

RECOMMENDATIONS

Rating	BUY ▲
Risk	Speculative
Price Target	\$0.009
Share Price	\$0.003

SNAPSHOT*

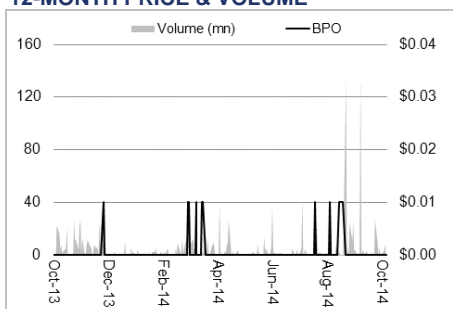
Monthly Turnover	\$0.6mn
Market Cap	\$11mn
Shares Issued	3,506.5mn
52-Week High	\$0.005
52-Week Low	\$0.001
Sector	Health Care

Note: No. of shares does not take into account current transactions related to moving to 100% ownership of Invatec and recent capital raising.

BUSINESS DESCRIPTION

BioProspect is developing a new diagnostic test for mental illness which we call the Invatec test. This test is based on measured differences in heart rate variability analysed using proprietary algorithms. BioProspect argues that its test is simple, non-invasive, safe and quick, with potential to become the world's first quantitative, evidenced-based test for mental illness. BioProspect's team is currently optimising the technology to the point where it detects ~90% of all mental health cases where there has previously been a physician diagnosis

12-MONTH PRICE & VOLUME



RESEARCH ANALYST

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Disclosure

The author owns no shares in BPO.

Baillieu Holst Ltd has raised funds for BioProspect Ltd and earned fees in relations to those activities in the last twelve months.

BioProspect (BPO)

INITIATION OF COVERAGE

Diagnosing mental health just got a whole lot easier

- Company summary.** BioProspect is developing a new diagnostic test for mental illness which we call the Invatec test. This test is based on measured differences in heart rate variability, analysed using proprietary algorithms. BioProspect argues that its test is simple, non-invasive, safe and quick, with the potential to become the world's first quantitative, evidenced-based test for mental illness. BioProspect's team is currently optimising the technology to the point where it detects ~90% of all mental health cases where there has previously been a physician diagnosis.
- The Invatec test's likely primary application is Depression,** since there is a large prevalence – perhaps 4-5% of the global adult population - and there is currently no objective diagnosis method.
- Invatec test is the basis for a consumer app to be released next year.** Currently BioProspect is working on a consumer app for tracking mental health – initially a monitor for chronic stress to be called My Bettermind – which would be available via Google Play and the App Store. This app, expected to be released late in mid-2015, would not be an official diagnostic but would suggest that the user see a physician. We see this app as an early revenue producer for BioProspect as well as driving awareness of Invatec test.
- The test will ultimately be a physician-administered diagnostic,** subject to clinical validation and regulatory approval. BioProspect is currently preparing for a validation study of the Invatec test, most likely in Depression, and potentially involving US hospitals top-ranked for their psychiatric expertise. We expect that after this initial study BioProspect will file for 510(k) approval of the test, as well as CE Mark, probably in 2015. Following approval of the initial indication or indications we expect further studies would be done in other mental health conditions. Anxiety disorder is particular interesting given the high prevalence.
- BioProspect is now set up for the next stage of its development,** with A\$3.5m having been raised in a placement at 0.3 cents per share in October 2014. A recent restructuring of the BioProspect vehicle simplifies the investment proposition.
- BioProspect is undervalued on our numbers,** with a base case valuation of 0.9 cents per share and optimistic case of 2.1 cents on a probability-weighted DCF valuation. Our target price sits at our base case.

INVESTMENT SUMMARY

Year End: 30 June		2013 (A)	2014 (A)	2015 (E)	2016 (E)	2017 (E)
Revenue	\$mn	0	0	0	3	7
EBITDA	\$mn	-0.9	-0.3	-2.6	-0.4	2.7
EBIT	\$mn	-0.9	-0.3	-2.6	-0.4	2.7
Reported Profit	\$mn	-1.1	-0.4	-2.7	-0.5	2.5
Adjusted Profit	\$mn	-1.1	-0.4	-2.7	-0.5	2.5
EPS (Reported)	¢	0.0	0.0	0.0	0.0	0.0
EPS (Adjusted)	¢	0.0	0.0	0.0	0.0	0.0
EPS Growth	%	N/A	N/A	N/A	N/A	N/A
PER (Reported)	x	N/A	N/A	N/A	N/A	13.7
PER (Adjusted)	x	N/A	N/A	N/A	N/A	13.7
Dividend	¢	0.0	0.0	0.0	0.0	0.0
Yield	%	0.0	0.0	0.0	0.0	0.0
Franking	%	0	0	0	0	0

Financial summary

Code	BPO
Analyst	Stuart Roberts
Date	27 October, 2014
Share price	\$0.0030
Market capitalisation	\$11m
Year end	30 June

Rating	BUY
Price target	\$0.009
Upside/downside	200.0%
Valuation	\$0.009 / \$0.021
Valuation method	Probability-weighted DCF
Risk	Speculative

PROFIT AND LOSS (A\$m)					
Y/e June 30 (A\$m)	FY13A	FY14A	FY15E	FY16E	FY17E
Revenue	0.0	0.5	0.3	3.2	7.5
EBITDA	-0.9	-0.3	-2.6	-0.4	2.7
D&A	0.0	0.0	0.0	0.0	0.0
EBIT	-0.9	-0.3	-2.6	-0.4	2.7
Net interest	-0.2	-0.1	-0.1	-0.1	-0.1
Pre-tax profit	-1.1	-0.4	-2.7	-0.5	2.5
Tax	0.0	0.0	0.0	0.0	0.0
NPAT	-1.1	-0.4	-2.7	-0.5	2.5
Minority interests	0.0	0.0	0.0	0.0	0.0
Net profit after minorities	-1.1	-0.4	-2.7	-0.5	2.5

BALANCE SHEET (A\$m)					
Y/e June 30	FY13A	FY14A	FY15E	FY16E	FY17E
Cash	0.2	0.1	1.1	0.8	3.5
Current receivables	0.1	0.1	0.1	0.3	0.4
Inventories	0.0	0.0	0.0	0.1	0.3
Other current assets	0.0	0.0	0.0	0.0	0.0
Current assets	0.2	0.2	1.2	1.2	4.2
PPE	0.0	0.0	0.0	0.0	0.0
Intangible assets	0.0	0.9	0.9	0.9	0.9
Other non-current assets	5.2	3.9	3.9	3.9	3.9
Non-current assets	5.2	4.8	4.8	4.8	4.8
Total assets	5.4	5.0	6.0	6.0	9.0
Payables	0.4	0.4	0.4	0.5	0.6
Debt	2.4	1.9	0.4	0.4	0.4
Other liabilities	0.0	0.0	0.0	0.0	0.0
Total liabilities	2.9	2.3	0.8	0.9	1.0
Shareholders' equity	2.5	2.7	5.2	5.1	8.0
Minorities	0.0	0.0	0.0	0.0	0.0
Total shareholders funds	2.5	2.7	5.2	5.1	8.0
Total funds employed	5.4	5.0	6.0	6.0	9.0
W/A shares on issue	2,505	2,904	8,797	11,631	11,631

