



C A P N I A

January 2015



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## Forward-Looking Statements

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# Capnia Summary (NASDAQ: CAPN)

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- ◆ **Developer of medical diagnostics and therapeutics based on proprietary technology for precision metering of gas flow**
- ◆ **Lead product: CoSense®**
  - 510(k) cleared in US, CE marked in EU
  - Measures End-tidal Carbon Monoxide (ETCO)
  - “Gold standard” marker of hemolysis risk in infants w/ jaundice
  - Treatment guidelines suggest use in neonates
- ◆ **Sensalyze™ Diagnostic Technology Platform**
  - Precision sampling of exhaled breath
  - Several additional Dx product candidates:  
Asthma, Diabetes. Gastric Malabsorption, ETCO<sub>2</sub> monitoring in neonates
- ◆ **Therapeutic technology with potential for treating:**
  - Allergic rhinitis
  - Cluster Headache
  - Trigeminal Neuralgia

# Capnia Management & Board

## Management

### **Anish Bhatnagar, M.D., *President & CEO***

- ◆ Senior Capnia executive since 2006
- ◆ Product approval experience at Coulter (Bexxar), Capnia (Serenz, CoSense), management at Titan

### **David O'Toole, *Chief Financial Officer***

- ◆ Former CFO for Codexis (CDXS), Response Genetics (RGDX), Abraxis (ABBI)

### **Gina Phelps, *VP of Sales***

- ◆ Launched point-of-care Dx products at Metrika (acquired by Bayer) and Accumetrics (acquired by ITC)

### **Anthony Wondka, *VP of R&D***

- ◆ Former VP R&D, VP Technology and Clinical Affairs for Breathe Technologies

### **Kristen Yen, *VP of Clinical and Regulatory Affairs***

- ◆ Head of Clinical Operations at Capnia since 2006
- ◆ Program management of multiple U.S. and global clinical studies

## Board of Directors

### **Ernest Mario, Ph.D., *Chairman***

Former CEO, Reliant Pharmaceuticals (acquired by GSK for \$1.6 billion)  
Former CEO of ALZA Corporation (acquired by J&J for \$12 billion)

### **Edgar Engleman, M.D.**

Founding member, Vivo Ventures

### **Steinar Engelsen, M.D.**

Partner, Teknoinvest AS

### **Stephen Kirnon**

CEO, PharmaPlan LLC

### **William Alexander, M.D.**

Senior Director of Medical Affairs, Chiesi USA

### **William ("Bill") Harris**

Chief Financial Officer & SVP, Xenoport

### **Anish Bhatnagar, M.D.**

CEO, Capnia

# Advisors - Leading Neonatologists

## ◆ Vinod (Vinny) Bhutani, M.D.

- Professor of Pediatrics, Stanford University School of Medicine
- American Academy of Pediatrics Exec. Committee, Section on Perinatal Pediatrics, and Committee of Fetus and Newborn, Subcommittee on Hyperbilirubinemia
- Member of California Association of Neonatologists

## ◆ David Stevenson, M.D.

- Harold K. Faber Professor of Pediatrics, Stanford University School of Medicine
- Director of NIH-Funded Training Program in Developmental and Neonatal Biology

## ◆ Robert Christensen, M.D.

- Research Director, Neonatology, Intermountain Healthcare Clinic
- Former member of the NIH National Heart, Lung & Blood Institute, NIH National Institute of Child Health & Human Development, National Foundation March of Dimes





# Sensalyze™ Diagnostic Technology Platform

# Breath Analysis – Background

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- ◆ **Similar to a fingerprint, every individual has a “breathprint” that can provide useful information about his/her state of health**
- ◆ **Exhaled breath contains**
  - Oxygen, nitrogen, and carbon dioxide
  - NO and carbon monoxide
  - Compounds / gases produced in the lung and airways, the GI tract, the sinuses and/or the oral cavity
- ◆ **Thousands of unique substances have been identified in exhaled breath**
- ◆ **Concept of breath analysis dates back to Hippocrates**

# Breath Analytics - Huge Market Opportunity

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- ◆ **Theoretically, many compounds produced in the body can be present in exhaled breath**
  - Breath diagnostics can therefore potentially replace a variety of blood tests
- ◆ **There are over 30 types of breath analyzers cleared by the FDA for various indications, e.g.:**
  - Alcohol intake
  - Measurement of respiration during anesthesia
  - Asthma diagnosis and monitoring
  - *H Pylori* infection
  - CO<sub>2</sub> status



# Current Breath Analysis Technologies - Limitations

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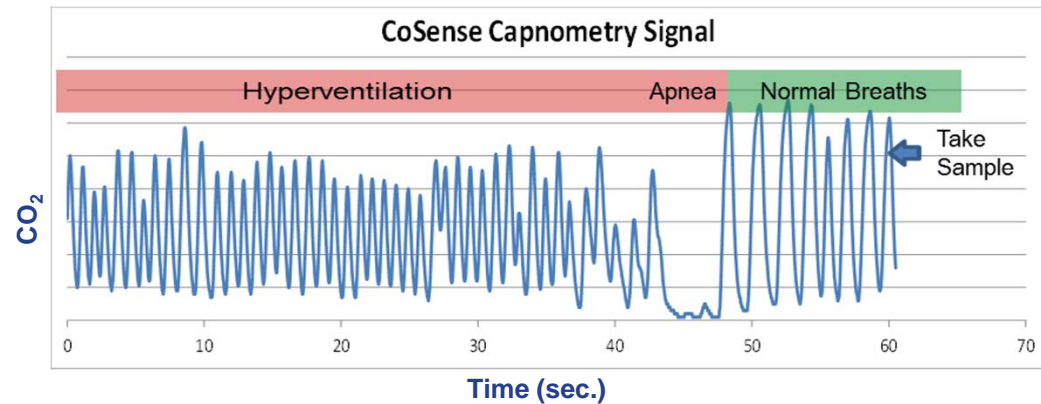
- ◆ **Breath testing with today's devices typically requires**
  - Breath maneuvers (e.g., forced exhalation)
  - Large quantities of exhaled breath
  - Slower respiratory rate
- ◆ **Only suitable for patients that are willing and able to follow commands (older children and cooperative, relatively healthy adults)**
- ◆ **The most significant diagnostic dilemmas (and need for non-invasiveness) is in the very young and very sick**

