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Specialized in the laser devices
for the healthcare and beauty

A new concept of blood glucose meter

"HandyRay Glu"

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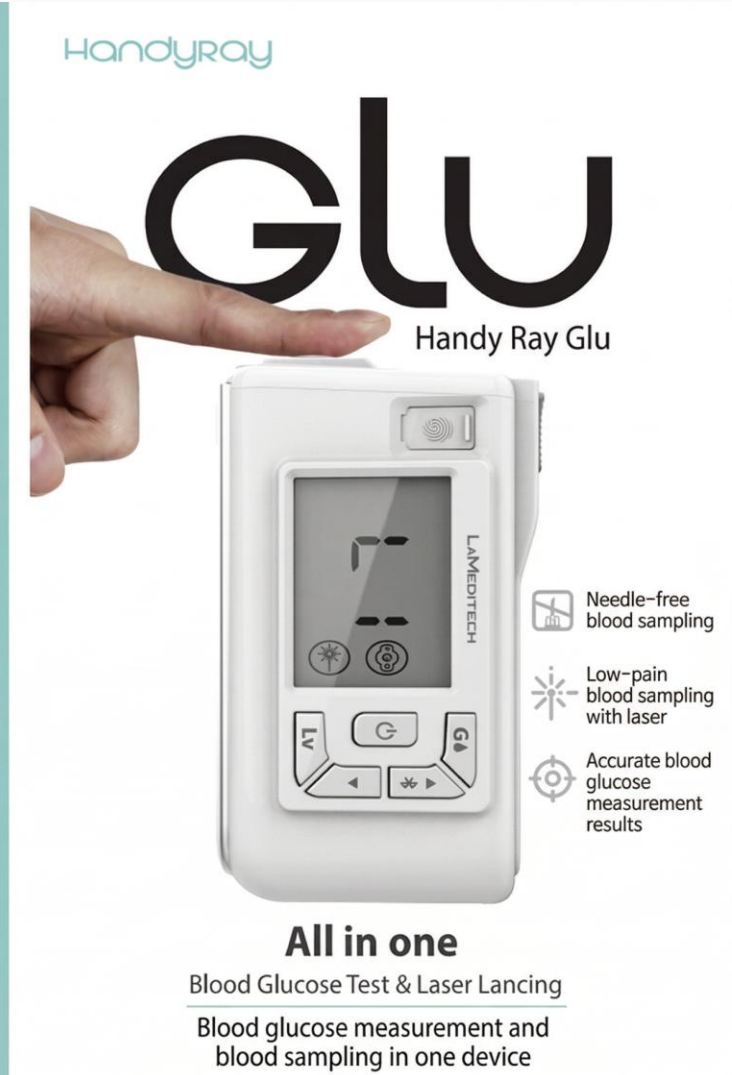
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1. HandyRay-Glu – All in One Solution

HandyRay Glu

Laser blood collection and glucose testing in one device

A new concept of blood glucose meter



1 HandyRay-Glu – All in One Solution

The “**HandyRay-Glu**” is an all-in-one product combines laser lancing device, glucose meter and mobile care app functions, in specialized medical institutions where daily usage is high

Laser Lancing Spec

- Laser Type: Er:YAG
- Laser Wavelength: 2940nm($\pm 10\%$)
- Laser Intensity: 100~180mJ($\pm 20\%$)
- Laser Class: Class 1
- Laser Level: 1~5 Level
- Perforation Size : 250 μ m
- Product Weight: 158g
- Product Size: 110x64x31mm

Glucose Meter Spec

- Hematocrit: 0~70%
- Test Range: 10~600mg/dL
- Test time: 5 seconds
- Sample Vol.: 0.5 μ l
- Data Memory: 1000 tests



Laser Lancing Advantages

- Lower pain
- No needle phobia
- No 2nd infection
- No callus and needle mark

Glucose Meter Advantages

- Integrated system with laser lancet
- Tracking health conditions with higher accuracy
- Quick and simple measurement
- Measurement with small volume

Application Advantages

- Personalized program for glucose level
- Extra care with other factors
- Simple and Easy GUI

2. Key issue for Diabetes care / Blood Glucose Monitoring



- 1 Pain
- 2 Contamination
- 3 Scar(Black dots)
- 4 Draw an appropriate amount of blood at once
- 5 Less access to Blood Glucose Level management

3 HandyRay Glu - Diabetic patients' needs : Less pain

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ORIGINAL RESEARCH

TRANSFUSION

Comparison between a laser lancing device and lancet for capillary blood sampling, capillary blood hemoglobin measurement, and blood typing

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Abstract
Background: Blood donor screening includes tests using capillary blood.

