ResApp HEALTH

Digital healthcare for respiratory disease

Tony Keating
CEO and Managing Director
tony@resapp.health

TechKnow Invest Roadshow
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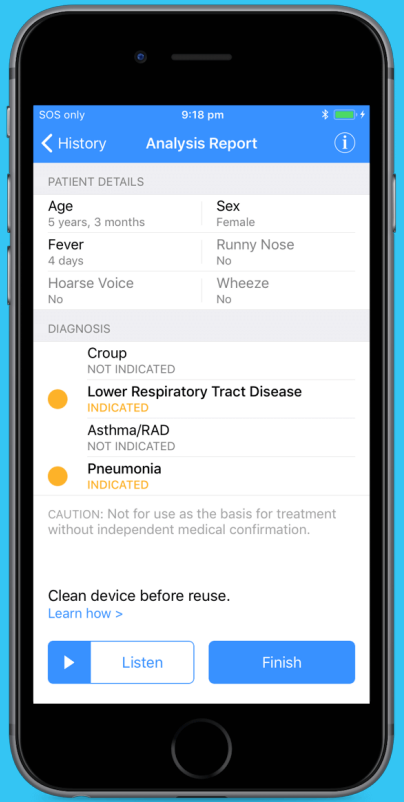

ASX: RAP

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Digital healthcare for respiratory disease

- Developing the world's first clinically-validated, regulatory-cleared respiratory disease diagnostic test and management tools for smartphones
- Huge global market, 700 million+ doctor visits annually for respiratory disease[1]
- Compelling clinical evidence with 4,000+ patients enrolled in Australian and US clinical studies, including positive results from two double-blind, prospective paediatric studies
- Regulatory filings submitted or underway in Europe, Australia and the US
- Well-funded to execute our commercialisation strategy
- Broadening product portfolio
  - Promising proof-of-concept results in chronic respiratory disease management
  - Excellent results from double-blind, prospective study for screening of obstructive sleep apnoea
  - Partnership with Lockheed Martin on US DARPA WASH research program

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1. ResApp estimate based on OECD doctor consultations per capita data (http://stats.oecd.org), and assuming 10% of visits (US prevalence based on NAMCS 2015 data) are for respiratory disease.

Company overview

Capital Structure (ASX:RAP)

Market Cap. **as of 15 March 2019**	**AU$61M**
Share Price as of 15 March 2019	AU$0.088
Shares on Issue	693M
Performance Shares[1]	93.75M
Options[2]	6.37M
Incentive Options[3]	51.2M
Cash Balance as of 31 December 2018	**AU$6.8M +** **AU$1.7M estimated R&D rebate**

1. Issued on achieving AU$20M of annual revenue or on an acquisition
2. 4.5M, exercise price of 28c, expire 29/4/19; 1.87M, exercise price of 30c, expire 29/4/19
3. Issued to directors, staff and scientific advisory board

Board of Directors

Dr Roger Aston Non-Executive Chairman
(Chairman of Regeneus, PharmAust and Immuron, Non-Exec. Director of Oncosil Medical, formerly CEO of Mayne Pharma, Cambridge Antibody, co-founder of pSivida)

Dr Tony Keating Managing Director and CEO
(formerly Director, Commercial Engagement at UniQuest, engineering management roles with Exa Corporation)

Mr Nathan Buzza Non-Executive Director
(formerly founder of Commtech Wireless, EVP Azure Healthcare and non-executive director of Alcidion)

Mr Chris Ntoumenopoulos Non-Executive Director
(Managing Director at Twenty 1 Corporate, Non-Exec. Director at Race Oncology, formerly at Citigroup, Indian Ocean Capital and CPS Capital)

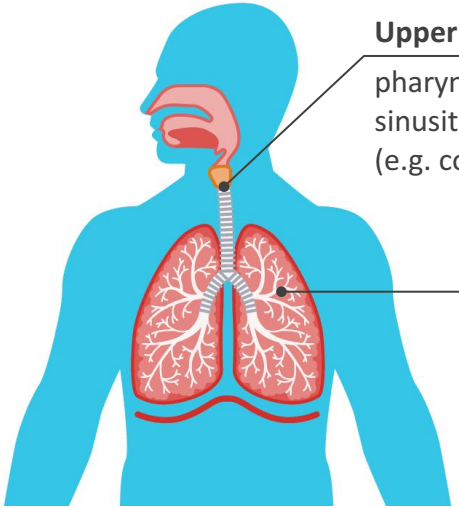
Substantial Shareholders*

Fidelity International: 9.23%
Freeman Road: 6.68%
Ian Francis Reynolds: 5.60%

* Based on Substantial Shareholder Notices lodged by the respective holders

Diagnosis of respiratory disease is the most common outcome from a visit to the doctor[1]