*Opportunity to develop testing devices that are suitable for infants, young children, and other patients who may not be candidates for current breath testing*

# Sensalyze – Proprietary Technology Platform

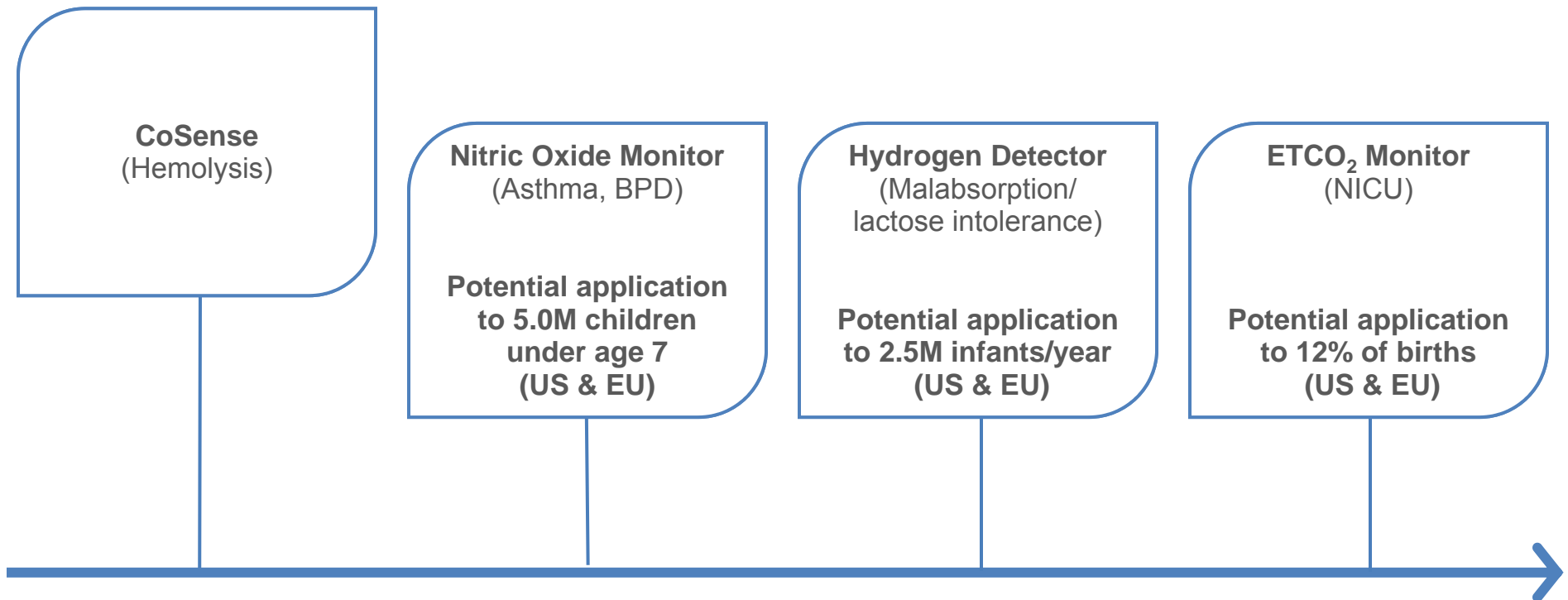
- ◆ **Problem:**  
**Current sampling technologies require breath control**
  - Breath holding or forced exhalation
  - Impossible for babies... often inconvenient for adults

## Infant Breathing Pattern: Fast, Irregular, Hard to Capture



- ◆ **Capnia Solution:**  
**Sophisticated, IP-protected mechanism for detecting analytes in breath**
  - Combination of sampling hardware and software
  - High sensitivity even in small breath volumes and rapid, irregular breath rates
  - Patent portfolio (issued and pending) with expirations out to 2030s

