NDF RESEARCH

Providing independent research coverage of
ASX-listed Life Science companies

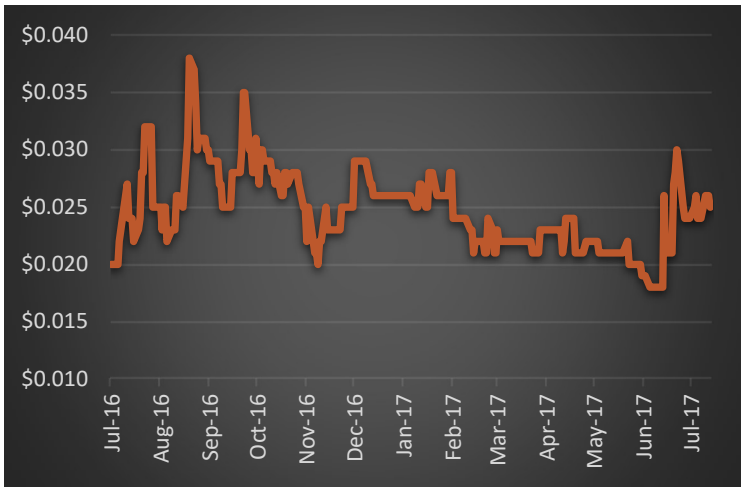
Resonance Health (ASX: RHT)

Update note – Monday 17 July 2017

MRI for the masses

This note updates our 1 December 2016 note headlined '*World-leading MRI diagnostic*'. Resonance Health was originally built on FerriScan, an MRI-based test for iron overload disorders which gained FDA approval and CE Mark in 2005. FerriScan is widely regarded as the most accurate measure of Liver Iron Concentration in the world, being highly useful in managing a range of conditions from hemochromatosis to thalassemia to sickle cell disease. The diagnostic earns Resonance around A$2.0-2.5m in revenue a year. This could be higher were it not for the fact that, at this stage, FerriScan is not widely reimbursed. Resonance is gathering data on the utility of FerriScan and hopes to obtain further reimbursement in the future. In the meantime, it has developed a new technology based on machine learning (artificial intelligence) which it believes can markedly lower the cost of the FerriScan diagnostic. This new test can reasonably be expected to unlock new market opportunities, most notably in developing countries where there is a critical need for a robust diagnostic. We value Resonance at 7.6 cents per share base case and 14.5 cents per share optimistic case. Our target price of 11 cents per share sits at the midpoint of our DCF range.

Rating	Risk	Current price	Target price
Buy	Speculative	$0.026	$0.11



Stock details

Daily Turnover: ~A$6,500
Market Cap: A10.5m
Shares Issued: 402.5m
52-Week High: $0.038
52-Week Low: $0.017

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Please note: This report has been commissioned by Resonance Health and NDF Research will receive payment for its preparation. Please refer below for risks related to Resonance Health as well our General Advice Warning, disclaimer and full disclosures. Also, please be aware that the investment opinion in this report is current as at the date of publication but that the circumstances of the company may change over time, which may in turn affect our investment opinion.

About NDF Research

NDF is an independent equity research firm based in Sydney, Australia. It focuses on Life Science companies that are publicly traded on the Australian Securities Exchange (ASX). This Exchange hosts one of the world's premier equity markets for biotech and medical device companies, and is home to world-beating companies such as CSL and ResMed and emerging pioneers such as Mesoblast and Impedimed.

NDF's Founder and Senior Analyst, Stuart Roberts, has been involved in Life Sciences since 2002 as a sell-side analyst as well as an executive of two ASX-listed immuno-oncology drug developers.

NDF believes that ASX-listed companies have been largely overlooked in the global Life Sciences boom that began in late 2008, partly because of insufficient quality research. NDF's goal is to provide such research, and introduce investors around the world to potential future billion dollar companies from 'Down Under'.

To learn more about the Life Sciences sector on the ASX and our firm, please visit ndfresearch.com.

Ferry at the end of a rainbow on Sydney Harbour, August 2014

In this report

Financial summary

Code	RHT
Analyst	Stuart Roberts
Date	17 July, 2017
Share price	$0.0260
Market capitalisation	$10m
Year end	30 June

Rating	BUY
Price target	$0.110
Upside/downside	323.1%
Valuation	$0.076 / $0.145
Valuation method	Probability-weighted DCF
Risk	Medium

PROFIT AND LOSS (A$m)

Y/e June 30 (A$m)	FY15A	FY16A	FY17E	FY18E	FY19E
Revenue	2.6	2.5	2.6	3.3	4.9
EBITDA	**0.5**	**-0.3**	**-0.4**	**0.1**	**1.4**
D&A	-0.1	-0.1	-0.2	-0.2	-0.2
EBIT	**0.4**	**-0.4**	**-0.6**	**-0.1**	**1.2**
Net interest	0.1	0.0	0.0	0.0	0.0
Pre-tax profit	**0.5**	**-0.4**	**-0.6**	**0.0**	**1.2**
Tax	0.0	0.0	0.3	0.0	0.0
NPAT	0.5	-0.4	-0.3	0.0	1.2
Minority interests	0.0	0.0	0.0	0.0	0.0
Net profit after minorities	0.5	-0.4	-0.3	0.0	1.2