CASH FLOW (A\$m)					
Y/e June 30	FY13A	FY14A	FY15E	FY16E	FY17E
NPAT plus discontinued ops.	-1.1	-0.4	-2.7	-0.5	2.5
Non-cash items	0.1	0.1	0.4	0.4	0.4
Working capital	-0.1	-0.3	0.0	-0.1	-0.2
Other operating cash flow	0.0	0.0	0.0	0.0	0.0
Operating cashflow	-1.1	-0.6	-2.3	-0.3	2.7
Capex	0.0	0.0	0.0	0.0	0.0
Investments	0.0	1.4	0.0	0.0	0.0
Other investing cash flow	0.0	0.0	0.0	0.0	0.0
Investing cashflow	0.0	1.4	0.0	0.0	0.0
Change in borrowings	0.2	-0.8	0.0	0.0	0.0
Equity raised	1.1	0.0	3.3	0.0	0.0
Dividends paid	0.0	0.0	0.0	0.0	0.0
Other financing cash flow	0.0	0.0	0.0	0.0	0.0
Financing cashflow	1.3	-0.8	3.3	0.0	0.0
Net change in cash	0.1	-0.1	1.0	-0.3	2.7
Cash at end of period	0.2	0.1	1.1	0.8	3.5

EARNINGS (A\$m)					
Y/e June 30	FY13A	FY14A	FY15E	FY16E	FY17E
Net profit (\$m)	-1.1	-0.4	-2.7	-0.5	2.5
EPS (c)	0.0	0.0	0.0	0.0	0.0
EPS growth (%)	N/A	N/A	N/A	N/A	N/A
P/E ratio (x)	-6.9	-20.4	-9.8	-71.4	13.7
CFPS (c)	0.0	0.0	0.0	0.0	0.0
Price/CF (x)	-6.6	-13.7	-11.3	-125.5	13.0
DPS (c)	0.0	0.0	0.0	0.0	0.0
Yield (%)	0.0%	0.0%	0.0%	0.0%	0.0%
Franking (%)	N/A	N/A	N/A	N/A	N/A
EV/EBITDA	-10.4	-28.8	-3.7	-25.6	3.5
EV/EBIT	-10.3	-28.8	-3.7	-25.6	3.5

PROFITABILITY RATIOS					
Y/e June 30	FY13A	FY14A	FY15E	FY16E	FY17E
EBITDA/revenue (%)	-4773.7%	-69.6%	-965.5%	-11.5%	35.8%
EBIT/revenue (%)	-4794.7%	-69.6%	-965.5%	-11.5%	35.8%
Return on assets (%)	-20.2%	-8.5%	-44.6%	-8.2%	28.3%
Return on equity (%)	-43.2%	-15.8%	-51.8%	-9.6%	31.9%
Return on funds empl'd (%)	-22.2%	-9.3%	-48.1%	-8.9%	30.4%
Dividend cover (x)	N/A	N/A	N/A	N/A	0%
Effective tax rate (%)	0.0%	0.0%	0.0%	0.0%	0.0%

LIQUIDITY AND LEVERAGE RATIOS					
Y/e June 30	FY13A	FY14A	FY15E	FY16E	FY17E
Net debt/(cash) (\$m)	2	2	-1	0	-3
Net debt/equity (%)	87.4%	66.4%	-13.3%	-8.2%	-38.8%
Net interest cover (x)	N/A	N/A	N/A	N/A	20.9
Current ratio (x)	0.1	0.1	2.8	2.3	6.8

INTERIMS					
Y/e June 30 (\$m)	2H13A	1H14A	2H14A	1H15F	2H15F
Revenue	0.0	0.5	0.0	0.1	0.1
EBITDA	-0.3	0.1	-0.4	-1.2	-1.3
D&A	0.0	0.0	0.0	0.0	0.0
EBIT	-0.3	0.1	-0.4	-1.2	-1.3
Net interest	-0.1	-0.1	0.0	-0.1	-0.1
Pre-tax profit	-0.4	0.0	-0.5	-1.3	-1.4
Tax	0.0	0.0	0.0	0.0	0.0
NPAT	-0.4	0.0	-0.5	-1.3	-1.4
Minority interests	0.0	0.0	0.0	0.0	0.0
Net profit after minorities	-0.4	0.0	-0.5	-1.3	-1.4

VALUATION		
	Base	Optim.
Consumer app (A\$m)	29.9	80.5
In-office diagnostic (A\$m)	60.2	154.0
Value of BioProspect technology	90.1	234.5
Value of tax losses	11.2	11.2
Corporate overhead	-5.3	-5.3
Cash now (A\$m)	3.6	3.6
Cash to be raised (A\$m)	0.0	0.0
Total value (A\$m)	99.7	244.1
Total diluted shares (million)	11631.2	11631.2
Value per share	\$0.009	\$0.021
Valuation midpoint	\$0.015	
Share price now (A\$ per share)	\$0.003	
Upside to midpoint	400.0%	

Summary investment view

We rate BioProspect a BUY with a target price of 0.9 cents per share. We see five reasons to buy BioProspect at current prices:

- **The Invatec test's likely primary application is Depression**, since there is a large prevalence of Depression in most industrial countries – perhaps 4-5% of the adult population - and there is currently no objective way for physicians to diagnose the condition. BioProspect believes that the Invatec test would be the world's first quantitative, evidenced-based test for mental illness.
- **The Invatec test is the basis for a consumer app to be released next year.** Currently BioProspect is working on a consumer app for tracking mental health – initially a monitor for chronic stress to be called My Bettermind – which would be available via Google Play and the App Store. This app, expected to be released late in mid-2015, would not be an official diagnostic but would suggest that the user see a physician. We see this app as an early revenue producer for BioProspect as well as driving awareness of the Invatec test. The app also helps position BioProspect in an area of enormous usage growth involving major players such as Apple, Google and Samsung.
- **The Invatec test will ultimately be a physician-administered diagnostic**, subject to clinical validation and regulatory approval. BioProspect is currently preparing for a validation study of the Invatec test, most likely in Depression, and potentially involving US hospitals top-ranked for their psychiatric expertise¹. We expect that after this initial study BioProspect will file for 510(k) approval of the test, as well as CE Mark, probably in 2015. Following approval of the initial indication or indications, we expect further studies would be done in other mental health conditions. Anxiety disorder is particular interesting given the high prevalence.
- **BioProspect is attracting some quality people.** Executive Director Claude Solitario has been involved in development of various technology-based ventures for over 25 years, while Stephen Stapelberg, Commercial Development Manager, brings many years' experience in consumer marketing. We see the recent involvement in BioProspect of people such as Dr Matt Mesnik (Chief Medical Officer), Dr James Campbell (a new non-executive director) and Steve Pearce (Chairman of the Medical and Scientific Advisory Board) as greatly strengthening the commercial prospects of the Invatec test.
- **BioProspect is undervalued on our numbers**, with a base case valuation of 0.9 cents per share and optimistic case of 2.1 cents on a probability-weighted DCF valuation. Our target price sits at our base case valuation.

We value BioProspect at 0.9 cents per share base case and 2.1 cents per share optimistic case

Summary of valuation methodology

Our valuation of BioProspect was achieved as follows:

- Our WACC is 16% (speculative);
- We model separate payoffs for the My Bettermind consumer app and the regular in-office diagnostic application;
- For valuation purposes we assume 100% ownership of Invatec Health;
- We attribute no development risk for the consumer app, but a 20% chance of failure to the in-office diagnostic;
- We assume the consumer app can reach \$5-10m in annual revenue within five years of launch;
- We assume that the in-office diagnostic can reach \$30-50m over a similar time period; and
- We assume the total shares on issue as per the company's 8/9/2014 announcement.
- We assume that no further capital needs to be raised after the October 2014 raising.