# CoSense and Pipeline of Future Products

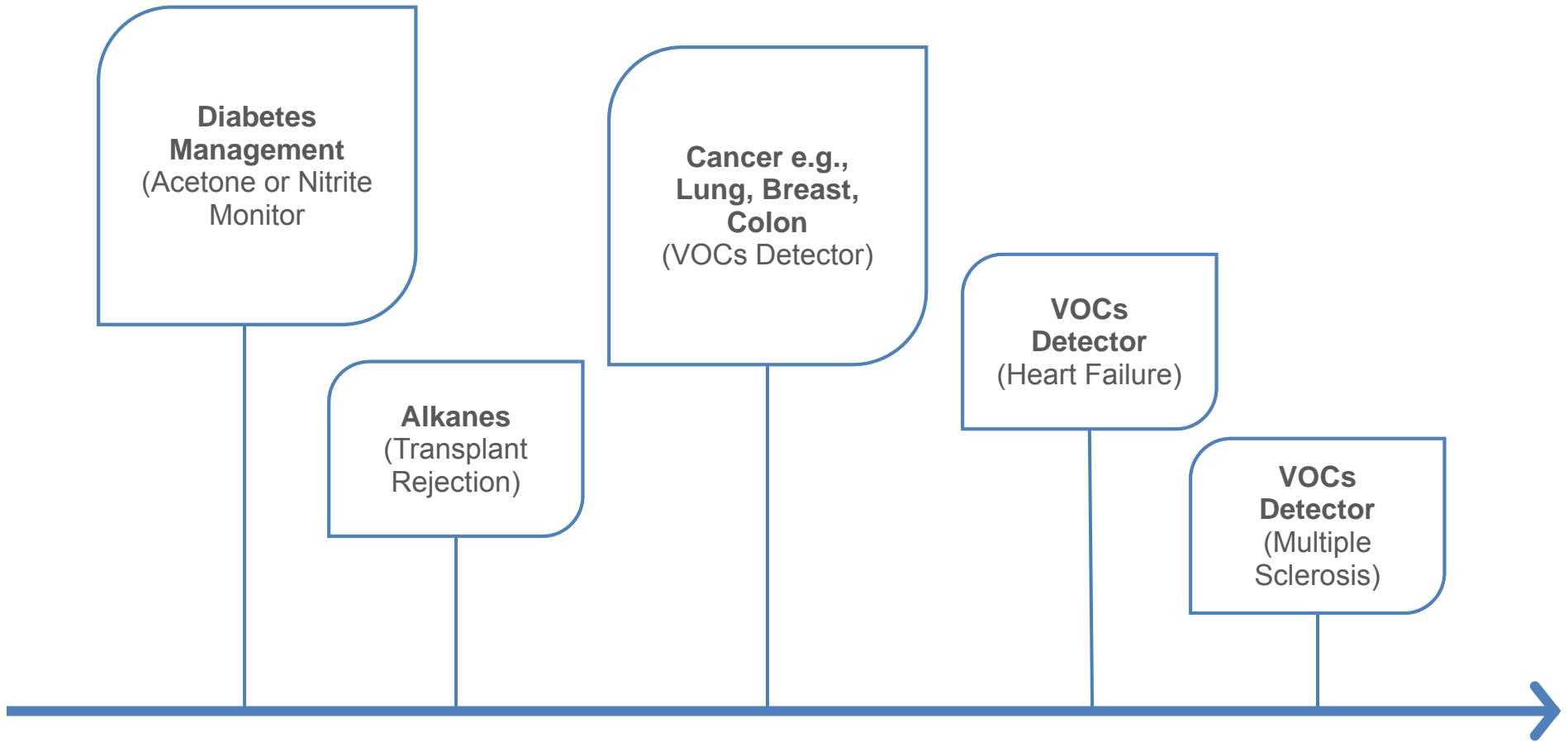


#### Sources:

- (1) CDC. The State of Childhood Asthma in the US. 2006. Available at: <http://www.cdc.gov/nchs/data/ad/ad381.pdf>
- (2) 2013 US Population: 316,128,839 (<http://quickfacts.census.gov/qfd/states/00000.html>). 6.4% of the population is under 5 years of age; 23.5% of the population is under 18 years of age. 17.1% of the population is between 5-18 years of age.
- (3) EU population in 2013 is 505.7M. Assume the same pediatric population rates and asthma prevalence as the US.
- (4) Am Fam Physician. 2003 May 1;67(9):2005-2006. Available at: <http://www.aafp.org/afp/2003/0501/p2005.html>
- (5) Assumes 9M births in the US and EU each year.
- (6) Neonatal Resuscitation in low-resource settings: What, who and how to overcome the challenges to scale up, Int J. Gynaecol Obstet. 2009 Oct 107(Suppl 1): S47-S64.

# Pipeline of Future Product Candidates

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# CoSense Overview

# Clinical Management of Jaundiced Infants

9M annual births US + EU  
143M births WW

60% of neonates & 80% of pre-term neonates  
present with jaundice/hyperbilirubinemia  
(Routine blood or transcutaneous test  
for bilirubin)

**Hemolysis**

Favorable  
clinical  
outcome

**Adverse clinical outcomes:**  
*Bilirubin-induced neurological dysfunction*  
*Acute bilirubin encephalopathy*  
*Respiratory failure*  
*Kernicterus*



Before you leave the hospital ask your doctor or nurse about a jaundice bilirubin test for your baby.

