fail. It is thought that 4.8m people in the US have cardiac failure, with 400,000 new cases diagnosed each year.

Heart failure is almost always a chronic, long-term condition, although it can sometimes develop suddenly

What is a heart attack?

A heart attack (myocardial infarction) occurs when an area of heart muscle dies or is permanently damaged because of an inadequate supply of oxygen to that area. Most heart attacks are caused by a clot that blocks one of the coronary arteries (the blood vessels that bring blood and oxygen to the heart muscle). The clot usually forms in a coronary artery that has been previously narrowed from changes related to atherosclerosis. The atherosclerotic plaque (build-up) inside the arterial wall sometimes cracks, and this triggers the formation of a clot, also called a thrombus.

A clot in the coronary artery interrupts the flow of blood and oxygen to the heart muscle, leading to the death of heart cells in that area. The damaged heart muscle loses its ability to contract and the remaining heart muscle needs to compensate for that weakened area. Occasionally, sudden overwhelming stress can trigger a heart attack.

It is difficult to estimate exactly how common heart attacks are because as many as 300,000 people in the US die each year before medical help is sought. PubMed estimates that about 1m patients visit hospitals in the US each year with a heart attack.

PubMed estimates about 1m patients visit hospitals in the US each year with a heart attack

How do MSB MPCs potentially treat heart failure?

MSB's method stimulates new blood vessel growth in damaged or 'at risk' heart tissue, thereby protecting and even causing the regeneration of heart muscle. This approach is different to that of those working to stimulate the growth of the heart muscle without stimulating blood vessels that supply oxygen to the muscle. Regenerated heart muscle is of limited value if the blood vessels supporting it are unable to pump enough oxygen to the affected area. MSB's efforts thus far demonstrate that the regeneration of blood vessels actually promotes the development of heart muscle cells as well.

MSB's method stimulates new blood vessel growth in damaged or 'at risk' heart tissue

What are the market segments?

The goals of treating heart failure include the aim to address the following:

- Decreasing the likelihood of disease progression, thereby lowering the risk of death and the need for hospitalisation.
- Lessening symptoms.
- Improving quality of life

This is achieved via the following:

- **Lifestyle changes** – Including stopping smoking, weight reduction, the control of high blood pressure, cholesterol and diabetes, and regular exercise.
- **Medications** – Usually oral, the classic treatment for cardiac failure includes combinations of ACE-inhibitors, beta-blockers, digoxin, diuretics and anticoagulants (blood thinners) if needed.
- **Surgical interventions** – This usually treats the causes of the cardiac failure and might include angioplasty, coronary artery bypass grafting, valve replacement and the insertion of pacemakers.
- **Surgical procedures to treat cardiac failure** – This includes cardiac transplants. However, the shortage of donor hearts renders transplantation impossible for most patients. Another option includes mechanical devices (LVADs and artificial hearts) and xenotransplantation. However, both these options can produce significant immune responses that lead to immune deficiency and frequent infections.
- **Heart-muscle regeneration** – Cellular cardiomyoplasty with either isolated skeletal muscle progenitor cells and/or bone marrow cells is an encouraging therapeutic strategy for heart failure. There are now a number of investigators into the combined cell therapy of skeletal muscle progenitor cells and bone marrow cell transplantation to the heart muscle after heart attack. Unlike for MSB, we believe most of these have not progressed to trials in humans.

What does the science say?

Little evidence of cardiac-muscle regeneration

There now appears to be general consensus in the literature that the controlled clinical studies thus far have provided only some evidence of cardiac-muscle regeneration. MPCs are being studied at the clinical and experimental levels, and seem promising. Recent studies suggest the MPCs do not regenerate cardiac muscle following transplantation, so again any benefit might be ultimately related to the effect of the MPC being close to the borderline cardiac cell. Further studies are required.

MPCs are being studied at the clinical and experimental levels, and seem promising

This is because there is no efficient system to deliver the cells

One of the limitations in several of the clinical studies has been the current low efficiency of delivery of the cells into the heart following intracoronary delivery.

Recent studies have shown that the standard approach of intracoronary delivery leads to a rapid transit of the cells out of the heart, such that less than 2% of the cells remain in the heart after 24 hours.

As a result, alternative strategies have been developed to deliver the cells by direct injection into cardiac muscle, either at the time of surgery or using a catheter-based approach.