BALANCE SHEET (A$m)

Y/e June 30	FY15A	FY16A	FY17E	FY18E	FY19E
Cash	2.8	2.5	1.8	2.2	3.9
Current receivables	0.7	0.5	0.8	0.9	0.9
Inventories	0.0	0.0	0.0	0.0	0.1
Other current assets	0.0	0.0	0.1	0.1	0.1
Current assets	**3.5**	**3.0**	**2.7**	**3.2**	**5.0**
PPE	0.0	0.1	0.1	0.1	0.1
Intangible assets	1.6	1.7	1.8	1.7	1.5
Other non-current assets	0.1	0.1	0.1	0.1	0.1
Non-current assets	1.7	1.9	2.0	1.9	1.7
Total assets	5.2	4.9	4.7	5.1	6.7
Payables	0.3	0.4	0.5	0.5	0.6
Debt	0.0	0.0	0.0	0.0	0.0
Other liabilities	0.5	0.5	0.3	0.3	0.3
Total liabilities	0.8	0.9	0.8	0.8	0.9
Shareholders' equity	4.4	4.0	3.9	4.2	5.8
Minorities	0.0	0.0	0.0	0.0	0.0
Total shareholders funds	**4.4**	**4.0**	**3.9**	**4.2**	**5.8**
Total funds employed	**5.2**	**4.9**	**4.7**	**5.1**	**6.7**
W/A shares on issue	398	402	402	402	402

CASH FLOW (A$m)

Y/e June 30	FY15A	FY16A	FY17E	FY18E	FY19E
NPAT plus discontinued ops.	0.5	-0.4	-0.3	0.0	1.2
Non-cash items	0.1	0.2	0.4	0.5	0.6
Working capital	-0.4	0.3	-0.4	-0.1	-0.1
Other operating cash flow	0.0	0.0	0.0	0.0	0.0
Operating cashflow	**0.2**	**0.1**	**-0.4**	**0.4**	**1.7**
Capex	0.0	-0.1	0.0	0.0	0.0
Investments	0.0	0.0	0.0	0.0	0.0
Other investing cash flow	-0.2	-0.3	-0.3	0.0	0.0
Investing cashflow	**-0.2**	**-0.3**	**-0.3**	**0.0**	**0.0**
Change in borrowings	0.0	0.0	0.0	0.0	0.0
Equity raised	0.6	0.0	0.0	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	**0.6**	**0.0**	**0.0**	**0.0**	**0.0**
Net change in cash	**0.7**	**-0.3**	**-0.7**	**0.4**	**1.7**
Cash at end of period	2.8	2.5	1.8	2.2	3.9

EARNINGS (A$m)

Y/e June 30	FY15A	FY16A	FY17E	FY18E	FY19E
Net profit ($m)	0.5	-0.4	-0.3	0.0	1.2
EPS (c)	0.1	-0.1	-0.1	0.0	0.3
EPS growth (%)	N/A	N/A	N/A	N/A	N/A
P/E ratio (x)	22.4	-27.2	-35.8	-232.2	8.6
CFPS (c)	0.0	0.0	-0.1	0.1	0.4
Price/CF (x)	52.6	171.2	-29.6	23.5	6.2
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	14.4	-28.0	-20.1	61.4	4.7
EV/EBIT	19.3	-18.4	-14.1	-154.9	5.5

PROFITABILITY RATIOS

Y/e June 30	FY15A	FY16A	FY17E	FY18E	FY19E
EBITDA/revenue (%)	20.4%	N/A	N/A	4.1%	28.2%
EBIT/revenue (%)	15.2%	N/A	N/A	N/A	24.3%
Return on assets (%)	8.9%	-7.8%	-6.2%	-0.9%	18.1%
Return on equity (%)	10.5%	-9.5%	-7.5%	-1.1%	20.8%
Return on funds empl'd (%)	10.5%	-9.5%	-7.5%	-1.1%	20.8%
Dividend cover (x)	0%	N/A	N/A	N/A	0%
Effective tax rate (%)	0.0%	0.0%	50.9%	0.0%	0.0%

LIQUIDITY AND LEVERAGE RATIOS

Y/e June 30	FY15A	FY16A	FY17E	FY18E	FY19E
Net debt/(cash) ($m)	-3	-3	-2	-2	-4
Net debt/equity (%)	-63.5%	-62.3%	-46.9%	-53.0%	-67.2%
Net interest cover (x)	N/A	N/A	N/A	N/A	N/A
Current ratio (x)	4.4	3.4	3.4	3.8	5.7