¹ U.S. News and World Report surveys psychiatric specialists as part of the research for its annual Best Hospitals rankings. 14 US hospitals have consistently been named among the best for difficult cases and procedures by at least 5% of the specialists that responded for the last three years. See health.usnews.com/best-hospitals/rankings/psychiatry.

Diagnosing mental health just got a whole lot easier

- **BioProspect is developing a new diagnostic test for mental illness which we call the Invatec test**, because it came from a privately held Perth-based company called Invatec Health. BioProspect, ASX-listed since 2001, is being used as the shell to back-door list the Invatec venture.
- **The Invatec test facilitates the diagnosis and monitoring of mental illness using heart rate variability.** The diagnostic, invented at the University of Western Australia, involves the use of a couple of externally-worn sensors that capture circadian heart rate data – that is, the changes in heart rate that take place over a cycle of roughly 24-hours. This data is then uploaded wirelessly to a Cloud-based server for analysis using proprietary algorithms, which can flag mental health conditions based on subtle changes in heart rate variability. BioProspect argues that its test is simple, non-invasive, safe and quick, with the potential to become the world's first quantitative, evidenced-based test for mental illness.

There are a lot of mental health problems out there

- **Major Depression may affect ~4% of the population.** Major Depression, or Major Depressive Disorder as it is often called, is commonplace globally, particularly in industrial countries². Global prevalence has been estimated at 4.0-5.0%³, for a patient population of >300 million people. One study using data from the CDC's Behavioral Risk Factor Surveillance Survey - an on-going telephone health survey system – found that 3% of the US adult population has Major Depression⁴, and another 6% may have other kinds of Depression⁵.
- **Anxiety may affect close to one in five adults this year.** One large US survey found that in any 12-month period 18% of US adults had experienced an anxiety disorder of some kind. Within this grouping, the 12-month prevalence of Generalised Anxiety Disorder - excessive worry about various everyday problems for at least six months – was estimated at ~3%⁶.
- **There will be around 30,000 cases of acute psychosis in America this year**, judging by incidence data for 'acute and transient' psychotic disorders⁷. Psychosis is a mental disorder characterised by delusions, hallucinations and a general lack of touch with reality. Such disorders are treatable with antipsychotic drugs such as Abilify (a US\$2.8bn drug for Bristol-Myers Squibb in 2012), Risperdal (US\$4.4bn for J&J in 2007), Seroquel (US\$5.8bn for AstraZeneca in 2011) and Zyprexa US\$5bn for Eli Lilly in 2010).
- **Panic disorder may affect 2% of the population.** Panic disorder – where a person experiences sudden and repeated attacks of fear – may affect around 5-6% of women and 1% of men in industrial countries⁸.
- **Around 1% of the population has manic depression.** Bipolar disorder Type I – often called manic depression, where depression alternates with brief periods of elevated mood – affects 1% of the US population while another 0.5-1.0% has Bipolar disorder Type II, the milder version⁹.
- **Stress is commonplace.** In the US around 41% of adults will experience at least one symptom of stress in the next 30 days¹⁰.

4-5% of the world's population may have Major Depression

² Along with psychosis, it seems to run with increasing urbanisation – see Br J Psychiatry. 2004 Apr;184:293-8.

³ See Psychol Med. 2013 Mar;43(3):471-81. Epub 2012 Jul 25 and Ferrari et al., PLoS Med. 2013 Nov;10(11):e1001547. Epub 2013 Nov 5.

⁴ See MMWR Morb Mortal Wkly Rep. 2010 Oct 1;59(38):1229-35.

⁵ Other types of depression include dysthymia (mild but chronic depression), 'atypical' depression (depression with, among other things, 'mood reactivity', allowing the subject to temporarily brighten up in response to happy news) and Seasonal Affective Disorder (the depression that hits in winter when there is less sun about).

⁶ See Arch Gen Psychiatry. 2005 Jun;62(6):617-27.

⁷ See Compr Psychiatry. 2008 May-Jun;49(3):255-61. Epub 2007 Dec 20.

⁸ See Soc Psychiatry Psychiatr Epidemiol. 2002 May;37(5):207-11.

⁹ See Arch Gen Psychiatry. 2007 May;64(5):543-52.

¹⁰ Source: American Psychological Association, Stress in America survey for 2013.

Why Depression is a particularly serious health issue

- **Depression tends to have co-morbidities**, which intuitively makes sense because people who are depressed are less motivated to look after themselves. Treating Depression is therefore potentially a way to treat other costly chronic health conditions such as
 - Type II diabetes, where people have twice the risk of Depression as the general population¹¹.
 - Cardiovascular disease, where around 20-35% of patients are typically depressed¹²;
 - Obesity - being depressed increases one's risk of being obese by ~60%¹³;
 - Sleep apnea – Having sleep apnea more than doubles a patient's Depression risk¹⁴.
- **Depression is costly**, not just because of the treatment costs, or the missed work days, but because it can kill people. One 2003 paper estimated that the economic burden of Depression in 2000 in America was ~US\$83bn. We estimate it to be US\$100bn today¹⁵.
 - In 2009 17.6 million US adults were treated for Depression, or 7.6% of all adults, at a cost of US\$22.8bn, that is, ~US\$1,300 per patient. US\$8.2bn was spent on hospital visits and US\$12bn was spent on antidepressant medications¹⁶. Outpatient treatment probably cost another ~US\$2.6bn.
 - One Gallup study in the US suggested that 10.8% of members of the full-time workforce has Depression and will miss 8.7 work days per year because of ill-health. Non-depressed workers only lose 4.5 days to ill-health. The difference in terms of lost productivity is estimated at US\$19bn¹⁷. Other estimates have put the combined cost of absenteeism and 'presenteeism' for all workers at >US\$50bn¹⁸.
 - It's very sad to note that in the US, in 2011, 38,000 people chose to take their own lives. It's fair to say that many of these people were depressed¹⁹. One study has suggested that up to two-thirds of suicide victims contact a primary care physician in the four weeks before their death²⁰.
 - Depression tends to move in lockstep with unemployment, with the unemployed around 60% more likely to become depressed over any 12-month period²¹. Consequently it's reasonable to suggest that Depression prevalence increased in the three years after 2007.
- **People don't talk to their doctors about Depression**. One US survey that used NHANES data found that only 29% of people experiencing Depression contacted a mental health professional²².
- **Depression is difficult to diagnose using current approaches**. You go to a doctor and say you're depressed. The doctor does a physical examination to rule out whether or not the symptoms are linked to an underlying physical health problem. He may also order a blood test to check for thyroid problems, long known to cause Depression²³. After that, it's the doctor talking to you about your thoughts and feelings, often with the help of questionnaires that allow the level of mood to be estimated and go by names such as the Beck Depression Inventory, the Hamilton Depression Rating Scale for Depression (commonly known as HAM-D) or the Zung Self-rating Depression Scale. All of the aforementioned questionnaires have been around a long time²⁴, and are widely regarded

Depression costs the US economy US\$19bn in terms of full-time worker days lost

¹¹ See Diabetes Care. 2001 Jun;24(6):1069-78

¹² See Circulation. 2005 Jan 25;111(3):250-3.

¹³ See Arch Gen Psychiatry. 2010 Mar;67(3):220-9.

¹⁴ See J Clin Sleep Med. 2013 May 15;9(5):417-23.