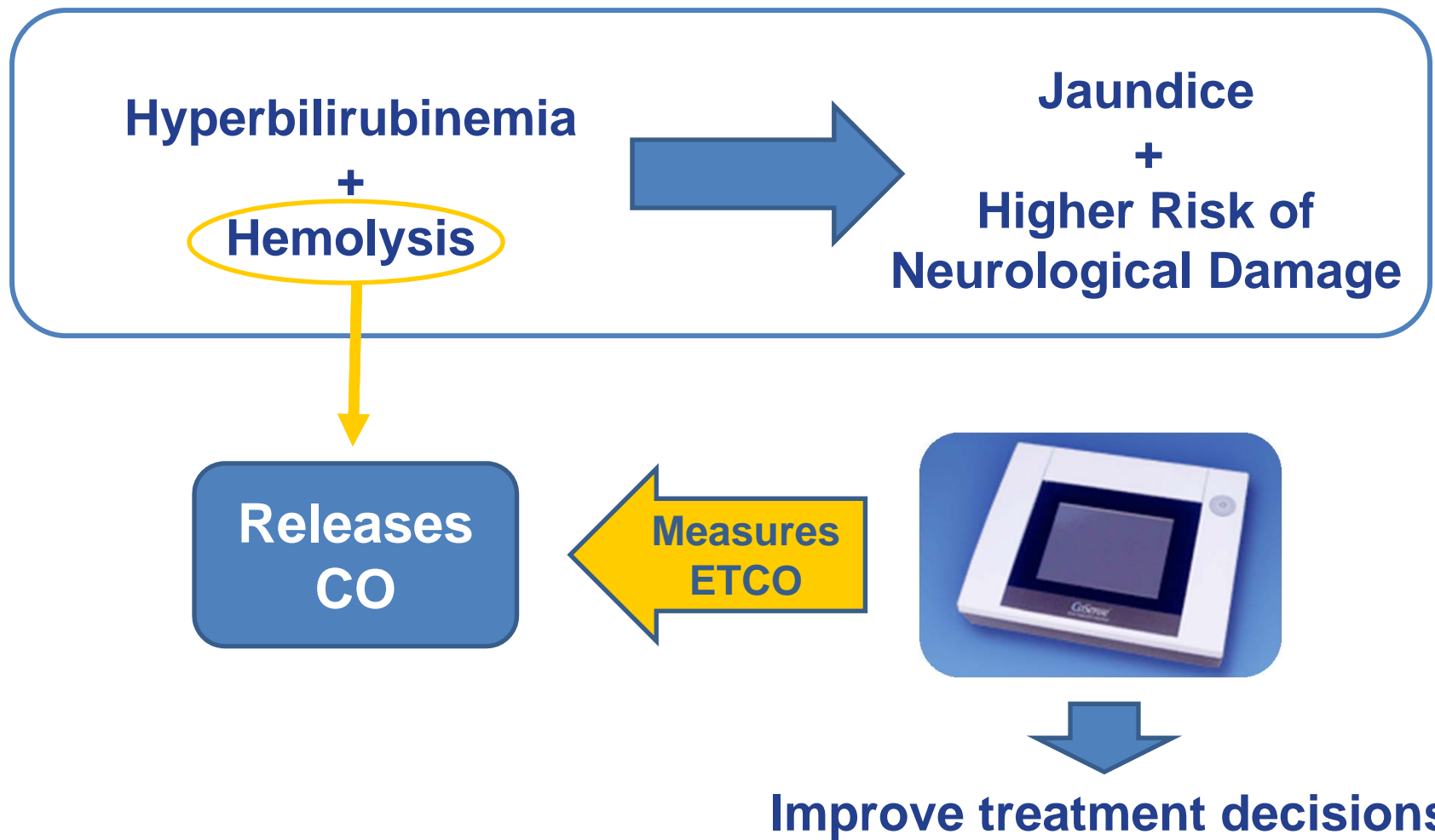
All babies can get jaundice in the first few days of life. To see your doctor or nurse about a jaundice bilirubin test—it's the only way to know for sure if your baby has jaundice that needs to be treated. Placing the baby in the sunlight is not a safe way to treat jaundice. Also, make sure a doctor or nurse checks your baby for jaundice 48 hours after your baby leaves the hospital.

For more information, visit [www.cdc.gov/jaundice](http://www.cdc.gov/jaundice)



# Hemolysis: A Key Risk Factor for Neurological Damage

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# Multiple Publications Link Hemolysis/Hyperbilirubemia and Adverse Neuro Outcomes

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- ◆ **Hemolysis with prolonged hyperbilirubinemia is associated with a significantly lower mean intelligence score.**
  - Nilsen et al. 1984
- ◆ **Hemolysis with significant hyperbilirubinemia is associated with lower performance and full scale IQ scores.**
  - Ozmert et al. 1996
- ◆ **Hemolysis with hyperbilirubinemia is associated with lower scores on cognitive testing**
  - Newman et al. 2006
- ◆ **Hemolysis with significant hyperbilirubinemia is associated with lower full-scale, verbal, and performance IQ scores**
  - Kuzniewicz et al. 2009
- ◆ **Hyperbilirubinemia is associated with definite alteration in neonatal neurobehavior, most strikingly in neonates with severe jaundice.**
  - Babu et al. 2013
- ◆ **Significant hyperbilirubinemia is associated with an increased risk for complex minor neurological dysfunction.**
  - Lansing et al. 2012



# ETCO: Guidelines Issued by American Academy of Pediatrics for Detecting Hemolysis

- ◆ **AAP Clinical Practice Guidelines:**

*“ETCO<sub>c</sub> levels can confirm the presence or absence of hemolysis, and measurement of ETCO<sub>c</sub> is the only clinical test that provides a direct measurement of the rate of bilirubin production...”* (Pediatrics 114:1, 297-316)

- ◆ **No product commercially available to measure ETCO**

**AAP POLICY**

PEDIATRICS Vol. 114 No. 1 July 2004, pp. 297-316

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CLINICAL PRACTICE GUIDELINE

**Management of Hyperbilirubinemia in the Newborn Infant 35 or More Weeks of Gestation**

**Subcommittee on Hyperbilirubinemia**

**Identification of Hemolysis**

Because of their poor specificity and sensitivity, the standard laboratory tests for hemolysis (Table 1) are frequently unhelpful.<sup>66,67</sup> However, end-tidal carbon monoxide, corrected for ambient carbon monoxide (ETCO<sub>c</sub>), levels can confirm the presence or absence of hemolysis, and measurement of ETCO<sub>c</sub> is the only clinical test that provides a direct measurement of the rate of heme catabolism and the rate of bilirubin production.<sup>68,69</sup> Thus, ETCO<sub>c</sub> may be helpful in determining the degree of surveillance needed and the timing of intervention. It is not yet known, however, how ETCO<sub>c</sub> measurements will affect management.