- 700M+ doctor visits p.a. globally for respiratory disease[2]
- Most common reasons for hospital admission[3]
  - → Bronchiolitis (infants)
  - → Asthma and pneumonia (children)
- US$10.6B p.a. direct US hospital costs for pneumonia[4]
- High prevalence and growth in Asia
  - → 100M adults in China with COPD[5]



Upper respiratory tract

pharyngitis, nasopharyngitis, sinusitis, laryngitis and tracheitis (e.g. common cold)

Lower respiratory tract

asthma, pneumonia, bronchiolitis, bronchitis, COPD and other viral lower respiratory tract infections

Diagnosed today using stethoscope, imaging (x-ray, CT), spirometry, blood and/or sputum tests

→ **Time consuming, expensive, subjective and not very accurate**

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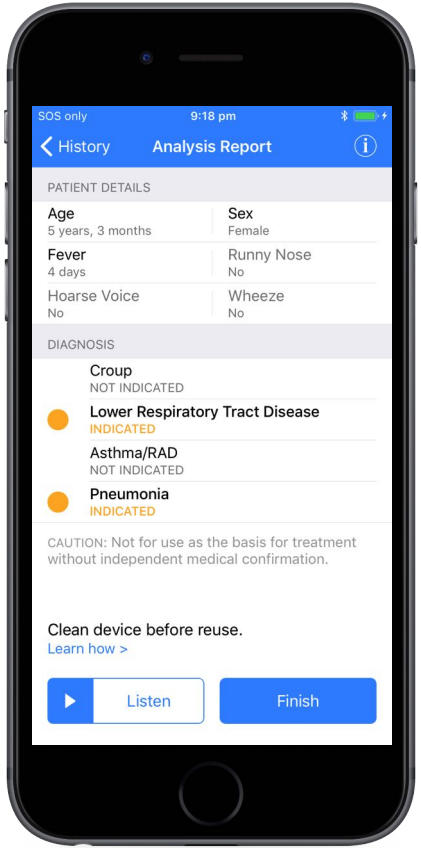
1. Ambulatory care visits (office and emergency department), National Ambulatory Medical Care Survey 2015
2. ResApp estimate based on OECD doctor consultations per capita data (http://stats.oecd.org), and assuming 10% of visits (US prevalence based on NAMCS 2015 data) are for respiratory disease.
3. HCUP Statistical Brief #148 (2010)
4. HCUP Statistical Brief #160 (2013)
5. Fang. L, et al., Chronic obstructive pulmonary disease in China: a nationwide prevalence study, *The Lancet Respiratory Medicine (2018)*

Easy to use, instant diagnosis using only a smartphone

- Machine learning technology developed by Associate Professor Abeyratne at The University of Queensland
  - Uses signatures in cough sounds to instantly differentially diagnose respiratory disease
  - Able to automatically improve performance and learn new diseases from new clinical datasets
- Uses the built-in microphone in modern smartphones
  - No additional hardware/accessories required
  - Real-time on-device analysis, no connectivity/cloud needed
- Growing patent portfolio and data assets
  - Core patent granted in US, Australia and Japan[1], in national phase examination in Europe, China, South Korea; three additional patent applications
  - Proprietary data set, over 4,000 patients' cough and breathing sounds and matching clinical signs, symptoms and diagnosis



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1. US Patent No. 10,098,569, Australian Patent No. 2013239327, Japanese Patent No. 6,435,257

Compelling clinical evidence from multiple clinical studies in Australia and the US

Paediatric

Breathe Easy
ANZCTR: ACTRN12618001521213

585 patient, double-blind, prospective study at two Australian hospitals completed

