



Noninvasive Diabetes Screening: Superior Performance of SAGE Technology to FPG

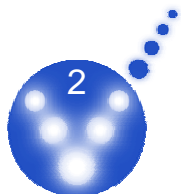
Seventh Annual Diabetes Technology Meeting

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T2DM - A Large and Growing Problem

- In the US alone...
 - 6M+ with undiagnosed type 2 diabetes
 - 54M+ have some form of pre-diabetes
- Worldwide, WHO estimates 221 million diabetes cases by 2010
- If found early and treated appropriately, diabetes and its complications are largely preventable



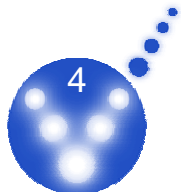
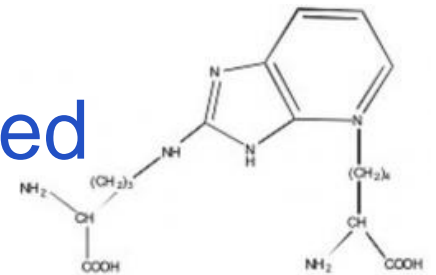
Current Screening is Inadequate

- Conventional blood-glucose based tests have insufficient performance and are inconvenient
 - FPG has poor sensitivity
 - Overnight fasting
 - Blood draws
 - OGTT requires >2 hour appointment
- As a result...
 - Diagnosis often occurs several years after onset
 - One-half of patients at diagnosis present with one or more complications



AGEs – A Better Biomarker for Early Detection

- Advanced Glycation Endproducts (AGEs) are stable cross-links and adducts formed during glycation of skin collagen
- Sensitive summary metric of integrated glycemic exposure
- Persons developing diabetes accumulate skin AGEs faster than individuals without diabetes
- Better predictor of future complications than HbA1c¹
- Dermal fluorescence - well correlated to skin AGE levels²

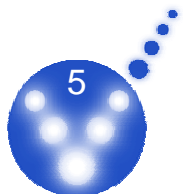
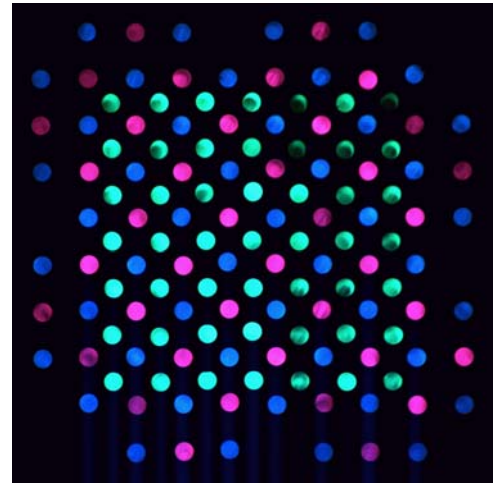


¹ Genuth et al., "Glycation and Carboxymethyllysine Levels in Skin Collagen Predict the Risk of Future 10-Year Progression of Diabetic Retinopathy and Nephropathy in the DCCT and EDIC Participants with Type 1 Diabetes," *Diabetes*, 54, 3103-3111 (2005)

² Mulder et al., "Skin Autofluorescence, a Novel Marker for Glycemic and Oxidative Stress-Derived Advanced Glycation Endproducts: An Overview of Current Clinical Studies, Evidence, and Limitations," *Diabetes Technology & Therapeutics*, 8, 523-535 (2006)

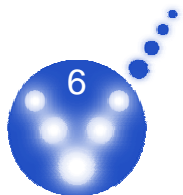
SAGE Technology Overview

- SAGE: **S**pectroscopic Measurement of Dermal **A**dvanced **G**lycation **E**ndproducts
- Key Elements
 - Optical probe targeting dermis
 - Multiple excitation-emission pairs
 - Compensation for skin color
 - Compensation for age
 - Multivariate classification techniques
- Embodied in SCOUT DS™ – a new medical device*