What is the competition? How advanced it is?

Apart from other researchers into this area, we believe there are a number of listed competitors and potential competitors to MSB's technology, the major ones being Osiris Therapeutics and Athersys.

We believe there are a number of listed competitors and potential competitors to MSB's technology

Osiris Therapeutics

We believe Osiris Therapeutics is also investigating the treatment of cardiac disease using MPCs. It believes MPC integration in diseased or damaged tissue favourably alters the inflammatory response. In cases where the damage involves ischemia (low oxygen), MPC treatment has demonstrated the ability to stimulate the formation of new blood vessels. At the resolution of the healing process, the therapy has shown a significant reduction in scar formation.

Provacel from Osiris is being evaluated in clinical trials for the prevention of heart failure resulting from acute myocardial infarction, or heart attack. Provacel has been demonstrated in animal models to prevent pathologic remodelling or scar formation in the area of the heart. Animal studies have demonstrated the product's ability to return heart function to near-normal levels in as few as two months.

We believe Osiris Therapeutics is mainly targeting improvement in cardiac function as its opportunity, rather than orthopaedics. To this end, it has entered into agreements to further develop this cardiac technology with:

- Boston Scientific Corporation (BSX) in the US; and
- JCR Pharma in Japan.

Athersys

Established in 1995, and with its principal operation in Cleveland, Ohio, Athersys is a privately held biopharmaceutical company engaged in the development and commercialisation of therapeutic products based on proprietary adult stem-cell technology. Through internal efforts, strategic partnerships and collaborations with clinical and basic research institutions, Athersys is developing therapeutic approaches to treat cardiovascular disease, stroke, haematological and immune-system disorders, and a range of other conditions.

Athersys is a privately held biopharmaceutical company

We believe Athersys is mainly targeting an improvement in cardiac function as its opportunity, rather than orthopaedics. To this end, it has entered into agreements to further develop this technology with:

- Bristol-Myers Squibb; and
- Angiotech Pharmaceuticals.

Recently Athersys completed a reverse merger with BTHC VI (OTCBB:BVIC) and completed a private placement of US\$65m to fund its pipeline.

Possible partners for MSB

We believe MSB is most likely to partner with a medical-device company to take any cardiac MPC to market. The most likely partners are those with existing market share in cardiac devices. These are listed in the following section.

We believe MSB is most likely to partner with a medical-device company to take any cardiac MPC to market

- **Johnson & Johnson** – Based in the US, Johnson & Johnson, through its operating companies, is the world's largest manufacturer of health-care products and provides related services for the consumer, pharmaceutical, and medical devices and diagnostics markets. Johnson & Johnson operates in 57 countries.
- **St Jude** – Based in the US, St. Jude Medical has devices in the cardiac, neurological and chronic pain areas. The company has five major focus areas that include cardiac rhythm management, cardiac surgery and cardiology.
- **Medtronic** – Based in the US, Medtronic has a large number of devices in the field of diabetes, heart disease, neurological disorders and vascular illnesses.

We list our biotechnology health comparable companies in the next table.

Table 15 : Health comparables (rolling basis)