83-97% PPA and 81-91% NPA compared to clinical diagnosis for lower respiratory tract disease, croup, bronchiolitis, pneumonia and asthma/RAD

CE Technical File submitted in December 2018

SMARTCOUGH-C-2
ClinicalTrials.gov: NCT03392363

1,470 patient, double-blind, prospective study at MGH, Cleveland Clinic and Texas Children's Hospital completed

73-77% PPA and 70-86% NPA compared to clinical diagnosis for upper respiratory tract disease, lower respiratory tract disease, croup and asthma/RAD

Pneumonia and bronchiolitis results <70% PPA and NPA due to observed clinical practice differences between US and Australia

FDA De Novo submission planned for Q1 CY2019

Adult

Breathe Easy
ANZCTR: ACTRN12618001521213

1,387 patient pilot study at two Australian hospitals completed

87-91% PPA and 88-90% NPA compared to clinical diagnosis for pneumonia, asthma and COPD exacerbations

87-89% PPA and 87-90% NPA compared to lung function testing for COPD and chronic asthma

Results from double-blind, prospective study due in Q1 CY2019

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Achieving breakthrough performance in diagnosis

- Lower respiratory tract disease diagnosis
  - Effective treatment needs identification of lower respiratory tract involvement
  - Correctly detected lower respiratory tract involvement in 97% of cases initially “missed” by experienced clinicians using a stethoscope
- Cause of pneumonia diagnosis

  “We need faster, less-expensive diagnostic tests for doctors to accurately diagnose the cause of pneumonia so they can effectively treat it” US CDC (2015)[1]
  - Incorrect diagnosis leads to unnecessary and ineffective antibiotic use
  - Identifying the cause today is time consuming, costly and only available in tertiary hospitals
  - Preliminary results demonstrated separation of bacterial and atypical from viral pneumonia with 89%-90% accuracy

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1. US Department of Health and Human Services Press Release, Feb 25, 2015 , http://www.cdc.gov/media/releases/2015/p0225-pneumonia-hospitalizations.html

Unique opportunity in telehealth, one of the fastest growing areas in healthcare globally

- US telehealth leads, with rapid growth in primary care:

75M	56%	US$12B
consults p.a.	**growth**	**US TAM**
(US telehealth 'evisits' in 2014 estimated by Deloitte)[1]	(Global telehealth revenue growth rate until 2018 estimated by IHS)[2]	(Goldman Sachs US total addressable market estimate)[3]

- Growth in Europe and Asia Pacific
  - Online consultations in China estimated by Frost and Sullivan to reach 4 billion p.a. by 2026[4]
  - Ping An Good Doctor performs 531,000 online consults per day[5]
- 30-50% of telehealth consults are for respiratory disease[6,7]
  - Today there is **no ability to use a stethoscope** and **no accurate remote diagnosis tools available**
- ResApp's test can be delivered anywhere, anytime while retaining a clinician's input

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1. Deloitte, eVisits: the 21st century housecall (August 2014)
2. IHS, World Market for Telehealth (2014)
3. Goldman Sachs Equity Research, The Digital Revolution Comes to US Healthcare (June 2015)
4. Frost and Sullivan Research, commissioned by Ping An via http://www.pahtg.com/media/1144/e_1833ipo.pdf
5. Ping An Good Doctor June 2018 Interim Results, http://www.pahtg.com/media/1238/ping-an-good-doctor-2018-interim-results.pdf
6. Uscher-Pines and Mehrotra (Health Affairs, 2014)
7. UnitedHealthcare Presentation (https://www.mobihealthnews.com/content/health-insurance-payer-related-digital-health-news-q2-2016)