# Current Standard of Care: Adverse Outcomes and Higher Costs

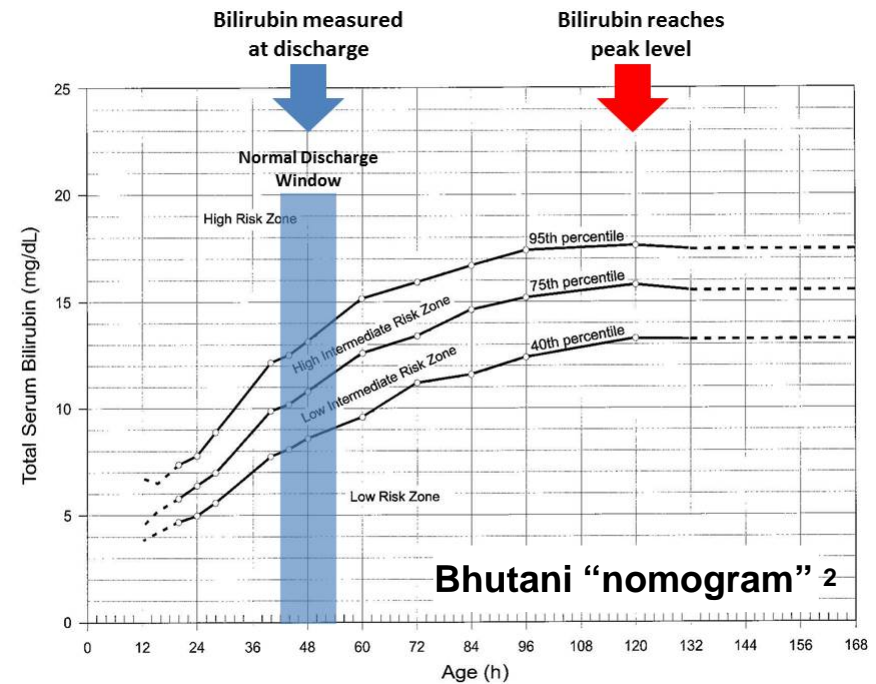
## CHALLENGES

- Bilirubin typically peaks after discharge
- Current diagnosis of hemolysis is invasive and inadequate



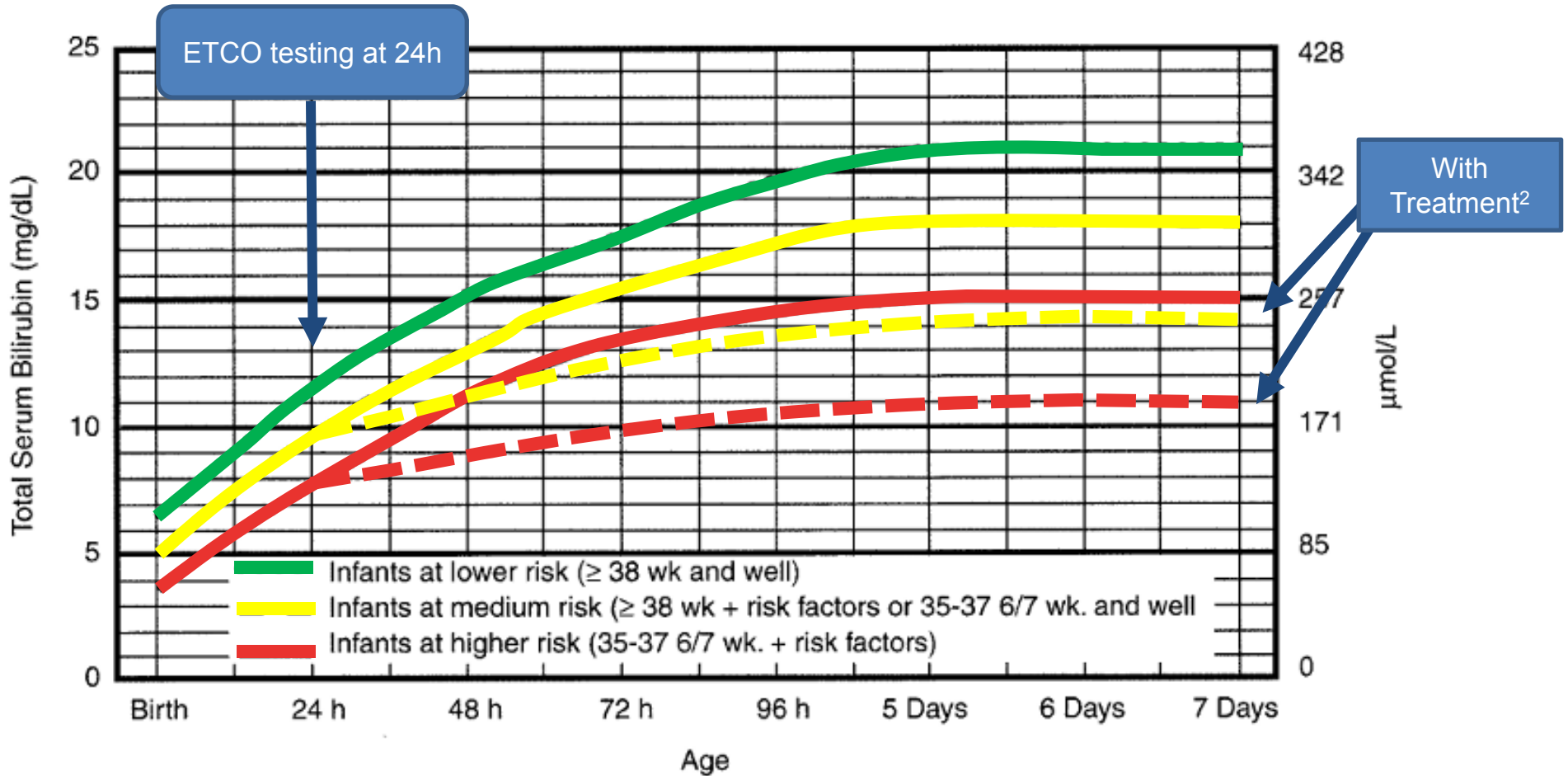
## CONSEQUENCES

- Hemolysis is under-diagnosed
- Treatment is delayed
- Jaundice is #1 cause of infant readmits to hospital<sup>1</sup>