INTERIMS

Y/e June 30 ($m)	2H15A	1H16A	2H16A	1H17F	2H17F
Revenue	1.4	1.3	1.2	1.3	1.3
EBITDA	**0.2**	**-0.1**	**-0.2**	**-0.2**	**-0.2**
D&A	**-0.1**	**-0.1**	**-0.1**	**-0.1**	**-0.1**
EBIT	**0.1**	**-0.1**	**-0.3**	**-0.3**	**-0.3**
Net interest	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
Pre-tax profit	0.2	-0.1	-0.3	-0.3	-0.3
Tax	**-0.1**	**0.1**	**-0.1**	**0.3**	**0.0**
NPAT	0.0	0.0	-0.4	0.0	-0.3
Minority interests	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
Net profit after minorities	0.0	0.0	-0.4	0.0	-0.3

VALUATION

	Base	Optimistic
Value of business	19.0	46.7
Value of tax losses	19.6	19.6
Corporate overhead	-9.7	-9.7
Cash now (A$m)	1.9	1.9
Cash to be raised (A$m)	0.0	0.0
Option exercises (A$m)	0.0	0.0
Total value (A$m)	30.7	58.4
Total diluted shares (million)	402.5	402.5
Value per share	$0.076	$0.145
Valuation midpoint	$0.111	
Share price now (A$ per share)	$0.026	
Upside to midpoint	325.0%	

The game changer of automated MRI is now here

We have previously argued that Resonance can create considerable shareholder value through having its MRI tests automated, where data from the scan translates directly into a result for the clinician. Various groups around the world have shown that machine learning can be used to increase sensitivity and specificity of MRI scans[1] and we suggested that the application of such machine learning for FerriScan, given that over 35,000 of these scans have now been performed, would be a straightforward engineering exercise for Resonance's team. Six months later Resonance has now automated the first of its tests, announcing on 14 June 2017 that it had developed '*a machine learned artificial intelligence prototype for a low-cost test to measure liver iron concentration*'[2].

RESONANCE IS A GLOBAL PIONEER OF 'SELF-ASSEMBLING' MRI TESTS

Resonance is now perfecting 'FerriScan 2.0'

Resonance has developed a potentially much more cost-effective version of FerriScan. Knowing the amount of iron in the liver is vital for determining if a patient has 'iron overload', that is, too much iron in their body as a whole, which can be fatal if not removed through phlebotomy or chelation therapy. At present, Liver Iron Concentration (LIC) is generally tracked either through a blood test for a protein called serum ferritin, or through a biopsy of the liver. FerriScan was developed by Professor Tim St. Pierre, a Resonance Health founder, as an MRI-based alternative. With FerriScan the patient undergoes an MRI scan, and trained staff in Resonance's Perth-based laboratory process and analyse the data from that scan with the help of proprietary algorithms to provide a highly accurate assessment of LIC. The company has data showing that FerriScan has much better sensitivity than serum ferritin, and, being non-invasive, the test is clearly superior to liver biopsy, which can be painful and has been known to be fatal. Over time the test has gained a following for managing sickle cell disease and thalassemia, where the availability of chelation therapy has increased the need for knowing the point where iron levels have been returned to normal, thereby avoiding anemia. However, the main downside for FerriScan is the scan cost, which today averages US$250. The company has yet to secure widespread reimbursement so the test is often billed out-of-pocket. For emerging healthcare markets, even where there is a critical need for an accurate LIC diagnostic, the US$250 tends to be prohibitive. Resonance's 14 June announcement may change all that.

FerriScan plus machine learning/AI is a powerful combination. What Resonance announced on 14 June was that it had used the tools of machine learning and artificial intelligence to create a FerriScan-like test that would require much less in the way of external processing, but could use the various magnetic resonance signals coming straight from the MRI scanner to accurately measure the level of LIC. With the current approved version of FerriScan, there are various manual steps which Resonance's staff need to perform to complete the test. The data needs to be properly formatted, after which it is analysed and checked before a final QA step returns a diagnosis. The new 'FerriScan 2.0' automates the analysis of the data, and Resonance has plans over the next 12 months to fully

[1] See Conf Proc IEEE Eng Med Biol Soc. 2011;2011:7957-60.
[2] See Resonance's 14 June 2016 market release headlined '*Artificial intelligence solution for the substantial iron overload market in emerging growth markets*'.

automate as much as possible of the other tasks involved in processing a patient's MRI file. What this automation notionally allows is a FerriScan that can sell into emerging health care markets at a materially lower cost than the US$250 average price we referred to above, while at the same time cutting the time delay and potential for error from external data analysis, and ensuring quality by allowing the diagnostic to get progressively more accurate over time.

The vast majority of iron overload is in emerging markets. We argue that FerriScan 2.0 could unlock a hitherto unreached market for iron overload. In its 14 June announcement Resonance suggests that *'globally there are over 330,000 people born annually with haemoglobin disorders alone'*. That estimate is sourced from 2008 World Health Organisation estimates[3]. We took those estimates and broke them down by World Health Organisation region[4], then compared them to GDP per capita for those regions[5]. The results are in Table 1. What our analysis showed was that 85% of the world's sickle cell disease and thalassemia occurred in Africa and South-east Asia, where incomes were generally below the global average, and another 5% in the low-income Eastern Mediterranean region. That left only 10% of the global burden of haemoglobin disorders in the higher income countries of Europe, the Americas and the Western Pacific. While the new test will need to be CE Marked in due course, we expect that that approval could then allow the product to be marketed in some of these lower-income jurisdictions, beginning, we expect, in Southeast Asia.