Company name	Currency	Mkt cap (Local m)	Mkt cap (US\$m)	EV/EBITDA (x)				P/E (x)				EPS growth (%)	
				Actual	FY1	FY2	FY3	Actual	FY1	FY2	FY3	FY1	FY2
Australia													
Alchemia Limited	AUD	114	97	-7.3	-8.3	-29.3	-36.5	-8.4	-10.8	-40.1	-50.6	-22.2%	-73.1%
Antisense Therapeutics Limited	AUD	20	17	-	-	-	-	-	-	-	-	-	-
Aveva Limited	AUD	164	140	-6.0	-4.7	-4.6	-4.6	-6.5	-8.2	-8.9	-8.9	-20.4%	-8.0%
ChemGenex Pharmaceuticals Limited	AUD	139	119	-9.1	-14.0	3.9	3.5	-12.2	-21.6	5.0	4.5	-43.4%	-
Clinuvel Pharmaceuticals Limited	AUD	212	182	-	-	-	-	-	-	-	-	-	-
Cytopia Limited	AUD	49	42	-	-	-	-	-	-	-	-	-	-
Fermiscan Holdings Limited	AUD	236	202	-	-	-	-	-	-	-	-	-	-
Metabolic Pharmaceuticals Limited	AUD	36	30	1.7	-2.3	1.3	1.1	-2.5	1.4	5.6	7.6	-	-74.5%
Mesoblast limited	AUD	210	180	-	-	-	-	-	-	-	-	-	-
PanBio Limited	AUD	19	16	-	-	-	-	-	-	-	-	-	-
Peplin Limited	AUD	162	139	-5.4	-4.0	-6.0	-6.2	-8.1	-8.5	-8.7	-8.8	-4.8%	-2.6%
Progen Pharmaceuticals Limited	AUD	161	138	-8.1	-3.1	-3.4	-3.4	-9.8	-4.2	-4.4	-4.4	-	-4.9%
Progen Pharmaceuticals Limited (USA)	USD	146	146	-	-	-	-	-	-	-	-	-73.5%	14.3%
Pharmaxis Ltd.	AUD	596	511	-16.0	-16.7	30.3	24.8	-21.4	-20.5	45.2	36.1	4.6%	-
Ventracor Limited	AUD	189	162	-5.0	-8.7	25.6	19.8	-6.1	-11.0	39.7	29.6	-44.6%	-
Vision Group Holdings Limited	AUD	223	191	10.7	9.3	8.3	8.3	16.5	13.5	11.6	11.5	22.4%	16.5%
			Ave	-5.0	-5.8	2.9	0.8	-6.5	-7.8	5.0	1.8	-22.7%	-18.9%
USA													
Amgen, Inc.	USD	58,523	58,523	10.3	9.7	9.5	9.5	16.5	12.4	11.8	11.3	33.0%	5.6%
Amylin Pharmaceuticals, Inc.	USD	6,118	6,118	-25.1	-29.8	-55.8	-114.2	-28.0	-36.6	-78.1	-	-23.5%	-53.2%
BioMarin Pharmaceutical Inc.	USD	1,730	1,730	-42.3	-55.4	-169.7	-121.7	-64.7	-	36.9	27.0	-	-
Celgene Corporation	USD	23,007	23,007	64.0	33.1	22.7	19.6	-	45.9	31.6	26.9	-	45.1%
Cephalon, Inc.	USD	4,975	4,975	11.7	10.2	8.9	8.1	25.6	17.6	15.1	13.6	45.4%	16.4%
Genzyme Corporation	USD	16,653	16,653	14.0	10.8	9.7	9.4	43.9	17.4	15.2	14.1	-	15.0%
Gilead Sciences, Inc.	USD	34,767	34,767	17.0	14.1	12.5	11.4	-	21.6	19.3	17.9	-	12.1%
ImClone Systems Incorporated	USD	2,823	2,823	6.9	9.6	8.0	7.3	11.5	25.0	21.8	20.3	-54.0%	14.3%
The Medicines Company	USD	823	823	-	-	-	-	27.6	-	20.2	14.9	-86.6%	-
MGI Pharma, Inc.	USD	2,002	2,002	248.6	35.1	22.4	19.8	-	32.5	25.3	21.6	-	28.7%
Neurocrine Biosciences, Inc.	USD	386	386	-2.6	-2.8	-4.5	-11.5	-3.4	-3.6	-4.4	-4.9	-4.3%	-18.7%
Onyx Pharmaceuticals, Inc.	USD	1,331	1,331	-	-	-	-	-15.6	-29.5	-	24.0	-47.3%	-
Osiris Therapeutics, Inc.	USD	335	335	-	-	-	-	-7.4	-7.7	-10.0	-14.0	-4.4%	-23.2%
Palatin Technologies, Inc.	USD	155	155	-	-	-	-	-4.2	-5.5	-4.6	-3.2	-24.3%	19.6%
PDL BioPharma Inc.	USD	2,739	2,739	81.9	40.4	22.7	17.3	-56.4	36.5	25.0	20.4	-	46.0%
Progen Pharmaceuticals Limited (USA)	USD	146	146	-	-	-	-	-	-	-	-	-73.5%	14.3%
Synta Pharmaceuticals Corp.	USD	269	269	-	-	-	-	-3.2	-3.5	-4.0	-4.8	-9.3%	-12.9%
Thermo Fisher Scientific Inc.	USD	22,029	22,029	20.3	12.0	10.6	9.7	33.1	18.9	16.2	15.0	74.8%	16.4%
Vanda Pharmaceuticals Inc.	USD	497	497	-4.3	-3.1	-3.2	-3.6	-5.6	-4.7	-4.8	-5.1	19.0%	-1.9%
			Ave	30.8	6.5	-8.2	-10.7	-2.0	8.5	7.8	11.5	-11.9%	7.7%
Europe													
Jerini AG	EUR	149	204	-3.6	-4.4	-4.9	-3.6	-5.9	-7.1	-	8.4	-16.6%	-
Merck Serono S.A.	CHF	16,629	13,818	-	-	-	-	-	-	-	-	-	-
			Ave	-3.6	-4.4	-4.9	-3.6	-5.9	-7.1	-	8.4	-16.6%	-