**AAP guidelines recommend ETCO for hemolysis diagnosis, but no tool exists**

# As a Newborn's Risk Profile Increases, the Treatment Threshold for Phototherapy Declines<sup>1</sup>



(1) American Academy of Pediatrics. Management of Hyperbilirubinemia in the Newborn Infant 35 weeks or more of gestation. Pediatrics 2004; 114; 297

(2) Dashed lines: Capnia's opinion of potential impact of CoSense testing

# Capnia Solution: CoSense

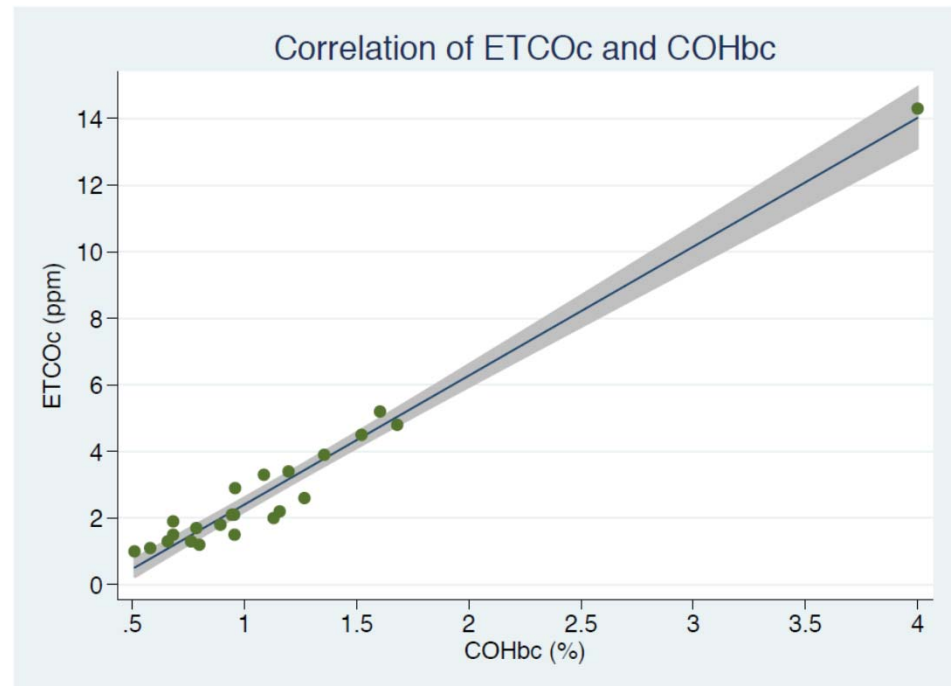
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- ◆ **Detects rate of hemolysis via measurement of ETCO<sub>2</sub>**
  - Non-invasive, < 5 minute test performed by nurse or respiratory therapist
  - Administered at the bedside; does not disrupt mother/infant bonding
- ◆ **Assesses risk of serious disability and supports early action**
- ◆ **FDA 510(k) clearance, CE Marked**
  - Reusable device + disposable cannula



# Detection of Hemolysis in Infants by ETCO Levels

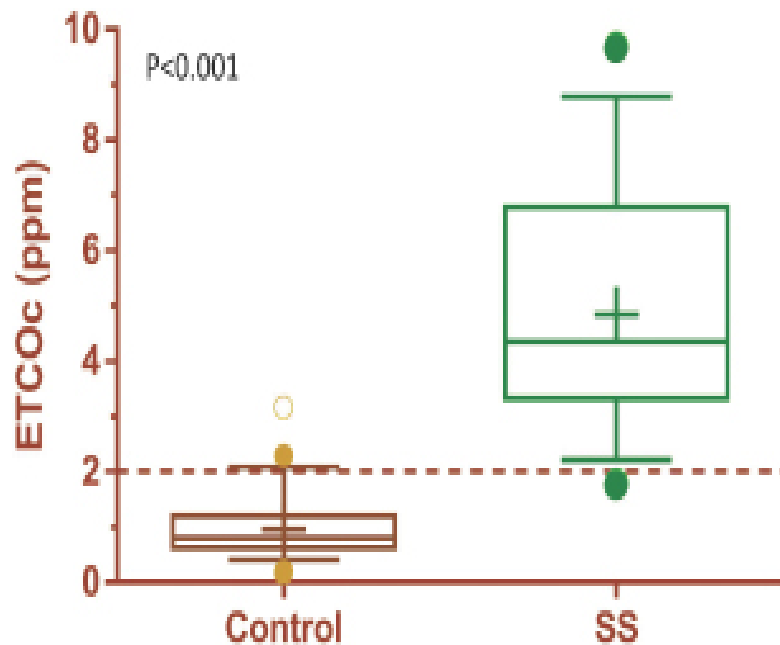
- ◆ CoSense ETCO values from 73 newborns (102 separate measurements)
- ◆ Carboxyhemoglobin (COHb) levels in blood are used for experimental measurements of hemolysis
- ◆ Close correlation between CoSense ETCO and COHb indicates accurate detection of hemolysis by CoSense
- ◆  $r^2=0.98$



Stanford University Hospital  
Presented at PAS on May 6, 2014

# CoSense Accurately Detects Hemolytic Status: Sickle Cell vs. Healthy Controls

- ◆ Sickle cell anemia patients are known to have chronic hemolysis
- ◆ Significantly higher ETCO values in sickle cell patients compared with controls



Highest ETCO Value for Each Subject		
Patients (N=33)	Sickle Cell (N=16)	Control (N=17)
Mean (ppm)	4.85	0.96
Standard Deviation (ppm)	2.24	0.54
Min (ppm)	1.8	0.2
Max (ppm)	9.7	2.3 <sup>1</sup>
p < 0.001		

<sup>1</sup>One control subject had a high ETCO. This subject, who was on anti-epileptic treatment and had asthma, was excluded from analysis.