Targeting multiple market segments

	Telehealth	Clinical use	Developing world	Direct to consumer
Market size	700M doctor visits in OECD for respiratory disease p.a.[1] • 22.5M respiratory-related US telehealth consults p.a.[2]	• 13.4M US ED visits for respiratory disease p.a.[3] (~4.6M for children)	• 1M child deaths due to pneumonia p.a.[4] • 151M cases of pneumonia in developing countries p.a.[4]	• 400M iPhone users[5] • 1.6B Android users[5] • mHealth app market expected to grow to $31B by end of 2020[6]
Value proposition	✓ The only remote clinically-accurate diagnostic tool available ✓ Easily integrated into existing platforms	✓ Reduce costs (<$10 vs >$200 for x-ray) ✓ Reduce time (x-ray adds ~30 mins, cultures can take days)	✓ Low cost, accurate & fast ✓ Usable by non-medical personnel ✓ Integrates into IMCI framework	✓ Convenience ✓ Low cost ✓ Consumer empowerment
Commercial strategy	Partner with telehealth providers to reach tens of millions of patients	Initial use in emergency departments (ED), extending to regular clinics	Partner with leading international aid agencies to equip field personnel	Direct to consumer via app stores to target growth in consumer-led health
Revenue model	**$5-$10 per test fee** from telehealth providers	**$5-$10 per test fee** from healthcare payors	**annual subscription** from aid agencies	**download and per test fee** direct from consumers

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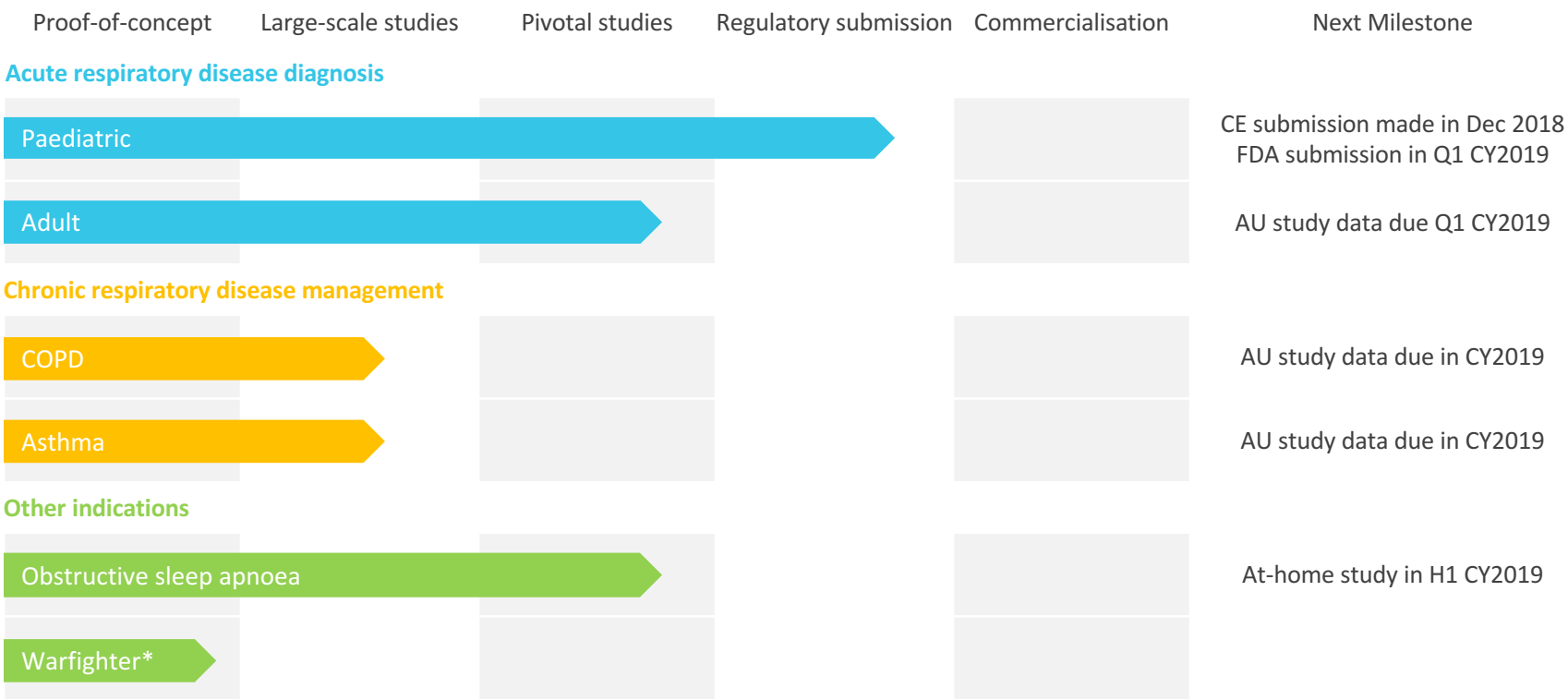
1. ResApp estimate based on OECD per capita data
2. ResApp estimate based on 33% of Deloitte's estimated 75M telehealth 'evisits' (2014) being respiratory-related
3. NHAMCS (2011)
4. WHO estimate
5. Statista (2014 estimates)
6. Research2guidance mHealth App market sizing 2015-2020