MOST IRON OVERLOAD IS IN AFRICA AND SOUTHEAST ASIA

Table 1: Haemoglobin disorders by WHO region

	Sickle cell	Thalassemia	Total	% of total	GDP per capita (USD, ppp)
Africa	232,500	1,500	234,000	70.9%	4,300
South-east Asia	26,000	23,000	49,000	14.8%	7,400
Western Pacific	100	17,900	18,000	5.5%	16,800
Eastern Mediterranean	6,500	9,700	16,200	4.9%	12,300
Americas	9,400	600	10,000	3.0%	30,200
Europe	1,300	1,500	2,800	0.8%	31,000
WORLD	275,800	54,200	330,000		15,900

The commercial potential of FerriScan 2.0 in emerging markets is significant. While historically most MRI machines were in established healthcare markets, increasingly they are being introduced into emerging markets[6]. A good example is Turkey, whose installed base per head of population more than tripled between 2005 and 2014, while Mexico's rose by ~75%[7]. Consequently, for FerriScan the issue isn't availability of MRI machines, it's the cost

[3] Modell and Darlison, *Global epidemiology of haemoglobin disorders and derived service indicators*, Bull World Health Organ. 2008 Jun; 86(6): 480–487.
[4] The World Health Organisation's 194 member states cover 99.4% of the world's population. The only sovereign states not represented in the WHO with populations over 1 million are Kosovo and Taiwan.
[5] Source: CIA World Factbook.
[6] For some background here, see *MRI manufacturers target opportunities in emerging markets* by John Bonner, AuntMinnie.com, 9 March 2013.
[7] Source: OECD estimates. Other countries are taking note of Turkey – see *Britain has fewer high-tech medical machines than Estonia and Turkey* by Martin Beckford, The Telegraph, 30 March 2011.

of the test. To illustrate the opportunity in emerging markets for FerriScan 2.0, Resonance in the same 14 June announcement noted that it had already compared FerriScan 1.0 in an emerging market clinical setting with '*a widely available but unvalidated T2* technique*' whose use in developing nations was, in Resonance's view, '*potentially endangering people's lives*'. The comparison was favourable to FerriScan. The study in question, called the 'Dragon Study' was conducted on 100 thalassemia patients in the Vietnamese capital of Hanoi. In recent years various groups have developed software designed to convert magnetic resonance readouts into LIC estimates, and made this software freely available for the benefit of healthcare systems with an installed base of MRI units but less healthcare resources to pay for FerriScan[8]. One such piece of software, called the Iron Calculator[9], claims to be able to 'convert T2* and R2* values obtained with 1.5T and 3.0T MRI into both liver and myocardial iron concentrations (LIC and MIC) in mg/g'. T2* and R2* (pronounced 'T2 star' and 'R2 star') are simply different kinds of magnetic resonance[10]. The Iron Calculator was routinely used at National Institute of Haematology and Blood Transfusion to manage the significant thalassemia burden of Vietnam[11], where GDP per capita is only US$6,400. When FerriScan was compared to the Iron Calculator by scientists at the National Institute, the Iron Calculator was found to be missing around a third of the iron-overloaded patients, and to be returning different results depending on the MRI machine used. Resonance's Tim St Pierre reported these results at the June 2017 European Haematology Association Congress in Madrid[12]. The results have already prompted calls from one major patient advocacy group, the Thalassaemia International Federation, for the routine use of standardised and validated MRI methods for measuring iron burden[13].

What's the upside for Resonance with FerriScan 2.0? Resonance argues that in the long run FerriScan usage will become routine as management of iron overload becomes more important to care in a range of disease conditions. A notable example is cancer, where frequent blood transfusions after chemotherapy can result in iron overload. Also, there is potential to revisit the reimbursement process given the long history of the diagnostic, its utility in managing thalassemia and sickle cell disease, its presence in various treatment guidelines, and the growing number of physicians that would advocate for its routine use. In our 1 December 2016 initiation note on Resonance we argued that Novartis' Exjade drug provides a guide for Resonance's upside for FerriScan. Exjade (deferasirox), FDA approved in 2005, was the first FDA approved orally available iron chelation drug. This product, a dispersible tablet for oral suspension, had grown to a >US$900m best-seller for Novartis by 2014. In March 2015 Novartis gained FDA approval for Jadenu, a once-daily deferasirox tablet. The addition of Jadenu to the franchise has now brought annualised sales up to US$980m[14]. With Exjade and Jadenu having revolutionised treatment of