¹⁵ The 2003 paper was Greenberg et. al., J Clin Psychiatry. 2003 Dec;64(12):1465-75. We took the basic assumptions of this paper and updated them to the present time.

¹⁶ Source: *Trends in use and expenditures for Depression among US adults age 18 and older, civilian noninstitutionalized population, 1999 and 2009*, AHRQ Statistical Brief No. 377, July 2012.

¹⁷ See 24/7/2013 Gallup article by Dan Witters, Diana Liu, and Sangeeta Agrawal and headlined *Depression costs US workplaces \$23 billion in absenteeism*. The numbers were estimated using J Occup Environ Med. 2003 Jan;45(1):5-14. Absenteeism from depressed part time workers costs another US\$4.2bn on these figures.

¹⁸ See Greenberg et. al., op. cit.

¹⁹ Greenberg et. al., op. cit., calculates the cost of depression by assuming 60% of all suicides as Depression-related.

²⁰ See Br J Psychiatry. 1998 Dec;173:462-74.

²¹ See Soc Sci Med. 2011 Dec;73(11):1627-34. Epub 2011 Oct 10.

²² See *Depression in the United States household population, 2005-2006*, NCHS Data Brief, No. 7, September 2008.

²³ See J Thyroid Res. 2012;2012:590648. Epub 2011 Dec 14.

²⁴ Hamilton since 1960 (See J Neurol Neurosurg Psychiatry. 1960 Feb;23:56-62), Beck since 1961 (See Arch Gen Psychiatry. 1961 Jun;4:561-71) and Zung since 1965 (See Arch Gen Psychiatry. 1965;12(1):63-70).

as having utility even with their known shortcomings²⁵. The drawback with such tests is not just that they are time-consuming, but also qualitative and therefore somewhat subjective even though they result in a quantitative score. Also, they may have unwitting cultural biases²⁶ given their age and where and by whom they were developed²⁷.

Why the Invatec test works as an objective diagnostic

- **Heart rate variability (HRV) is predictive of Depression.** Heart rate is simply the time interval between heartbeats, which in adult resting hearts normally ranges between 60 and 100 beats per minute. Heart rate is supposed to vary with the respiratory cycle, beating a little faster as one breathes in and slower when you breathe out. The process is called 'respiratory sinus arrhythmia' and is under the control of the autonomic nervous system²⁸. However after heart attacks and in heart failure HRV is reduced, and this reduction is strongly predictive of death. What seems to be happening is that the parasympathetic nervous system, which would ordinarily slow the heart rate, gradually loses effectiveness, allowing the sympathetic nervous system to overstimulate, and as a result weaken, the heart. Frequently heart attack patients go through a bout of Depression after their attack²⁹ - we noted above the 20-35% co-morbidity for cardiovascular disease generally. In recent years a body of work has elaborated the link between reduced HRV and Depression:
 - Licht et. al. at the Free University of Amsterdam in the Netherlands showed in a large adult sample showed that HRV was lower in depressed people compared to healthy controls, but concluded that this was a result of anti-depressant medication³⁰.
 - Kemp et. al. at the University of Sydney in 2010³¹ showed in a meta-analysis of depressed patients without cardiovascular disease that Depression went with lower HRV and depression severity was negatively correlated with HRV³².
 - Kemp et. al. were able to establish in 2012 that the reduced HRV in Depression was not driven by antidepressants³³, firmly establishing HRV as a Depression biomarker.
- **The Invatec test is simple.** The Invatec test, which was invented around 1998³⁴, involves the identification of various distinct patterns in heart rate data indicative of Depression and certain other mental illnesses. Knowledge of these patterns makes an HRV-based diagnostic for mental health fairly simple – heart rate data is collected using a heart rate monitor over a 24-hour period, and this is then sent to the Cloud for analysis using BioProspect's algorithm to search for the relevant HRV abnormalities. Since Bluetooth-enabled heart rate monitors are everywhere these days – Samsung's new Galaxy Gear 2 smartwatch comes with one - the data can be processed on mobile phones and tablets as well, meaning that it can work as an app.
- **The Invatec test has a high level of specificity, and is getting better.** The Invatec test has largely been used to diagnose five main mental health conditions - Major Depression, Generalized Anxiety Disorder, acute psychosis, panic disorder and delusional disorder – with a high level of correlation between expert clinician that until 2014 averaged ~90% in everyday clinical practice, across ~6,000 patients monitored over many years up to 2014.
 - BioProspect's due diligence team, which included independent researchers from Universities of NSW, Sydney and Newcastle, initiated a new analysis of the sensitivity of the Invatec in early 2014, with results available in March. In this study the Invatec test was able to identify, with statistical significance, >80% of patients with various known mental health conditions, while patients followed up with serial monitoring over extended periods of time showed that normalisation of HRV correlates with clinical recovery³⁵. 80% may seem low, but it's worth keeping in mind that this was a blinded test of patients (98 case files) as well as healthy controls, where the patients had

Peer-reviewed papers have established the connection between heart rate variability and Depression

²⁵ For Beck, see *Psychopathology*. 1998;31(3):160-8; for Hamilton, see *Am J Psychiatry*. 2004 Dec;161(12):2163-77; for Zung, see *West Indian Med J*. 2012 Aug;61(5):483-8, which found that Beck worked better than Zung.

²⁶ Consider that Japan and South Korea may only have 2.5% Depression prevalence whereas the Netherlands may have 8% and Switzerland 6% (Ferrari et. al., op. cit.). Possibly the questionnaires are biasing the data. Possibly not. One study suggesting that in fact Japanese people are less prone to Depression was a comparison of 'culturally Japanese' and 'culturally Western' men of Japanese heritage in Hawaii (see *Am J Geriatr Psychiatry*. 2012 Apr;20(4):337-45).

²⁷ Aaron Beck (1921-) and Bill Zung (1929-1992) did their work in the US while Max Hamilton (1912-1988) did his in the UK.

²⁸ The part of the nervous system responsible for control of the bodily functions not consciously directed, such as breathing and heartbeat.

²⁹ See *Curr Opin Cardiol*. 2007 Jul;22(4):286-91. US President Dwight Eisenhower (1890-1969) had such an experience after his 1955 heart attack when President (see *Perspect Biol Med*. 1978 Autumn;22(1):115-26).

³⁰ See *Arch Gen Psychiatry*. 2008 Dec;65(12):1358-67.

³¹ In work funded by Brain Resource (ASX: BRC).

³² See *Biol Psychiatry*. 2010 Jun 1;67(11):1067-74. Epub 2010 Feb 6. This analysis also found that antidepressants didn't fix the HRV problem

³³ See *PLoS One*. 2012;7(2):e30777. Epub 2012 Feb 15.

³⁴ The relevant patent application is *Method for diagnosing psychiatric disorders*, WO/1998/046128, priority date 11/4/1997.

³⁵ See BioProspect's market release dated 20 March 2014.

previously been physician-diagnosed, with all the labour-intensity that implies. Also, the study used algorithms which had been identified by Invatec some years ago, and the investigators came away convinced that better algorithms could be built into the test.