Broadening product portfolio



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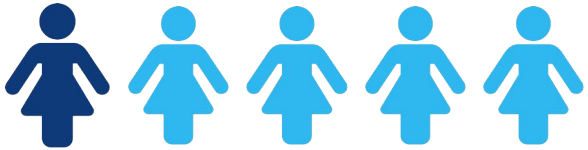
* Warfighter Analytics using Smartphones for Health (WASH) program, in collaboration with US DARPA and Lockheed Martin Corporation

Improving chronic respiratory disease management

- Estimated 339M people globally have asthma[1]
  - $80B+ p.a. US economic burden (2013)[2]
  - Patient adherence to asthma medications is generally very poor
- 251M cases of COPD in 2016[3]
  - Emphysema and chronic bronchitis, primarily caused by smoking
  - 3.17M people died of COPD in 2015, 5% of all deaths globally[3]

1 in 7 children has asthma[4]



1 in 5 adults over 45 has COPD[5]

- Opportunity to measure the severity of asthma and COPD, without the cost of additional hardware or the need to carry an extra device
  - Demonstrated 94% accuracy in identifying asthma patients who require additional treatment
  - Identified infective exacerbations in COPD patients at 91% PPA and 90% NPA

1. The Global Asthma Report 2018 (Global Asthma Network), citing the 2016 Global Burden of Disease Study
2. US CDC, https://www.ajmc.com/newsroom/cdc-study-puts-economic-burden-of-asthma-at-more-than-80-billion-per-year
3. WHO, citing the 2015 Global Burden of Disease Study, http://www.who.int/news-room/fact-sheets/detail/chronic-obstructive-pulmonary-disease-(copd)
4. International Study of Asthma and Allergies in Childhood via 2014 Global Asthma Report, http://www.globalasthmareport.org/2014/priority/ncd.php
5. COPD Foundation, https://www.copdfoundation.org/About-Us/Press-Room/Press-Releases/Article/965/COPD-Foundation-Goes-Orange-for-National-COPD-Awareness-Month-in-November.aspx

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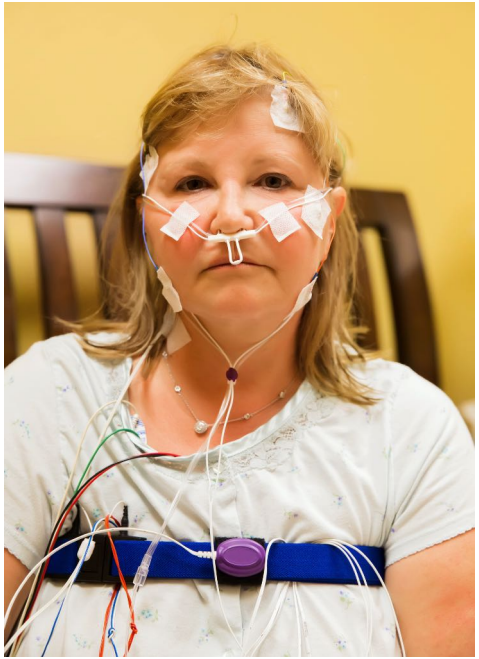
Sleep apnoea is the most common sleep breathing disorder[1] and is significantly underdiagnosed

- Studies have found that more than 3 in 10 men, and nearly 2 in 10 women have sleep apnoea[2]
- Estimated 80% of adults with sleep apnoea are undiagnosed[3]
- Linked to heart disease, stroke and type 2 diabetes[4]
- Major barriers to diagnosis:

Sleep laboratory polysomnography (PSG)	Requires referral Long wait times $600-$5,000 per test Uncomfortable & unfamiliar environment
Home sleep testing (HST)	Requires referral & training Up to 18% failure rate[5] $150-$500 per test Uncomfortable