Prices at close of 1 Aug 2007
Source: Reuters consensus data

Recommendation structure

Absolute performance, short term (trading) recommendation: A Trading Buy recommendation implies upside of 5% or more and a Trading Sell indicates downside of 5% or more. The trading recommendation time horizon is 0-60 days. For Australian coverage, a Trading Buy recommendation implies upside of 5% or more from the suggested entry price range, and a Trading Sell recommendation implies downside of 5% or more from the suggested entry price range. The trading recommendation time horizon is 0-60 days.

Absolute performance, long term (fundamental) recommendation: The recommendation is based on implied upside/downside for the stock from the target price. A Buy/Sell implies upside/downside of 10% or more and a Hold less than 10%. For listed property trusts (LPT) or real estate investment trusts (REIT) the recommendation is based upon the target price plus the dividend yield, ie total return. A Buy implies a total return of 10% or more, a Hold 5-10% and a Sell less than 5%. This structure applies to research on Asian and European stocks published from 1 November 2005; on Australian stocks from 7 November 2006; on continental European small and mid cap stocks from 23 November 2006; and on Brazilian stocks from 18 June 2007. For UK small caps a Buy/Sell implies upside/downside of 10% or more, an Add/Reduce 5-10% and a Hold less than 5%.

Performance parameters and horizon: Given the volatility of share prices and our pre-disposition not to change recommendations frequently, these performance parameters should be interpreted flexibly. Performance in this context only reflects capital appreciation and the horizon is 12 months.

Sector relative to market: The sector view relative to the market is the responsibility of the strategy team. Overweight/Underweight implies upside/downside of 10% or more and Neutral implies less than 10% upside/downside.

Target price: The target price is the level the stock should currently trade at if the market were to accept the analyst's view of the stock and if the necessary catalysts were in place to effect this change in perception within the performance horizon. In this way, therefore, the target price abstracts from the need to take a view on the market or sector. If it is felt that the catalysts are not fully in place to effect a re-rating of the stock to its warranted value, the target price will differ from 'fair' value.

Asset allocation: The asset allocation is the responsibility of the economics team. The recommended weight (Over, Neutral and Under) for equities, cash and bonds is based on a number of metrics and does not relate to a particular size change in one variable.

Stock borrowing rating: The stock borrowing rating is the subjective view and responsibility of the ABN AMRO equity finance team: Easy implies ready availability. Moderate implies some availability. Hard implies availability is tight. Impossible implies no availability.

Distribution of recommendations

The tables below show the distribution of ABN AMRO's recommendations (both long term and trading). The first column displays the distribution of recommendations globally and the second column shows the distribution for the region. Numbers in brackets show the percentage for each category where ABN AMRO has an investment banking relationship.

Long Term recommendations (as at 02 Aug 2007)		
	Global total (IB%)	Asia Pacific total (IB%)
Buy	621 (20)	370 (2)
Add	22 (55)	1 (0)
Hold	485 (18)	282 (4)
Reduce	1 (0)	0 (0)
Sell	110 (6)	75 (0)
Total (IB%)	1239 (19)	728 (3)

Trading recommendations (as at 02 Aug 2007)		
	Global total (IB%)	Asia Pacific total (IB%)
Trading Buy	15 (20)	10 (0)
Trading Sell	1 (0)	0 (0)
Total (IB%)	16 (19)	10 (0)

Valuation and risks to target price

Mesoblast (RIC: MSB.AX, Rec: Buy, CP: A\$1.95, TP: A\$2.48): Our valuation of MSB is based on a discounted cash flow model, from which we derive our target price. Upside risks include the faster-than-expected progression to production of MSB's MPC technology, while downside risks include the lack of scalability of the manufacturing process.