- BioProspect and its collaborators have markedly improved the algorithm behind the Invatec test since March, with sensitivity and specificity having risen to 82-92%, with more progress to come, since the algorithm involves machine learning³⁶. We understand that a 12-hour version of the test is being developed, which would improve compliance. We see completion of this optimisation process as a significant value driver for BioProspect.
- **The Invatec test fits with official calls for better diagnostics.** The standard way in which a mental health disorder is defined has traditionally been its entry in 'DSM' – the American Psychiatric Association's *Diagnostic and Statistical Manual of Mental Disorders* – the 5th Edition of which was published in May 2013³⁷. DSM entries basically represent a consensus of opinion across the psychiatric profession in the US, which can change over time with the culture³⁸. DSM5 has been notable because the National Institute of Mental Health (NIMH) indicated, just prior to its publication, that it didn't feel that the definitions in the DSM were valid. They were, in the opinion of NIMH director Dr Tom Insel, 'based on a consensus about clusters of clinical symptoms, not any objective laboratory measure'³⁹. The NIMH's Research Domain Criteria (RDoC) initiative is now working on gathering data for more objective measures involving things like genetics and imaging. We see the Invatec test as potentially becoming part of the new, 'post-DSM' paradigm for diagnosis and monitoring of mental health.
- **The Invatec test is potentially very valuable for five main reasons:**
 - The test provides an easy-to-use screening tool for physicians that can also be used to monitor treatment response;
 - The test can be used to identify people in occupations such as law enforcement and emergency services with a high risk for Depression⁴⁰;
 - With this test insurance companies and governments will have an objective measure for disability claims. When around 1% of the working age population moves onto disability benefits into year, and around 40% of these new claims relate to mental illness, the potential benefits of better diagnostics are clear⁴¹
 - Pharma companies will be interested to monitor the performance of their drugs in the clinic as well as on the market. We noted earlier the blockbusters historically created in the anti-psychotic class. Depression has similarly been big business for Big Pharma, with antidepressants an US\$11bn drug class in the US in 2011⁴².
 - Reimbursement agencies may be better able to target treatment. For health insurers managing mental health for people not yet disabled, a tool like the Invatec test could lower drug as well as other therapy costs once enough data becomes available.

The National Institute of Mental Health wants more objective ways of defining mental health

BioProspect is now a player in mobile health

- **Mobile health is booming**, with startups all over the world developing the software to capture more health-related information and provide it to consumers as well as other elements of the healthcare system. With global smartphone shipments booming at the moment, up 25% year-on-year in Q2 2014⁴³, and ~24% of the world's total population expected to be able to use smartphones this year⁴⁴, mobile health is potentially a gold mine for companies with the right kind of products. BioProspect aims to be part of this boom:

³⁶ See BioProspect's October 2014 presentation, slide 10.

³⁷ See www.dsm5.org.

³⁸ Consider that homosexuality is a mental disorder in DSM-1 (1952) and DSM-2 (1968). In 1973 the Board of Trustees of the American Psychiatric Association voted to delete homosexuality from the DSM, however in a 1974 poll of the APA membership only 58% were in favour of this decision (Source: *Psychiatry in Law, Law in Psychiatry* by Ralph Slovenko, 2nd Edition, p 306).

³⁹ See the 29/4/2013 entry in the Blog of NIMH director Dr Tom Insel.

⁴⁰ To cite just one example of the high level of Depression among policemen, one survey in the southern Taiwanese city of Kaohsiung found a probable risk of Major Depression in policemen there of 21.6% (see *Qual Life Res.* 2006 Jun;15(5):925-32). Taiwan as a whole may have a Depression rate of only 2.5% (as per Ferrari et al., op. cit.).

⁴¹ The 1% figure is from the UK, but the average for the OECD is still around 0.5% of the working age population – see OECD press release dated 10/2/2014 and headlined 'UK needs to tackle high cost of mental-ill health, says OECD'.

⁴² Source: IMS Health.

⁴³ Source: Source: IDC press release dated 14/8/2014 and headlined 'Worldwide smartphone shipments edge past 300 million units in the second quarter; Android and iOS devices account for 96% of the global market'.

⁴⁴ See the eMarketer press release dated 16/1/2014 and headlined 'Smartphone users worldwide will total 1.75 billion in 2014. On eMarketer's numbers global smartphone penetration will have crossed the 33% mark by 2017.

- Funding of digital health startups in America, at US\$700m in the March 2014 quarter, was up 87% year-on-year⁴⁵. A lot of this funding is for consumer-focused health technology companies and much of that is for mobile health⁴⁶.
- 46 million people in the US used fitness and health apps in January 2014, around 16 times a month on average. The number of people accessing such apps was up 18% year-on-year⁴⁷. That's significant given that 116 million Americans own a smartphone and 64 million own a tablet⁴⁸. Some health apps have amazing market reach. For example, apps from MyFitnessPal⁴⁹, which helps people accurately track their caloric intake and exercise, reportedly has 50 million registered users⁵⁰.
- There has been a boom in wearable, app-driven 'band' devices for fitness – basically, wireless activity trackers – that has created a US\$330m market in 2013⁵¹. The key players in this space are Fitbit⁵², Jawbone⁵³ and, importantly, Nike⁵⁴.
- Samsung⁵⁵, which is seeking with its Galaxy Gear product to dominate the new 'smartwatch' market (and which, as we noted above, now includes a heart rate monitor), is pushing hard in the health category with its S Health app. Other smartwatch players in this space include Sony, LG and a recent start-up called Pebble⁵⁶. Smartwatches are set to explode in popularity – BI Intelligence forecasts 91.6 million units to ship globally by 2018, from virtually nothing in 2013⁵⁷.

Health and fitness app access in America was up 18% year-on-year in January 2014

■ **Apple, Google and Samsung are working on new platforms that can handle e-health.** As tech followers will readily appreciate, a market as active and growing as mobile health is sooner-or-later going to attract the attention of Apple, Google and Samsung:

Apple and Samsung are set to compete on e-Health platforms

- Apple⁵⁸ released its iOS8 operating system in September 2014, shortly after the release of iPhone 6. A key feature of iOS8 is HealthKit⁵⁹, a Cloud API for integrating health and fitness data from multiple apps and monitoring devices into a digital repository. The appeal of HealthKit is expected to be the ability to put all the relevant data in the one place, allowing things like 'emergency cards' recording blood type or allergies to be created. For a sense of the potential of HealthKit, consider Apple's partnership with the Mayo Clinic, unveiled in June 2014, in which HealthKit will capture data from a blood pressure app, notifying the hospital in the event a patient's blood pressure falls outside the normal range⁶⁰. Other named partners for HealthKit include the Cambridge University Hospitals and the NHS in the UK, and Mount Sinai, UCLA Health and Stanford Hospitals in the US. Also involved are Nike, a developer of activity trackers called Strava⁶¹ and an Electronic Medical Record company called Epic Systems⁶².
- Google⁶³ may have failed to revolutionise medicine with Google Health⁶⁴, but it now has Google Fit. This platform will allow developers to create Android health apps once the Android Lollipop version steps up to succeed the current Kit-Kat version in November 2014. A software development kit for Google Fit is now available⁶⁵. The difference between Google Fit and Apple's Health App is that the latter is designed to

⁴⁵ Source; Rock Health.

⁴⁶ See *Mobile health companies raked in \$198 million during Q1 2014* by Aditi Pai, mobihealthnews, 15/4/2013.

⁴⁷ Source: *Hacking health: How consumers use smartphones and wearable tech to track their health*, Nielsen online article dated 16/4/2014.

⁴⁸ See *Survey: 32 percent of mobile device owners use fitness apps* by Jonah Comstock, mobihealthnews, 29/1/2014.