FERRISCAN HAS THE POTENTIAL TO BE USED ROUTINELY IN CANCER PATIENTS TO MANAGE IRON OVERLOAD

[8] A typical example is one developed by a Brazilian cardiologist named Juliano Lara Fernandes – see Br J Radiol. September 2015; 88(1053): 20150269.
[9] www.ironcalculator.com.
[10] There are two basic ways to measure the relaxation of protons back to their 'ground state'. The first, called T1, measures the time it takes, in milliseconds, for a proton's axis to return to the alignment it had previously been forced into by the MRI's magnet, that is, the relaxation in longitudinal magnetisation. The second, called T2, measures the time it takes for the proton's axial spin to return to normal, which is the relaxation in transverse magnetisation. R1 and R2 are simply the reciprocals of T1 and T2 respectively and measure the rate of relaxation rather than the absolute relaxation times. The asterisk next to the 2, which is called a 'star', denotes a slightly different measure to T1/T2 or R1/R2 because it takes into account how a proton's transverse relaxation rate is affected by the magnetic fields from nearby protons (called 'magnetic field inhomogeneity') as well as the outright level of relaxation of the proton itself.
[11] Some 1.5% of the majority Kinh people of Vietnam, who are 86% of the population, are beta thalassemia carriers. This expands to ~11% for the 1.4 million Muong people of central northern Vietnam and the 1.8 million Tay people of far northern Vietnam – see Ann Transl Med. 2015 Sep; 3(Suppl 2): AB035.
[12] Nguyen et al., *Assessment of the performance of a widely available T2*/T2* Liver Iron Concentration method used in clinical practice in a population of thalassemia patients* – Abstract available at ehaweb.org
[13] See the Thalassaemia International Federation press release dated 20 June 2017 and headlined '*New study highlights 'unsafe' T2* MRI method being used for iron overload assessment in thousands of patients*'
[14] 12 months to March 2017.

iron overload, we argue that the market is now ready for a more convenient diagnostic. A common rule of thumb in healthcare is that diagnostic testing represents just 2% to 3% of all healthcare spending even though it affects 70% of healthcare spending[15]. 2% of a US$980m drug is US$19.6m, which is markedly higher than FerriScan's current sales. The right pricing for FerriScan 2.0 could allow Resonance to start reaching this kind of payoff. Initially FerriScan 2.0 will be positioned as a different product, aimed in the first instance at emerging growth markets where regulatory clearance pathways are faster. This is new territory for Resonance. Once CE Mark and other First World regulatory clearances have been obtained, Resonance will look at tackling existing markets with the new product.

Resonance has potential to become a provider of choice for multiple participants in the imaging field. That diagnostic imaging is as much art as science is evidenced by the fact that Resonance's MRI-based test for iron overload didn't exist until the 2000s even though MRI itself has been in routine clinical use since the 1980s. Now that Resonance has expertise in MRI tests that, in effect, 'self-assemble' through machine learning, we see potential for the company to collaborate more widely with all sorts of participants looking to improve the cost and utility of MRI-based imaging:

MRI OEMS MAY BE INTERESTED IN FERRISCAN 2.0

- The MRI OEMs such as Phillips, Siemens, and GE may now be able to make greater use of Resonance to give their machines competitive advantage.
- The Pharma companies developing new drugs may be able to quickly assemble diagnostics to check on the pharmacokinetics of their compounds non-invasively. This would be particularly relevant for CNS drug developers working on conditions such as Alzheimer's and Huntington's Disease.
- Radiology practitioners interested in developing new tests could work with Resonance on this.

Resonance has a new bone marrow iron test

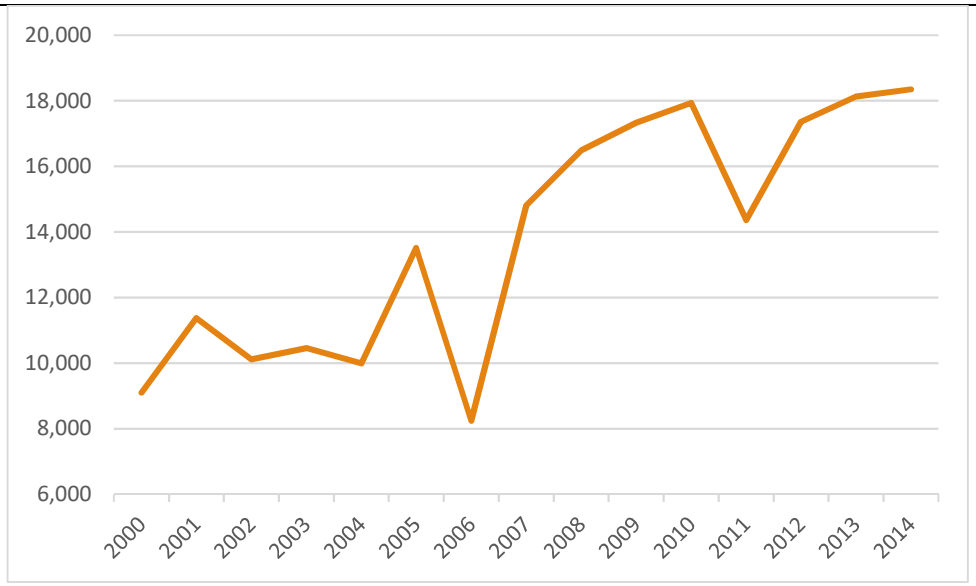
Resonance has developed a way to help manage bone marrow transplant. On 22 June 2017 Resonance announced that it had just launched a Bone Marrow R2-MRI, an MRI-based test to measure iron in the bone marrow. It is well known that patients with too much iron in the marrow have poorer survival outcomes in bone marrow transplant (BMT) situations[16], however the marrow biopsy which would ordinarily help manage this risk is subjective. Consequently, with such transplants becoming much more common in the management of hematologic disorders (as Figure 1 shows, the number of transplants doubled in the US between 2000 and 2014, from ~9,000 to ~18,000[17]) the availability of a rapid and non-invasive alternative is likely to be welcomed by the haematology community.