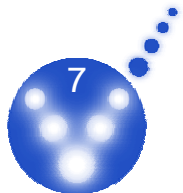
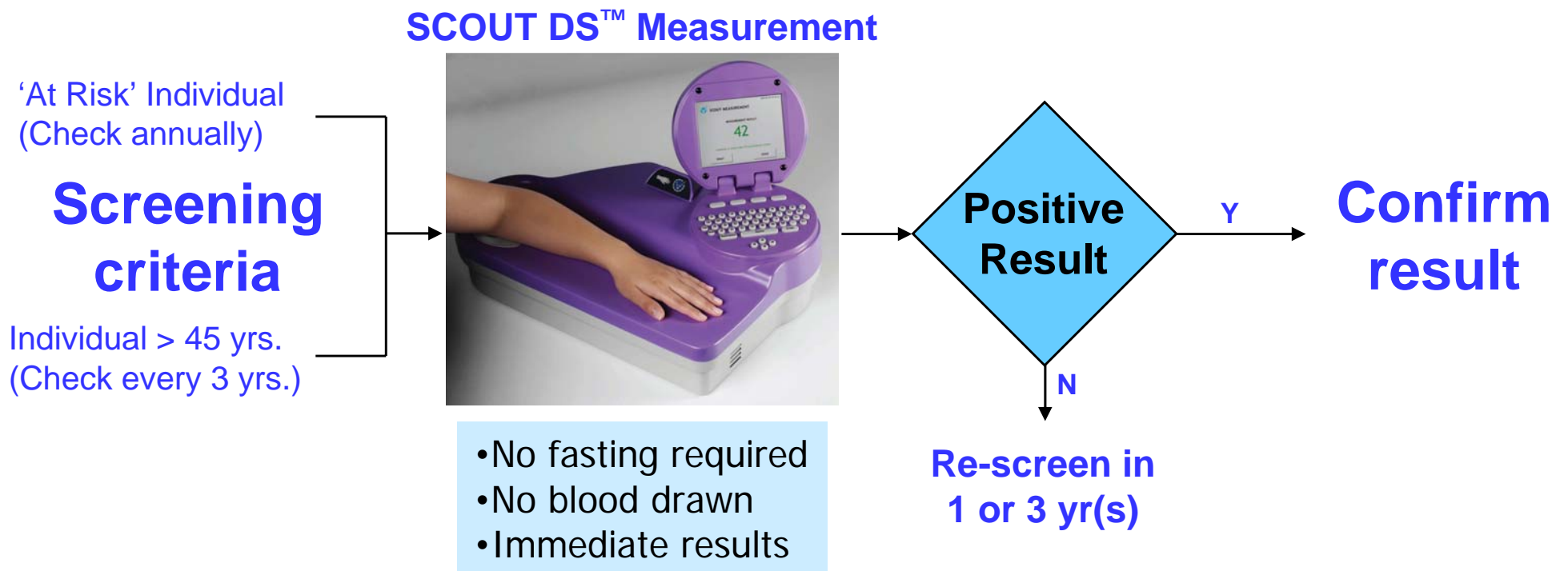


Advantages of SAGE Technology

- No blood draws – easier and no biohazards
- No fasting - test anytime
- Rapid results
- Facilitates point-of-service testing



Diabetes Screening Process



Scout Instrument Design



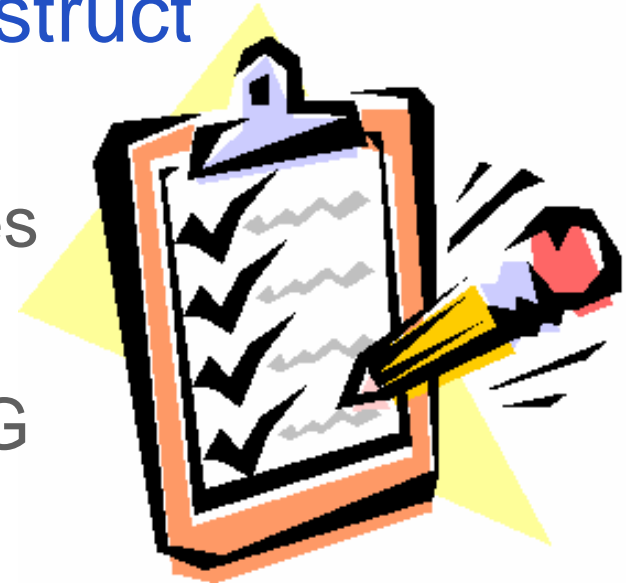
SCOUT DS™ Development & Clinical Studies

- Feasibility study (2006)
 - 351 subjects, 1 site
- Pilot study (2007)
 - 1822 subjects, 8 sites
- Calibration study (2008)
 - 2000 subjects, 18 sites
- Pivotal study (2008)
 - 4000 subjects, 18 sites



Pilot Study Objectives

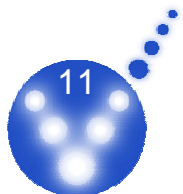
- Evaluate pivotal study trial construct
 - Naïve, at-risk cohort
 - Multiple sites and multiple devices
 - Diverse demographics
 - Head-to-head comparison to FPG
 - Truth determined by OGTT
- Collect data with pre-commercial instrument
 - Gather ‘actual use’ data to evaluate and improve device design
 - Test device performance, calibration transfer and compliance for certification