1. American Thoracic Society, Breathing in America: Diseases, Progress and Hope, https://www.thoracic.org/patients/patient-resources/breathing-in-america/resources/chapter-23-sleep-disordered-breathing.pdf
2. Peppard et al., Increasing prevalence of sleep-disordered breathing in adults, Am J Epidemiol (2013)
3. Frost & Sullivan, Hidden Health Crisis Costing America Billions, https://aasm.org/resources/pdf/sleep-apnea-economic-crisis.pdf
4. American Academy of Sleep Medicine, Severe obstructive sleep apnea hurts hearts, https://aasm.org/severe-obstructive-sleep-apnea-hurts-hearts/
5. Clinical Guidelines for the Use of Unattended Portable Monitors in the Diagnosis of Obstructive Sleep Apnea in Adult Patients, American Academy of Sleep Medicine

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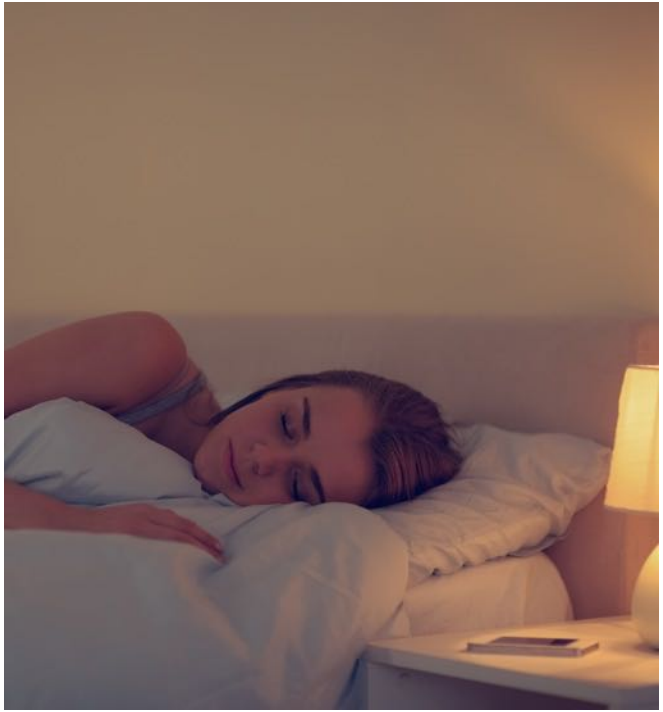
Convenient, at-home screening of obstructive sleep apnoea

- Using only a smartphone placed on the bedside table
  - Smartphone app uses audio signatures in overnight breathing and snoring sounds to identify sleep apnoea
- Excellent results from a 582 patient, double-blind, prospective clinical study compared to simultaneous in-laboratory PSG:

	AUC	Sensitivity	Specificity
AHI ≥ 5/h (Mild)	0.90 (95%CI, 0.87-0.93)	84% (95%CI, 80-87%)	83% (95%CI, 69-92%)
AHI ≥ 15/h (Moderate)	0.88 (95%CI, 0.85-0.91)	80% (95%CI, 75-84%)	80% (95%CI, 73-85%)
AHI ≥ 30/h (Severe)	0.90 (95%CI, 0.87-0.93)	82% (95%CI, 76-87%)	82% (95%CI, 77-86%)

- Currently recruiting patients in an at-home study with simultaneous in-home AASM Type II PSG



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Summary

- Revolutionary technology – diagnosis and management of respiratory disease without the need for additional hardware
- Compelling clinical evidence from two double-blind, prospective clinical studies
  - Double-blind, prospective adult study results due in Q1 CY2019
- Well understood regulatory pathway
  - CE Mark Technical File submitted in December 2018, TGA submission to follow successful CE Mark
  - Pre-Submission Meeting with FDA held in 2016, confirmed De Novo pathway
  - FDA De Novo submission planned for Q1 CY2019
- Beginning to execute on commercial strategy with LOI signed for German hospital network pilot
- Broadened product portfolio
  - Chronic respiratory disease (asthma, COPD) management
  - Excellent results from double-blind, prospective obstructive sleep apnoea screening study
  - Partnership with Lockheed Martin on US DARPA WASH research program

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Detailed clinical study data