Oakland Children's Hospital  
Presented at PAS on May 6, 2014

# CoSense: Better Medicine at Lower Costs

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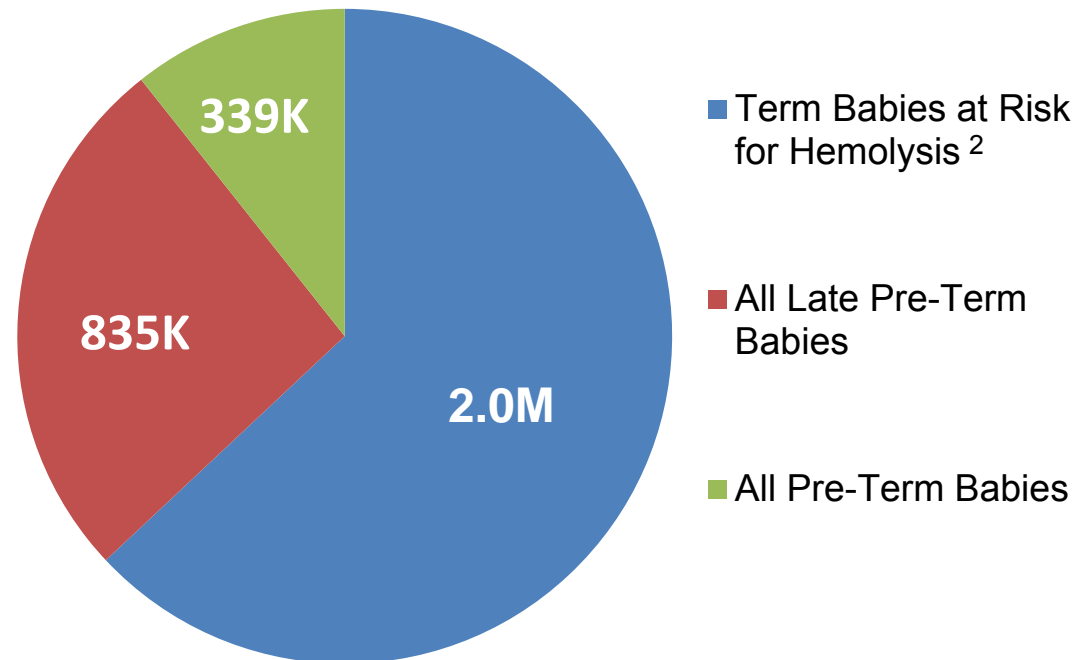
- ◆ **Potential to create value by reducing multiple hospital costs**
  - Replace existing lab testing for hemolysis
  - Reduce risk of malpractice lawsuits associated with Kernicterus/BIND
  - Reduce readmissions to hospital for jaundice
  - Avoid longer hospital stay associated with phototherapy
- ◆ **Inpatient reimbursement**
  - Existing hemolysis testing paid for by hospitals under the inpatient “bundled” payment (diagnosis-related group or DRG)
  - No separate code needed



# Large Addressable Initial Target Market

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## 3.1 Million Newborns Annual Potential (US/EU)<sup>1</sup>