We expect a new paper on this test in due course. When Resonance developed its HepaFat scan for the measurement of the liver fat fraction the company published the relevant study data in the journal PLOS ONE[18]. We expect a similar paper on a Bone Marrow R2-MRI will be published in due course.

[15] See the article headlined *The Value of Diagnostics* at Clinical Lab Products, published online at clpmag.com, 1 March 2016.
[16] Clin Lymphoma Myeloma Leuk. 2016 Oct;16(10):582-587. Epub 2016 Aug 24.
[17] Source: HCUP.
[18] PLoS One. 2016 Aug 8;11(8):e0160789. eCollection 2016.

There is potential for the new test to lower costs. BMT historically has been a very high cost procedure – in 2014 it was estimated to be US$380,000 for an autologous transplant and US$930,000 for an allogeneic transplant[19]. We argue that a test which can help properly measure marrow iron will help in the process of mainstreaming BMT by allowing the risk for potential adverse events like GvHD to be better managed.

Figure 1: Bone marrow transplant procedures in US hospitals.



[19] Source: 2014 US organ and tissue transplant cost estimates and discussion, Milliman, December 2014.

Introducing Resonance Health (ASX: RHT)

- **Who is Resonance Health?** Resonance Health is a Perth-based company which developed the world's first non-invasive diagnostic for iron overload, an MRI-based test called FerriScan. This test, which gained both CE Mark and FDA approval in January 2005, has been the basis of a small but growing business for Resonance currently worth A$2.0-2.5m p.a. in revenue. A subsequent MRI-based product, called HepaFat-Scan, for the measurement of the liver fat fraction, gained FDA approval in December 2013 and CE Mark in July 2014. Resonance continues to work on new MRI-based diagnostics.
- **What is iron overload and why is diagnosing it important?** We estimate there are 4-5 million people in the developed world who suffer from various iron overload disorders such as hereditary hemochromatosis, thalassemia, sickle cell disease, aplastic anaemia, myelodysplasia and Diamond Blackfan anaemia. In each of these disease conditions the patient's body absorbs excessive amounts of iron, either from food and drink or from blood transfusions, resulting in a build-up of iron in the liver, heart, pancreas and other organs. The iron overload can ultimately cause fibrosis (that is, scarring) of the organs where it is stored, and in the case of pancreatic fibrosis can cause diabetes. However, iron overload, once diagnosed, is easily treated with regularly scheduled phlebotomies (bloodletting) or with various chelation drugs that can bind to the iron and pull it out of the body. Over the last decade FerriScan has provided, for the first time, a non-invasive method of regularly tracking iron overload through the measurement of Liver Iron Concentration (LIC)[20], with the measurement obtained using images from the Magnetic Resonance Imaging machines routinely deployed in radiology practices.
- **Why is Resonance Health's FerriScan a better diagnostic?** Before FerriScan, iron overload would be estimated by tracking a blood protein called serum ferritin, or through a biopsy of the liver. FerriScan has been found in clinical practice to have more sensitivity and specificity than serum ferritin or liver biopsy, and the latter is not only painful but can potentially be fatal. FerriScan also works on conventional MRI machines with no extra hardware required. It can be practiced on infants and children. It can be performed at a cost estimated to be at least half of a normal liver biopsy (and in some jurisdictions much less than that), because no hospital stay is required. And it generates results within a couple of days, as against up to two weeks for a liver biopsy. For background on how MRI works and how Resonance co-founder Professor Tim St. Pierre and his colleagues used MRI to develop a reliable iron overload diagnostic, see Appendix VI of our 1 December 2016 note.
- **If FerriScan is so good how come Resonance Health's annual revenue from it is only A$2.0-2.5m pa?** Resonance Health has yet to obtain widespread reimbursement for its diagnostic from the healthcare systems where it is used, so it is most often paid for out-of-pocket by patients or from internal hospital funds. However, usage of the product is growing from off a low base, and Resonance argues that in the long run FerriScan usage will become routine as management of iron overload becomes more important to care in a range of disease conditions. A notable example is cancer, where frequent blood transfusions after chemotherapy can result in iron overload. Also, there is potential to revisit the reimbursement

FERRISCAN HAS PROVIDED, FOR THE FIRST TIME, A NON-INVASIVE METHOD OF TRACKING IRON OVERLOAD

[20] By contrast liver biopsy is only recommended once every 12-18 months.

process given the long history of the diagnostic, its presence in various treatment guidelines, and the growing number of physicians that would advocate for its routine use.