Australian double-blind, prospective paediatric clinical study

Breathe Easy Paediatric Study

(ANZCTR: ACTRN12618001521213)

- Double-blind, prospective study of 585 patients, aged 29 days to 12 years, presenting with signs and symptoms of respiratory disease at two Australian hospital sites
- Comparison to clinical diagnosis (including CXR, lab tests) formed by clinical adjudication committee

	Patients[1]		Positive Percent Agreement[2]	Negative Percent Agreement[2]
	Y	N		
Lower respiratory tract disease	419	154	83% (95%CI, 79-86%)	82% (95%CI, 75-88%)
Asthma/reactive airways disease	149	381	97% (95%CI, 92-99%)	91% (95%CI, 88-94%)
Croup	68	500	88% (95%CI, 78-95%)	86% (95%CI, 82-89%)
Pneumonia	60	509	87% (95%CI, 75-94%)	85% (95%CI, 82-88%)
Primary upper respiratory tract disease	89	482	79% (95%CI, 69-87%)	80% (95%CI, 76-83%)
Bronchiolitis (patients aged < 2 years old)	131	26	84% (95%CI, 77-90%)	81% (95%CI, 61-93%)

1. Number of patients clinically diagnosed as having disease (Y) or not having disease (N).
2. As per FDA guidance, positive and negative percent agreement (rather than sensitivity and specificity) are used when a new test is compared to a non-reference standard such as a clinical diagnosis.

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US double-blind, prospective paediatric clinical study

SMARTCOUGH-C-2 Study

(ClinicalTrials.gov: NCT03392363)

- Double-blind, prospective study of 1,470 patients, aged 29 days to 12 years, presenting with signs and symptoms of respiratory disease at three US hospital sites (MGH, Cleveland Clinic and TCH)
- Comparison to clinical diagnosis (including CXR, lab tests) formed by clinical adjudication committee
- Pneumonia and bronchiolitis results <70% due to observed clinical diagnosis differences between US and Australia

	Patients[1]		Positive Percent Agreement[2]	Negative Percent Agreement[2]
	Y	N		
Lower respiratory tract disease	412	775	73% (95%CI, 68-77%)	77% (95%CI, 74-80%)
Asthma/reactive airways disease	176	886	71% (95%CI, 64-78%)	86% (95%CI, 83-88%)
Asthma/reactive airways disease (children aged > 2years old)	177	779	75% (95%CI, 68-82%)	84% (95%CI, 82-87%)
Croup	29	1207	74% (95%CI, 53-87%)	74% (95%CI, 71-76%)
Primary upper respiratory tract disease	722	453	76% (95%CI, 73-79%)	70% (95%CI, 66-74%)
Pneumonia (Focal)	52	1027	67% (95%CI, 53-80%)	64% (95%CI, 61-67%)
Pneumonia	100	1150	63% (95%CI, 53-72%)	62% (95%CI, 59-65%)
Bronchiolitis (children aged < 2 years old)	42	89	76% (95%CI, 60-88%)	60% (95%CI, 59-70%)

1. Number of patients clinically diagnosed as having disease (Y) or not having disease (N).
2. As per FDA guidance, positive and negative percent agreement (rather than sensitivity and specificity) are used when a new test is compared to a non-reference standard such as a clinical diagnosis.

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Australian adult clinical study

Breathe Easy Adult Study

- Leave-one-out cross-validation results
- Achieved high levels of accuracy in diagnosis of pneumonia and acute asthma
- Diagnosis of COPD and chronic asthma compared to the gold standard of pulmonary function tests

Breathe Easy Adult Study *(compared to clinical diagnosis, population of patients with broad respiratory symptoms)*	Positive Percent Agreement	Negative Percent Agreement
Community-acquired pneumonia (n=360)	90% (95%CI, 86-93%)	88% (95%CI, 83-92%)
Acute asthma (n=54)	91% (95%CI, 80-97%)	88% (95%CI, 85-91%)

Breathe Easy Adult Study *(compared to lung function testing, population of patients referred to lung function testing)*	Sensitivity	Specificity
COPD (n=41)	89% (95%CI, 74-96%)	87% (95%CI, 79-92%)
Chronic asthma (n=34)	87% (95%CI, 73-97%)	90% (95%CI, 83-95%)

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