⁴⁹ San Francisco, Ca., privately held, www.myfitnesspal.com. This company, founded by brothers Mike and Albert Lee, attracted venture backing in 2013 from heavyweights like Kleiner Perkins (early in Google and Amazon) and Accel Partners (an early Facebook backer). The engine behind the apps is a gigantic nutritional database.

⁵⁰ See *MyFitnessPal starts tracking steps to grow the world's largest nutrition database* by Parmy Olson, Forbes, 1/5/2014.

⁵¹ See the NPD press release headlined *Wearable tech device awareness surpasses 50 percent among US consumers, according to NPD and dated 7/1/2014*.

⁵² San Francisco, Ca., privately held, www.fitbit.com.

⁵³ San Francisco, Ca., privately held, www.jawbone.com. Jawbone's activity tracker is called Jawbone Up.

⁵⁴ The presence of Nike in this space is significant because it leverages off that company's valuable fitness brand (34th in Millward Brown's 2014 list of the world's most valuable brands). Nike (Beaverton, Or., NYSE: NKE, www.nike.com) was No. 115 in the 2014 Fortune 500 list with US\$25.8bn in 2013 revenue. Nike's Nike+Running app is one of the most popular health and fitness apps in the US. The wearables are marketed under Nike's 'FuelBand' banner.

⁵⁵ Samsung (Suwon, Korea, KRX:005930, www.samsung.com) was No. 22 on the Forbes Global 2000 Leading Companies list for 2014. The brand was 29th in Millward Brown's 2014 list of the world's most valuable brands.

⁵⁶ Palo Alto, Ca., privately held, www.getpebble.com. Pebble, founded by Eric Migicovsky, got started with US\$10m in crowdfunding from Kickstarter. It shipped its first watch in January 2013.

⁵⁷ See *Smart watch forecast: Smart watches will lead wearable computing to mass market status* by Tony Danova, Business Insider Australia, 19/3/2014.

⁵⁸ Apple (Cupertino, Ca., Nasdaq: AAPL, www.apple.com) was No. 5 in the 2014 Fortune 500 list with US\$170.9bn in 2013 revenue. Apple was No. 2 in Millward Brown's 2014 list of the world's most valuable brands, right behind Google.

⁵⁹ See www.apple.com/au/ios/ios8/health.

⁶⁰ See *Inside Apple & the Mayo Clinic's new partnership* by Neal Ungerleider, Fast Company, 5 June 2014.

⁶¹ San Francisco, privately held, www.strava.com. Strava is considered the 'social network for athletes'.

⁶² Verona, Wi., privately held, www.epic.com. This company has made its founder, Judy Faulkner, the world's 570th richest person on the Forbes billionaires list for 2014. Epic is getting close to having half the US population with a record stored inside an Epic implementation.

⁶³ Google (Mountain View, Ca., Nasdaq: GOOG, www.google.com) was No. 46 in the 2014 Fortune 500 list with US\$60.6bn in 2013 revenue.

Google was No. 1 in Millward Brown's 2014 list of the world's most valuable brands.

⁶⁴ A venture to help users create their own private health records, Google Health was unveiled in 2008 but was shut down in early 2013, which says a lot about the bureaucratic hurdles faced by anyone trying to streamline the US healthcare system.

⁶⁵ See <https://developers.google.com/fit>.

collect all of a user's data, whereas Google Fit simply allows makers of health-related devices to interface with Android. Google Fit is a natural extension of Android Wear, the operating system for wearable devices that launched in July 2014 and now powers Samsung Gear as well as LG's new G Watch.

- Samsung, as the world leader in smartphones with a ~30% share, has been under pressure lately from Huawei and Lenovo with those companies' lower-cost Android devices. Samsung is therefore highly motivated to make the most of the S Health app, launched in mid-2012 on the Galaxy S3 smartphone. Samsung has added health and fitness functionality to its phones with the S4 release in April 2013 and the S5 in April 2014⁶⁶. The latter phone came with a built-in heart rate monitor. Samsung's SAMI platform, unveiled in May 2014, will allow a big push into e-health by making it easy to gather data from all sorts of devices and sensors into the Cloud for analysis. Samsung's Simband prototype wristband, also unveiled in May 2014, will provide an open design platform for wearable devices that will make it easier to gather biodata – much of it not hitherto routinely gathered - for SAMI to work with⁶⁷.
- **BioProspect is getting ready to launch its mobile health app, initially to measure stress.** BioProspect announced in June 2014 that it had retained Isobar, the digital marketing agency that is part of Dentsu⁶⁸, to develop apps for both iOS and Android platforms based on the Invatec test. The apps, which will be designed to measure stress, are expected to launch later next year. BioProspect intends that the first generation of its app will work with wearable sensors to be supplied by the company and linked to the user's smartphone. The sensors will capture HRV data, allowing the app to report back on the apparent level of stress, including suggestions about talking to a physician. The wearable sensor approach for 'version 1.0' is necessary because current smartphone battery life is not sufficient to allow for the quality of data needed for the test. Remember, the Invatec test involves 24 hours of data, which could be challenging when even the state of the art iPhone 6 can only get 'up to' 11 hours video playback⁶⁹. We predict that over the next two or three years smart devices such as smartwatches⁷⁰ will start getting considerably longer battery life⁷¹ and this will allow BioProspect to dispose of the wearable sensors and just use the watch or phone directly.
- **BioProspect's apps could lead to multiple commercial and clinical outcomes.** We noted above that a lot of people in the US will experience stress at any one time. Obviously BioProspect's app will come with the usual explanations about it not being an FDA- or EMA-approved diagnostic, but the company expects that it will help promote the approved diagnostic in due course. Meantime the app may open up other lucrative possibilities:
 - We see potential for BioProspect to become a 'Big Data' play as large amounts of HRV become available from the app. BioProspect can then use this data in improving the accuracy of the Invatec test as it moves into other mental health diagnostic applications⁷².
 - There is potential for various health service providers to white label the Invatec test as part of their push into consumer apps.
- **There will be competition in the mobile health space from other new diagnostics.** For example, a startup funded by Khosla Ventures⁷³ called Ginger.io⁷⁴ has technology that can monitor smartphone behaviour for signs of depression, schizophrenia and other mental health issues. The technology, having recently deployed at Kaiser Permanente, the major

BioProspect's apps are currently in development

⁶⁶ The forthcoming Galaxy Note 4 will sport a sensor that can track UV radiation.

⁶⁷ See *Samsung wants 'SAMI' and 'Simband' to be the start of a new biohealth ecosystem* by Mark Sullivan, VB News, 28/5/2014. Interestingly, Samsung intends to invest US\$50m in venture capital for startups that choose to build on the Simband platform.

⁶⁸ Dentsu (Tokyo, Japan, TYO: 4324, www.dentsu.com) is the dominant communications agency in Japan but has been expanding globally.

⁶⁹ Isobar (www.isobar.com) was launched in 2004 by the UK marketing group Aegis, which in turn was bought by Dentsu in 2012.

⁷⁰ That admittedly, is, 10% better than the iPhone 5S and the iPhone 5C, and the iPhone 6 Plus phablet gets up to 14 hours - see <https://www.apple.com/iphone/compare>. The iPhone5 has been known to lose more than half of its battery life after only six hours with iOS 7.1, released in March 2014. iOS 7.1.1 improved this situation in April 2014 but the drain was still around one-quarter every six hours - see *Apple's latest iPhone update may improve battery life for iPhone 5 owners* by Lisa Eadicicco, Business Insider Australia, 26/4/2014.