- **What is HepaFat-Scan and what is its clinical utility?** HepaFat-Scan, Resonance's third approved product, is an MRI-based method of measuring the volumetric fat fraction of the liver tissue (VLFF). Fatty liver, where that organ has a >5% fat content, has in recent years become an important health problem worldwide. It is estimated that around 30% of US adults have Non-Alcoholic Fatty Liver Disease, with the potential to lead to fibrosis and cirrhosis of the liver. A related disease, NASH (Non-Alcoholic Steatohepatitis), has attracted considerable drug development attention in recent years since it impacts around 2-3% of the general population of most Western countries but until now there have been no drug treatments. By providing the first accurate surrogate for a liver biopsy, Resonance with HepaFat-Scan has potentially made a strong contribution towards managing the burden of fatty liver disease.
- **How come Resonance only has a market capitalisation of A$10.5m as at 14 July 2017?** We believe that Resonance Health has a tiny current valuation because the full potential of FerriScan has yet to be realised because of reimbursement challenges. We also believe that Resonance is currently undervalued and that with increased usage and potential reimbursement wins for FerriScan, increased awareness and uptake of HepaFat-Scan, and the introduction of new products, there is potential for the market to re-rate the company over time.

Eleven reasons to consider Resonance Health

RESONANCE HAS THREE APPROVED DIAGNOSTICS

1. **Resonance has three approved diagnostics.** While Resonance only earns $2.0-2.5m p.a. in revenue from FerriScan, Cardiac T2 Star and HepaFat-Scan, these tests do have the potential to grow into a business of significant size, and show that the company has considerable product development smarts. The fact Resonance has obtained regulatory clearance in the USA, EU and Australia for these three products is significant and provides some confidence that the company can deliver other products to market. Also noteworthy is the fact that Resonance's tests are standardised, quality controlled and compatible with the three main MRI manufacturers (Siemens, Philips and GE), providing a significant advantage over competitors.
2. **There is strong potential for FerriScan once the product is widely reimbursed**. With FerriScan generally regarded as the gold standard in the diagnosis of iron overload, we believe that Resonance can grow this business once it becomes widely reimbursed in key healthcare systems, particularly the US. Currently, FerriScan is mostly billed out-of-pocket. Resonance recently announced that it will revisit its case for a US CPT code application.
3. **Even without reimbursement FerriScan is increasing its usage base**. In FY16, 25 new radiology centres started using the product. There are now over 250 radiology centres in 30 countries that can offer FerriScan to patients. This network is of significant value as it provides a platform to launch new products in the marketplace.

4. **Various large market opportunities are emerging for FerriScan**. Thanks to increasing awareness of the need to manage iron overload in cancer patients receiving blood transfusions, as well as other disease conditions where iron overload is becoming increasingly recognised, we see potential for FerriScan to move beyond a niche product and become more 'mainstream'.
5. **Resonance is working towards automated methods** for their technologies which will open new and significant large volume markets. Application of machine learning in medical imaging is an emerging trend and Resonance intends to maximise this opportunity.
6. **HepaFat-Scan has a great outlook**. With NASH (Nonalcoholic Steatohepatitis) understood to affect around 2-3% of the general population of most Western countries[21], and awareness growing of the health effects of fatty liver, we regard the upside from HepaFat-Scan, FDA approved in 2013, as significant given that the main alternative diagnostic is liver biopsy.
7. **NASH is now a significant new drug opportunity**. Multiple pharma companies are currently working on new compounds for the treatment of NASH given the high prevalence of that disease. Consequently, there is significant potential for HepaFat-Scan to grow its clinical usage. Firstly, there will be numerous clinical trials of the new compounds. Then, for those that are approved, the increased awareness of the test could help grow usage. Further, a future liver inflammation or fibrosis MRI test from Resonance, when combined with HepaFat-Scan, could form a valuable diagnostic suite.
8. **Resonance is working on its pipeline**. With Resonance having developed technologies for use in additional organs including the bone marrow, pancreas and spleen, we see multiple growth horizons for Resonance beyond FerriScan and HepaFat-Scan. We see significant upside should Resonance succeed in creating an MRI-based diagnostic for liver inflammation or fibrosis. The new developments also open the door for new strategic partners like pharmaceutical or radiology companies.
9. **Resonance has a leadership team with long experience with the technology**. Founder Professor Tim St. Pierre has been involved in the science behind Resonance since the mid-1990s, while General Manager Sander Bangma has been involved in all aspects of Resonance's development since 2005. Backing the leadership is an entrepreneurial board that understands how to grow Life Science ventures.
10. **Resonance has appropriately managed shareholder funds in a constrained environment** with a single capital raise in the past decade (in 2014). The company has stayed more-or-less steady on the cash front over the past few years while still carefully investing in new product development. The past 12–18 months has seen Resonance make a deliberate decision to invest more in marketing and R&D to develop and grow the business. We believe this investment will pay off over time as it paves the way for additional revenue streams.
11. **Resonance Health is undervalued on our numbers**. We value Resonance at 7.6 cents per share base case and 14.5 cents per share optimistic case. Our target price of 11 cents sits at the midpoint of these two numbers. We see Resonance stock re-rating on the back of a continued increase in usage for FerriScan and HepaFat-Scan, and increasing awareness of the utility of the diagnostics in a range of clinical settings.