Regulatory disclosures

Subject companies: **MSB.AX**

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MESOBLAST: KEY FINANCIAL DATA

Income statement

A\$m	FY05A	FY06A	FY07F	FY08F	FY09F
Revenue	0.00	2.23	2.23	2.23	2.23
Cost of sales	0.00	0.00	0.00	0.00	0.00
Gross profit	0.00	2.23	2.23	2.23	2.23
Operating costs	-1.44	-8.98	-10.4	-12.1	-14.1
EBITDA	-1.44	-6.75	-8.19	-9.87	-11.9
DDA & Impairment (ex gw)	-0.05	-0.13	-0.15	-0.15	-0.15
EBITA	-1.49	-6.88	-8.33	-10.0	-12.0
Goodwill (amort/impaird)	0.00	0.00	0.00	0.00	0.00
EBIT	-1.49	-6.88	-8.33	-10.0	-12.0
Net interest	0.40	0.45	0.07	-0.13	-0.42
Associates (pre-tax)	-0.38	-1.90	-1.90	-1.90	-1.90
Other pre-tax items	0.00	0.04	0.00	0.00	0.00
Reported PTP	-1.47	-8.30	-10.2	-12.1	-14.3
Taxation	0.00	0.00	0.00	0.00	0.00
Minority interests	0.00	0.00	0.00	0.00	0.00
Other post-tax items	0.00	0.00	0.00	0.00	0.00
Reported net profit	-1.47	-8.30	-10.2	-12.1	-14.3
Tot normalised items	0.00	0.00	0.00	0.00	0.00
Normalised EBITDA	-1.44	-6.75	-8.19	-9.87	-11.9
Normalised EBIT	-1.49	-6.88	-8.33	-10.0	-12.0
Normalised PTP	-1.47	-8.30	-10.2	-12.1	-14.3
Normalised net profit	-1.47	-8.30	-10.2	-12.1	-14.3

Source: Company data, ABN AMRO forecasts

year to Jun

Balance sheet

A\$m	FY05A	FY06A	FY07F	FY08F	FY09F
Cash & market secs (1)	15.1	7.85	-3.87	-3.72	-20.3
Other current assets	0.23	0.18	0.18	0.18	0.18
Tangible fixed assets	0.03	0.04	0.04	4.93	4.93
Intang assets (incl gw)	0.71	0.81	1.27	1.79	2.36
Oth non-curr assets	5.41	7.50	10.5	13.8	17.4
Total assets	21.5	16.4	8.12	17.0	4.56
Short term debt (2)	0.00	0.00	0.00	0.00	0.00
Trade & oth current liab	2.20	4.42	6.32	7.23	9.13
Long term debt (3)	0.00	0.00	0.00	0.00	0.00
Oth non-current liab	0.00	0.00	0.00	0.00	0.00
Total liabilities	2.20	4.42	6.32	7.23	9.13
Total equity (incl min)	19.3	12.0	1.80	9.75	-4.58
Total liab & sh equity	21.5	16.4	8.12	17.0	4.56
Net debt (2+3-1)	-15.1	-7.85	3.87	3.72	20.3

Source: Company data, ABN AMRO forecasts

year ended Jun

Cash flow statement

A\$m	FY05A	FY06A	FY07F	FY08F	FY09F
EBITDA	-1.44	-6.75	-8.19	-9.87	-11.9
Change in working capital	0.00	0.00	0.00	0.00	0.00
Net interest (pd) / rec	0.50	0.56	0.07	-0.13	-0.42
Taxes paid	0.00	0.00	0.00	0.00	0.00
Other oper cash items	0.33	3.01	0.00	0.00	0.00
Cash flow from ops (1)	-0.60	-3.18	-8.12	-10.0	-12.3
Capex (2)	-0.03	-0.02	-0.11	-5.00	-0.11
Disposals/(acquisitions)	-4.72	-4.13	-3.50	-3.85	-4.24
Other investing cash flow	-0.22	0.10	0.00	0.00	0.00
Cash flow from invest (3)	-4.97	-4.06	-3.61	-8.85	-4.35
Incr / (decr) in equity	22.7	0.00	0.00	20.0	0.00
Incr / (decr) in debt	0.00	0.00	0.00	0.00	0.00
Ordinary dividend paid	0.00	0.00	0.00	0.00	0.00
Preferred dividends (4)	0.00	0.00	0.00	0.00	0.00
Other financing cash flow	-1.99	0.00	0.00	-1.00	0.00
Cash flow from fin (5)	20.7	0.00	0.00	19.0	0.00
Forex & disc ops (6)	n/a	n/a	n/a	n/a	n/a
Inc/(decr) cash (1+3+5+6)	15.1	-7.24	-11.7	0.15	-16.6
Equity FCF (1+2+4)	-0.64	-3.20	-8.23	-15.0	-12.4

Lines in bold can be derived from the immediately preceding lines.