⁷¹ We don't know how powerful the battery will be behind the Apple Watch, launching in 2015, but industry observers expect that battery life will be low (See *Apple Watch: Geek chic with a lousy battery life* by Christian de Looper, Tech Times, 19/9/2014). A smartwatch that only requires infrequent recharges but with the functionality of a smartphone could change the face of the wearable market like the iPhone transformed the smartphone market in 2007 and the iPad transformed the tablet scene in 2010.

⁷² Consider, for example, the work of Yi Cui and his team at Stanford, who believe that pure lithium anode batteries are feasible and this could triple smartphone battery life. See *'Holy Grail' battery scientist explains incredible breakthrough* by Gordon Kelly, Forbes, 30/8/2014.

⁷³ Consider, for example, that Jawbone can use data gathered from millions of hours of sleep a week and recommend slight behavioral changes to Jawbone Up users. See *Gauging the natural, and digital, rhythms of life* by Nick Wingfield, the New York Times, 19/6/2013.

⁷⁴ The Sand Hill Road VC firm founded by Vinod Khosla, whose early money was made co-founding Sun Microsystems. Vinod Khosla was No. 63 on the Forbes billionaires list for 2014.

⁷⁵ Cambridge, Ma., private held, www.ginger.io.

US health insurance company, has reportedly help save the lives of several suicidal people⁷⁵.

BioProspect is also working on an in-office diagnostic for physicians

- **Doctors need better and faster diagnostic tools.** In most healthcare systems the vast majority of depressed patients are treated only in primary care, but typically a consultation with a primary care physician in a place like the UK will last a mere eight minutes or so⁷⁶. This scanty diagnostic window increases the potential for patients with Depression to be missed. One large European study found that, in 69% of cases, depressed people seeking help were not prescribed any treatment⁷⁷. We think straightforward and low-cost diagnostics like the Invatec test will therefore be welcomed by time-poor doctors as new tools to capture the missing patients.
- **BioProspect intends to conduct a large field trial of the Invatec test** ahead of seeking 510(k) approval and CE Mark, potentially involving US hospitals top-ranked for their psychiatric expertise. We see initiation and then completion of this study as a key value driver for BioProspect given the potential to help the doctors who see ~18 million people complaining of Depression in the US every year, and the availability of relevant CPT codes for reimbursement⁷⁸.
- **After Depression BioProspect will pursue other mental health indications.** We expect that once the Invatec test has gained regulatory approval as a Depression diagnostic that the test will also be trialled for the diagnosis of chronic stress, Generalised Anxiety Disorder and so on, gradually expanding the utility of the technology.
- **There is potential for the pharma companies to be interested in the Invatec test as they seek to build their CNS franchises.** We noted above that anti-depressants are a US\$11-12bn market for Big Pharma. Cymbalta was a US\$6.9bn drug for Eli Lilly in 2013 before the end of US exclusivity in October 2013; Lexapro was a US\$2.4bn blockbuster for Forest in 2011, its last full year of US exclusivity; and Effexor was a US\$3.9bn drug for Wyeth in 2008. We see potential for pharma companies to be interested in the Invatec test as a new way of establishing efficacy for their products in Depression as well other CNS drugs.

Time-pressed primary care physicians often miss patients with Depression

Good antidepressants have traditionally been blockbusters

Valuing BioProspect – how we get to 0.9 cents per share

- **BioProspect is acquiring 100% of Invatec.** Under a restructuring announced on 8/9/2014, BioProspect is moving to 100% ownership of Invatec. This restructuring includes a recent A\$3.5m capital raising at 0.3 cents per share which was announced on 6/10/2014 and will complete after shareholder approval, probably in late November. This restructuring, which will include a 100:1 share consolidation, simplifies the BioProspect story.

Valuing BioProspect

- **We value BioProspect at 0.9 cents per share base case and 2.1 cents per share optimistic case.** We used a probability-weighted DCF approach in which our WACC was 16% (Speculative)⁷⁹ and modelled separate payoffs for the consumer app and the in-office diagnostic application. For shares on issue we used the proposed capital structure from the 8/9/2014 restructure announcement, adjusted for the fact that A\$3.5m rather than A\$4.0m in new capital was raised on 6/10/2014. We assume that no further capital needs to be raised after the October 2014 raising.

⁷⁵ See *Khosla and Google's founders talk healthcare, Ginger.io, WellDoc* by Brian Dolan, mobihealthnews, 14/8/2014.

⁷⁶ BMJ. 1999 Sep 18;319(7212):738-43.

⁷⁷ Int Clin Psychopharmacol. 1997 Jan;12(1):19-29.

⁷⁸ See BioProspect's October 2014 presentation, slide 12.

⁷⁹ For a relevant discount rate, we use WACCs of between 12.5% and 16.9% depending on the risk for Life Science companies. This is derived from a RFR of 3.4%; a MRP of 7.5%-11.5% (7.5% for 'medium risk' companies, 9.5% for 'high risk' companies and 11.5% for 'speculative' companies like BioProspect); and an ungeared beta of 1.1. We regard Life Science companies with existing businesses, or who have enough capital to reach the market with their products, as 'Medium' risk. Companies that have small revenue streams from marketed products but that are still potentially in need of capital are 'High' risk. Everything else is 'Speculative'.

Risk weightings

- We assigned no risk weighting for the consumer app on the assumption that this product is easily deliverable.
- We assigned a 20% risk weighting to the in-office diagnostic to accommodate the fact that the technology is still being optimised and will have to undergo a validating clinical study.

Revenues and costs

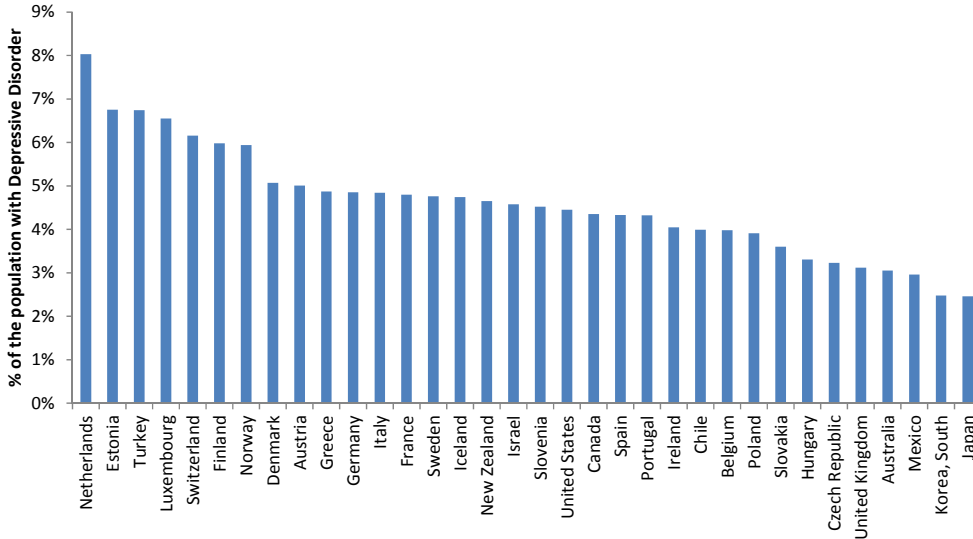
- We assume that the consumer app can reach US\$5m (base case) to US\$10m (optimistic case) in net sales for Invatec within five years of launch.
- We assume that the in-office diagnostic can reach US\$50-100m in sales within five years of launch.
- In each case we assumed a fourteen year commercial life from 2015/16, after which competition in terms of new kinds of diagnostics will have supplanted the edge currently represented by the Invatec algorithms, and sales drop to 10% of their peak.
- We assume peak sales for the consumer app of ~US\$35-60m and for the in-office diagnostic of ~US\$100-145m.
- We assume gross margins of 75%-85% for all products, and distribution costs of 5-10% of revenues for the consumer app and 10-15% for the in-office diagnostic.
- We assume gradual margin improvements for both gross margins and distribution costs of 1-2%
- We estimate corporate overhead of \$0.1m per month.