Pilot Study Demographics

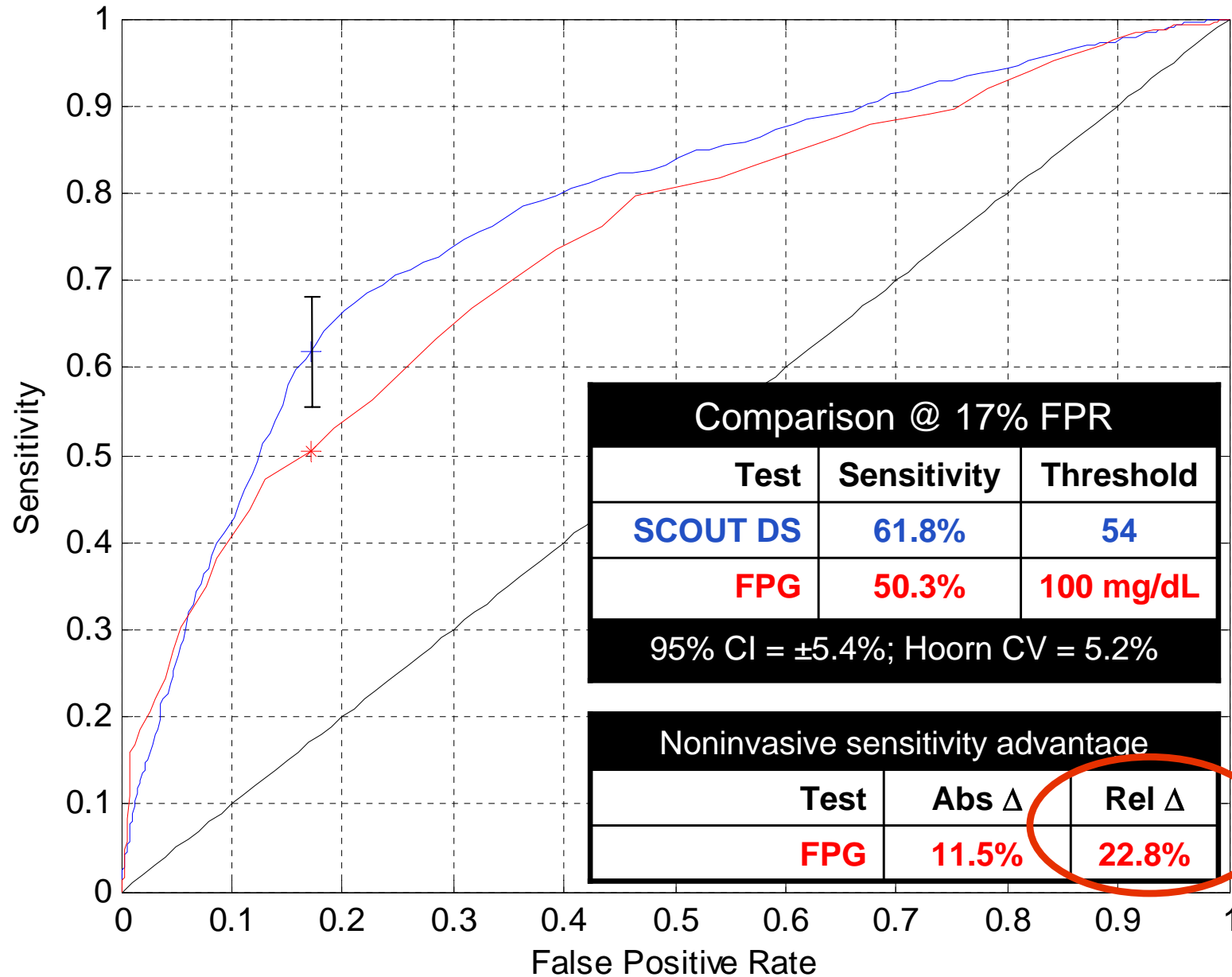
N = 1822					
Age		Gender		Ethnicity	
18 - 30	8.8%	Female	60.4%	Caucasian	55.8%
31 - 40	11.0%	Male	39.6%	African Am	27.3%
41 - 50	24.9%			Hispanic	10.0%
51 - 60	29.1%			Native Am	2.9%
61 - 70	18.7%			Asian	2.6%
71 - 80	6.7%			East Indian	0.4%
81+	0.8%			Other	0.9%

416 of 1822 (22.8%) had abnormal glucose tolerance



SCOUT DS™ Outperforms FPG

ROC for Detection of Abnormal Glucose Tolerance



Accuracy Unaffected by Potential Confounders

Factor	Issue	Method	Conclusion
Age	Natural skin fluorescence age trend	Use subject age to remove trend	No impact
Skin color	Melanin content impacts signal intensity and optical pathlength	Intrinsic fluorescence correction	No impact
Smoking	Smoking may influence skin fluorescence	None	No impact
Fasting	Ambient glucose levels might influence measurement	None	Skin fluorescence is independent of acute blood glucose



Summary

- **SCOUT DS™ is more sensitive than FPG**
 - Identifies >22% subjects with abnormal glucose tolerance at false-positive rate corresponding to IFG threshold
- **SAGE technology is more convenient**
 - No fasting
 - No blood draws
 - Rapid results
 - Well-suited to point of care, opportunistic screening (test anytime, anywhere)
- **SCOUT DS shows promise as superior tool for early detection of abnormal glucose tolerance**

Acknowledgements

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