Source: Company data, ABN AMRO forecasts

year to Jun

Mesoblast

Company description

Mesoblast (MSB) aims to capitalise on its patents that relate to the identification, extraction and culture of adult mesenchymal precursor cells (MPCs). MPCs are not fixed as to potential cell-line development (ie, MPCs can become any type of cell, rather than being a mixture of committed type of cells). MSB hopes to develop treatments for bone/joint and cardiovascular diseases.

Buy

Price relative to country



Strategic analysis

Average SWOT company score: 4

Orthobiologicals market

Strengths

We believe the potential inclusion of mesenchymal progenitor cells in bone graft substitutes is a step change in the technology of bone graft substitutes.

Weaknesses

There is limited evidence of scalability of the manufacturing process.

Opportunities

More than 1m of the 5.6m fractures occurring annually in the US are associated with healing difficulties in which repair processes stop before the break is completely mended. In addition, there are opportunities in cardiac and cartilage regeneration.

Threats

Recent research has established a protocol for safe and accelerated expansion of MPCs to be used in cell and tissue therapy after optimisation not unlike the MSB process. This may be used to imitate MSB's processes.

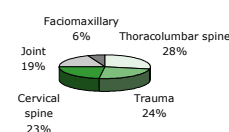
Scoring range is 1-5 (high score is good)

4

3

4

3



Source: Company data

Market data

Headquarters

Level 39, 55 Collins Street, Melbourne, Victoria, 3000

Website

www.mesoblast.com

Shares in issue

101.3m

Freefloat

66%

Majority shareholders

Dr. Silviu Itescu (35%), AMP Ltd (17%), Thorney Holding (6%)

Australia

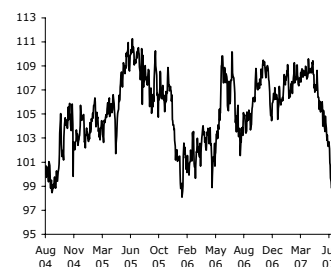
Country view

Neutral

Country rel to Asia Pacific

We recommend a Neutral position in Australian equities. We expect the economy to slow in 2007 due to deteriorating drought conditions and the impact of RBA interest rate increases. However, profit growth for 2007 looks solid, although off recent peaks. In addition, there is an unprecedented level of cash available - on corporate balance sheets and in the hands of private equity and institutional investors. This weight of money should underpin the market during 2007. Our preferred sectors are Consumer Staples (defensive), Healthcare (strong through the cycle), Capital Goods (ongoing non-residential and infrastructure spending) and Metals and Mining (strong Chinese GDP growth). We recommend underweight positions in sectors most exposed to a slowing economy (eg, Transport & Basic Industries).

The country view is set in consultation with the relevant company analyst but is the ultimate responsibility of the Strategy Team.



Competitive position

Average competitive score: 4-

4-

Supplier power

At present, MSB sources its MPCs itself and outsources its manufacturing. Cambrex is a contract manufacturing facility only.

Barriers to entry

The critical intellectual property for a biotech company is its patents. Our analysis of the MSB patent suggests it is strong. We understand MSB is also aiming to generate EU patent protection.

Customer power

Allograft bone banks continue to suffer from lack of donations, and this is likely to continue. Hence orthopaedic surgeons are likely to increasingly use the only other product, synthetic bone graft.

Substitute products

Adult stem cell therapy for bone fractures and spinal disease, and regeneration of damaged joint cartilage and intervertebral discs is a new technology, so there are minimal substitute products.

Rivalry

The only osteoinductive agents currently commercially available in large quantities are the bone morphogenetic proteins (BMPs). There are no other products that include MPCs.

Scoring range 1-5 (high score is good) Plus = getting better Minus = getting worse

4-

3+

4-

4-

3-