The path to 0.9 cents per share

- **We see various developments over the next twelve months as contributing towards a re-rating of BioProspect:**
 - Completion of technology optimisation of the Invatec test;
 - Unveiling of the protocol for the clinical validation study;
 - Launch of the consumer app;
 - Work on the Invatec test for applications beyond Depression;
 - Completion of the initial clinical validation study;
 - Potential grants from groups funding the search for mental health biomarkers; and
 - Inclusion of the consumer app into other digital health offerings that feed data into the Apple, Google and Samsung platforms.

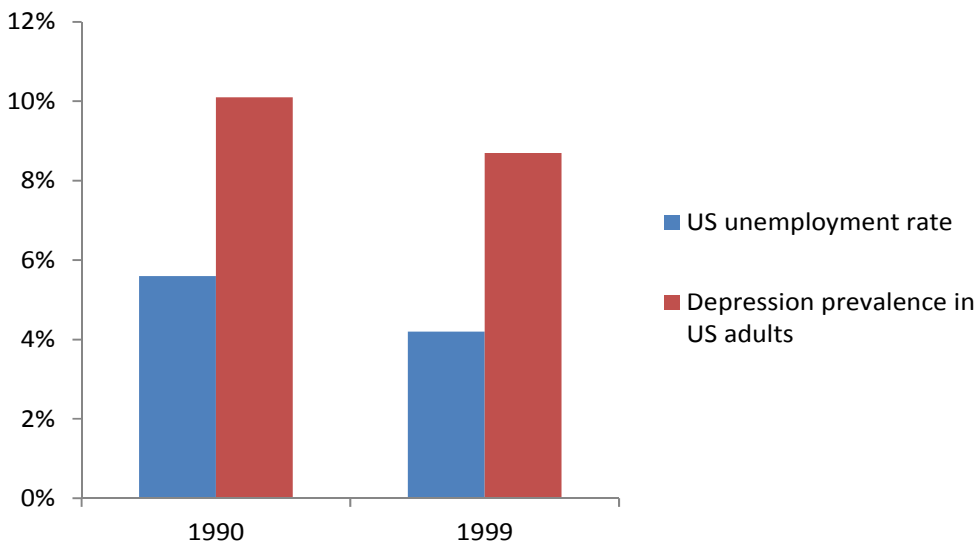
There is potential for good news flow over the next twelve months`

FIG.1: AROUND 4% OF ADULTS IN THE OECD HAVE DEPRESSION



Source: Ferrari et. al., 2013.

FIG.2: DEPRESSION TENDS TO TRACK UNEMPLOYMENT



Source: Greenberg et. al., 2003.; US Bureau of Labor Statistics.

Leadership

- **Claude Solitario** (Head of E-Health), co-founded Invatec in 2005. Solitario brings 25 years of involvement in the development of new and emerging technology, with considerable experience in licensing and commercialisation of intellectual property.
- **Stephen Stapelberg** (Commercial Development Manager) brings strong skills in consumer marketing gained as a senior member of the team that built EXP, a below-the-line agency that is now the largest such agency in Africa⁸⁰.
- **Dr Matt Mesnik** (Chief Medical Officer) brings an understanding of the US healthcare scene gained through diagnostic developers such as Ativa Medical⁸¹ and QuickHealthCheck⁸². Mesnik was a pioneer of convenient, walk-in healthcare in the US as CMO of the MinuteClinic chain of CVS Caremark⁸³.
- **Steve Pearce** (Chairman of the Medical and Scientific Advisory Board) is the current CFO of Fortescue Metals⁸⁴. He joined BioProspect in July 2014 as an advisor to provide strategic, commercial and corporate guidance to the board.
- **Dr Stephen Addis** (Member of the Medical and Scientific Advisory Board and an Invatec co-founder) is currently Consultant Psychiatrist at Fremantle Hospital in WA. He brings a high level of knowledge around the Invatec test as well as its role in the diagnosis of mental illness.
- **Professor Hans Stampfer** (Member of the Medical and Scientific Advisory Board), currently Professor of Psychiatry at the University of Western Australia was the inventor of the Invatec test.
- **The BioProspect board**, post the current restructure, will comprise Chairman **Chris Indermaur** (formerly GM of Strategy and Development at Alinta, where he was a colleague of Steve Pearce), **Kris Knauer** (Executive Director, Equities at the Sydney-based corporate finance house Novus Capital) and **Dr James Campbell** (a biotech entrepreneur who was a founding executive of ChemGenex⁸⁵).

BioProspect's board is being advised by Steve Pearce, the current CFO of Fortescue Metals

The risks

- **Competitor risk.** Other app-based mental health diagnostic players such as ginger.io may be able to move faster than BioProspect to dominate this new market;
- **Compliance risk.** There is the risk that gathering the necessary hours of HRV data from test subjects with existing sensor and mobile phone technologies may prove too difficult.
- **Clinical risk.** There is the risk that the data on the Invatec test in upcoming clinical trial may point to inadequacies in the test in terms of specificity;
- **Funding risk.** There is the risk that BioProspect may not have sufficient capital to commercialise the Invatec test;
- **'Incumbency' risk.** There is the risk that physicians may continue to prefer their own judgement plus questionnaires as the primary methodology for mental health diagnoses;
- **IP risk.** The original patent application over the Invatec test dates from 1998. While BioProspect is currently building new intellectual property, mainly trade secrets, around the Invatec test there is the risk that it will be considered 'out of date'.

Major shareholders

- Currently the only substantial shareholder is the Pitt Street Absolute Return Fund (10.1%), associated with BioProspect director Kris Knauer.

⁸⁰ See www.expagency.biz. In marketing communications 'above the line' uses mass media whereas 'below the line' uses niche media.

⁸¹ See www.ativamed.com

⁸² See www.quickcheckhealth.com.

⁸³ Woonsocket, RI, NYSE:CVS, www.cvscaremark.com. CVS is primarily known for its CVS/pharmacy stores. MinuteClinic

(www.cvs.com/minuteclinic) grew from 80 clinics in 2006 when Mesnik joined to over 800 today.

⁸⁴ Perth, WA, ASX: FMG, www.fmg.com.au. FMG, a major iron ore producer, is a Top 50 company in Australia with a market capitalisation of >US\$10.8bn (market close 21 October 2014)

⁸⁵ A cancer drug developer sold to Cephalon in 2011 for US\$225m.

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Analysts' stock ratings are defined as follows:

Buy: The stock's total return is expected to increase by at least 10-15 percent from the current share price over the next 12 months.

Hold: The stock's total return is expected to trade within a range of $\pm 10-15$ percent from the current share price over the next 12 months.

Sell: The stock's total return is expected to decrease by at least 10-15 percent from the current share price over the next 12 months.

Disclosure of potential interest and disclaimer:

Baillieu Holst Ltd has raised funds for BioProspect Ltd and earned fees in relation to those activities in the past 12 months.

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