RESONANCE IS WORKING ON AUTOMATED MRI DIAGNOSTICS

[21] Dig Dis. 2010;28(1):155-61. Epub 2010 May 7.

Valuing Resonance Health

Base case 7.6 cents / Optimistic case 14.5 cents. We previously valued Resonance at 7.5 cents per share base case and 14.3 cents per share optimistic case using a DCF approach. With this report, we increase that range slightly, to 7.6 cents per share base case and 14.5 cents per share optimistic case to reflect a slight change in the risk-free rate. Our 11-cent target price sits at around the midpoint of our valuation range. Our DCF of Resonance was built on the following core assumptions:

WE VALUE RESONANCE AT 7.6 CENTS BASE CASE AND 14.5 CENTS OPTIMISTIC CASE

- Our WACC was ~11%, appropriate in our view for a 'Medium' risk rating[22];
- We used a measurement horizon out to FY26;
- We assume continued growth in usage of FerriScan and HepaFat-Scan to between US$20m (base case) and US$30m (optimistic case), reflecting the large potential market value of the relevant drug markets;
- We assumed that most of the growth was HepaFat-Scan even though FerriScan continued to grow usage;
- We made allowance for rapid test uptake once tests become automated, which as we noted above could be game-changing for Resonance;
- We assume the AUD/USD exchange converges on 0.7 over a three-year period from now;
- We assumed true gross margins for Resonance's tests is around 65% at present, but will expand to between 70% (base case) and 80% by FY26 as efficiencies build;
- We assumed that cost growth converged on revenue growth by FY26;
- We assumed capex/R&D to run at 2-4% of revenue;
- We assumed a terminal growth rate in each case of 4.5% and terminal EBITDA margins of 40%.

Re-rating Resonance Health

Re-rating Resonance. We see the following factors playing a part in re-rating Resonance over the next 12-18 months:

WE LOOK FOR GROWTH IN HEPAFAT-SCAN USAGE

- Continued development of the new tests;
- Growth in usage of HepaFat-Scan;
- Increased revenue from FerriScan given the steady increase in test sites over time;
- Progress on the development of a liver inflammation or fibrosis test;
- Continued development of machine learning in Resonance's tests;

[22] For a relevant discount rate, we use varying WACCs depending on the risk for Life Science companies. We start with an RFR of the Australian ten year bond rate and an ungeared beta of 1.1 but use a variable MRP of 7.5%-11.5% (7.5% for 'medium risk' companies, 9.5% for 'high risk' companies and 11.5% for 'speculative' companies). 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'.

- Pioneering of new markets for Resonance's existing tests, including, potentially, entry into China;
- Any favourable developments among the various programmes developing new NASH drugs;
- Potential corporate relationships with a pharmaceutical or radiological partner organisation;
- Reimbursement.

Risks related to Resonance Health

Risks specific to Resonance Health. We see four major risks for Resonance Health as a company and as a listed stock:

- **Reimbursement risk**. There is the risk that Resonance may continue to miss out on reimbursement for its MRI-based tests.
- **Adoption risk**. There is the risk that clinicians may fail to see the utility of Resonance's diagnostics compared to existing modalities.
- **Regulatory risk**. There is the risk that the FDA and other regulators may decline to approve Resonance's new diagnostics even if the company considers the data submitted to be adequate.
- **Development risk**. There is the risk that Resonance's R&D team may fail to solve all the technical problems with individual diagnostics it has set out to develop.

Risks related to pre-revenue Life Science companies in general.

- The stocks of biotechnology and medical device companies without revenue streams from product sales or ongoing service revenue should always be regarded as speculative in character.
- Since most biotechnology and medical device companies listed on the Australian Securities Exchange fit this description, the 'term' speculative can reasonably be applied to the entire sector.
- The fact that the intellectual property base of most biotechnology and medical device lies in science not generally regarded as accessible to the layman adds further to the riskiness with which the sector ought to be regarded.

Caveat emptor. Investors are advised to be cognisant of the abovementioned specific and general risks before buying any the stock of any biotechnology and medical device stock mentioned on this report, including Resonance Health.

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NDF Research issues a BUY recommendation in case of an expected total shareholder return (TSR, share price appreciation plus dividend yield) in excess of 25% within the next twelve months, an ACCUMULATE recommendation in case of an expected TSR between 5% and 25%, a HOLD recommendation in case of an expected TSR between -5% and +5% within the next twelve months and a SELL recommendation in case of an expected total return lower than -5% within the next twelve months.