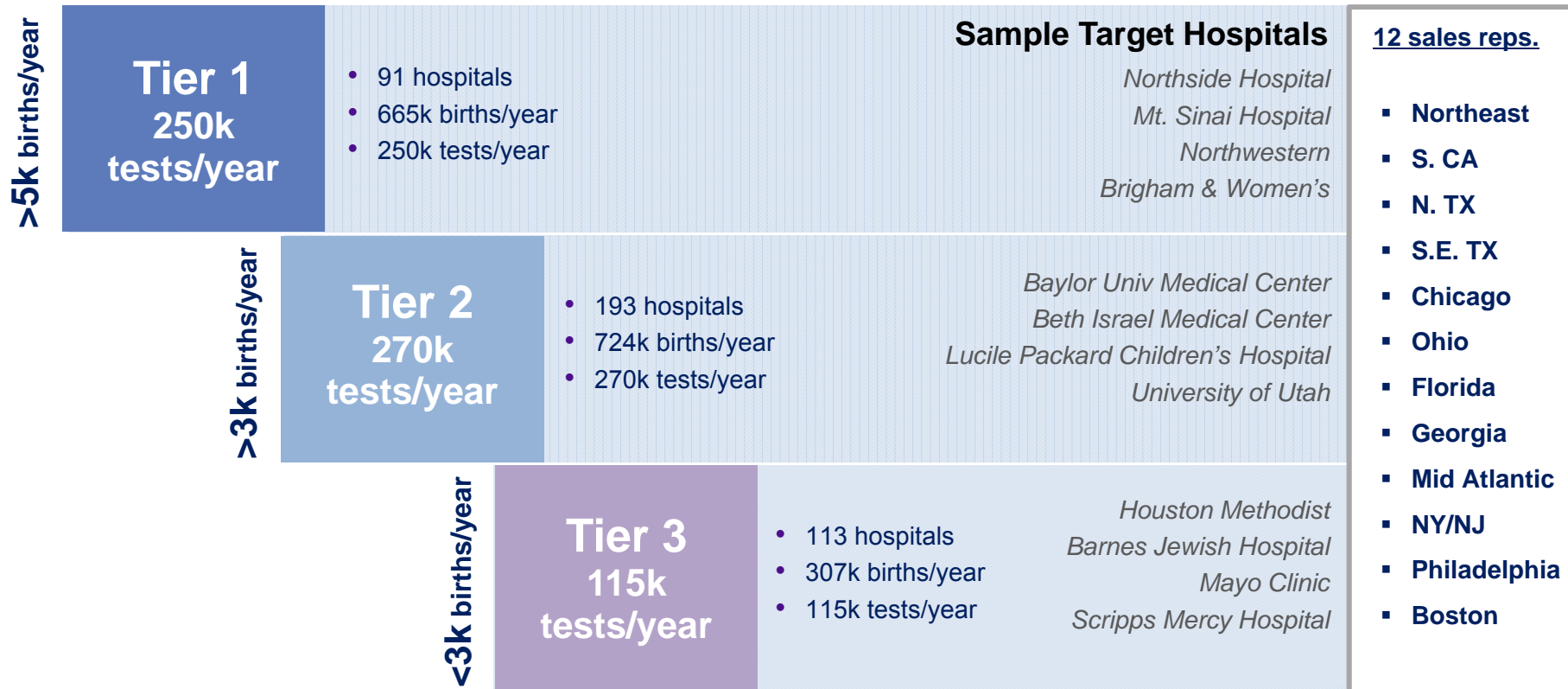
# 2014 Launch Strategy

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- ◆ **US: Direct sales to large hospitals / birthing centers**
  - NICU, well baby nursery, labor & delivery units
  - Cultivate neonatologists and nurse support at each institution
- ◆ **Advocacy campaign to broaden awareness of AAP guidelines**
  - Engage with key specialty societies (AAP, PAS, AAFP), presence at annual conferences
  - Collaborate with patient advocacy groups
- ◆ **Implement clinical strategy to support sales efforts**
  - Fund clinical evaluations in key areas
  - Engage thought-leader neonatologists
  - Develop / execute publication strategy: Clinical and economic outcomes
- ◆ **Ex-US: Distribution partnerships**

# US Sales Segmentation

## Initial Target Market: 400 Hospitals



## Significant Revenue Potential Across 3,400 US Hospitals

# CoSense

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- ◆ FDA cleared and CE marked
- ◆ ETCO testing recommended by AAP practice guidelines, with no means of testing available
- ◆ No directly competitive product
- ◆ Non-invasive
- ◆ Patent portfolio with exclusivity to 2030s
- ◆ Potential application to millions of births

# Therapeutic Technology

Nasal, Non-inhaled Carbon Dioxide



# Nasal CO<sub>2</sub>

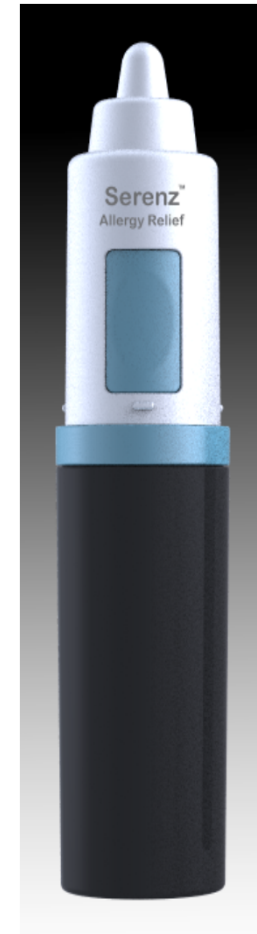
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- ◆ Precision metered delivery of low flow CO<sub>2</sub> to the nasal mucosa
- ◆ Highly portable, handheld device
- ◆ Preclinical and clinical data support use in several indications
- ◆ Potential indications
  - Allergic rhinitis (allergies)
  - Cluster headache
  - Trigeminal neuralgia
  - Migraine

# Allergic Rhinitis

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- ◆ **Serenz: Treatment for allergic rhinitis**
  - Disposable device holds ~1-2 weeks' requirements
- ◆ **Six randomized, controlled Phase 2 trials completed**
  - Fast-acting therapy
  - Statistically significant improvements in standard TNSS endpoints
  - Rapid onset of relief (within 30 minutes)
- ◆ **Patent protection to 2020 or beyond: 9 issued US patents**
- ◆ **Potential US / EU market size (\$1 billion+)**
- ◆ **Seeking development + commercial partnership**
  - CE Marked in EU (currently inactivated)
  - US approval path TBD



# Cluster Headache

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- ◆ **Severe, recurring bouts of unilateral headache associated with symptoms in the eye, nose etc**
- ◆ **0.2% of the US population**
- ◆ **Current treatments are often ineffective or have side effects, limited options for abortive treatments that are rapidly acting and safe**
- ◆ **MOA for Nasal CO<sub>2</sub>**
  - Provide relief by targeting the trigeminal nerve via the nasal mucosa
- ◆ **Status – signed MOU with Clinvest for pilot clinical trial**

# Trigeminal Neuralgia

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- ◆ **Rare disease with ~100,000 sufferers in the US**
- ◆ **Debilitating unilateral facial pain, one of the worst known to man**
- ◆ **Current treatment:**
  - Chronic drug therapy
  - Surgery
- ◆ **Acute treatments typically ineffective**
- ◆ **MOA for Nasal CO2**
  - Target trigeminal nerve via nasal mucosa to provide immediate relief
- ◆ **Application for Orphan Designation filed**



# Key Financial Metrics

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## Potential Annual Target

3.1M high-risk births  
(US & EU) <sup>1</sup>

## Gross Margins

Consumable: > 90%  
Durable Device: > 50%

## Expected List Price

Consumable: \$50 - 100  
Durable Device: \$4,995

## Headcount

Field sales: 12 FTEs by Q2 2015  
R&D: Variable based on revenue  
G&A: Minimal increase in headcount

# Capnia Summary (NASDAQ: CAPN)

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- ◆ **Sensalyze™ Technology Platform**
  - ◆ Overcomes significant problems with breath diagnostic devices
  - ◆ Several potential products addressing very large markets
- ◆ **First approved product with Sensalyze: CoSense**
  - ◆ Potential application to millions of births
  - ◆ Anticipated recurring revenue from consumables
- ◆ **Therapeutic technology with potential for treating:**
  - ◆ Allergic rhinitis
  - ◆ Cluster Headache
  - ◆ Trigeminal Neuralgia



CAPNIA

January 2015



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