Use of a laser lancing device for capillary Hb measurement and blood typing showed accurate results, with significantly reduced skin puncture pain.

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cHb levels obtained using both lancing devices.

The paired cHb results obtained with the laser lancing device and showed a strong correlation ($r = 0.927, p < .001$) without any significant difference ($p = .113$) and a substantial agreement ($\kappa = 0.654$) for the identification of participants with a low Hb level (<12.5 g/dL). cHb levels were significantly higher than vHb levels with both lancing devices (mean differences: 0.5 g/dL). The results of blood typing using the laser lancing device showed 100% accuracy. Use of the laser lancing device showed significantly lower skin puncture pain scores ($p < .001$).

Conclusion: Use of a laser lancing device for capillary Hb measurement and blood typing showed accurate results, with significantly reduced skin puncture pain. Laser lancing devices could be feasible for donor screening tests.

KEYWORDS
capillary blood sampling, donor screening, hemoglobin, lancet, laser, pain

1 | INTRODUCTION

Blood donor screening tests include several laboratory tests performed at the donation site, including measurement of the donor's hemoglobin (Hb) concentration and

Abbreviations: cHb, capillary blood Hb; Er:YAG, erbium:YAG; Hb, hemoglobin; NRS, numeric rating scale; POC, point-of-care; RBCs, red blood cells; vHb, venous Hb.

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Short Communication

Technology/Devises

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dmj
DIABETES & METABOLISM JOURNAL

Comparison of Laser and Conventional Lancing Devices for Blood Glucose Measurement Conformance and Patient Satisfaction in Diabetes mellitus

Jung A Kim^{1,2}, Min Jeong Park¹, Eun Song¹, Eun Roh¹, So Young Park¹, Da Young Lee¹, Jaeyoung Kim³, Byoung Cheol Park⁴

LMT-1000 reduced puncture pain by 75.0% and increased satisfaction by 80.0% compared to a lancet.

can collect capillary blood samples from the palm side of the hand using the LMT-1000 or a conventional lancet. The primary outcome was correlation between glucose values obtained with the LMT-1000 and that using a lancet. And we compared the pain and satisfaction of the procedures. The capillary blood sampling success rates with the LMT-1000 and lancet were 99.3% and 100%, respectively. There was a positive correlation ($r = 0.974, P < 0.001$) between mean blood glucose levels in the LMT-1000 (175.8 ± 63.0 mg/dL) and conventional lancet samples (172.5 ± 63.6 mg/dL). LMT-1000 reduced puncture pain by 75.0% and increased satisfaction by 80.0% compared to a lancet. We demonstrated considerable consistency in blood glucose measurements between samples from the LMT-1000 and a lancet, but improved satisfaction and clinically significant pain reduction were observed with the LMT-1000 compared to those with a lancet.

Keywords: Blood glucose self-monitoring; Diabetes mellitus; Lasers; Pain

INTRODUCTION

Self-monitoring of blood glucose (SMBG) has been proven to reduce glycosylated hemoglobin (HbA1c) level and is useful for optimizing glycemic control and preventing diabetic complications by helping one understand their pattern of blood glucose level and facilitating lifestyle modifications [1-4]. Despite the importance of SMBG in glucose control, only 33% of patients with diabetes perform SMBG routinely [5] because of puncture pain, fear of needles, inconvenience, complexity, cost, and increased risk of infection [6]. Lancing pain is the main reason for noncompliance among patients with diabetes.

Recently, LAMEDITECH developed a lancing device, LMT-1000 (HandyRay-Lite, LAMEDITECH, Seoul, Korea), that uses a 2,940 nm single-pulse (erbium-doped yttrium aluminum garnet or erbium YAG) laser that generates high energy

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3 HandyRay Glu - Diabetic patients' needs : Less pain

Comparison of pain and satisfaction between samplings with a lancet and the LMT-1000

Variable	Lancet (n=150)	LMT-1000 (n=150)			P value ^{a,b}
		Total	1st attempt	2nd attempt	
Success rate of puncture	150 (100)	149 (99.3)	118 (78.7)	31 (20.6)	
Total pain score, NRS	4.0 (3.0–6.0)	1.0 (0–2.0) ^a	1.0 (0–2.0)	1.0 (0–1.0) ^b	<0.001
Total satisfaction score, VAS	5.0 (3.0–7.0)	9.0 (7.0–10.0) ^a	9.0 (7.0–10.0)	8.0 (5.5–10.0) ^b	<0.001

Values are presented as number (%) or median (interquartile range).

NRS, numeric rating scale; VAS, visual analog scale.

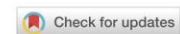
^a P value between lancet and total LMT-1000,

^b P value between lancet and 2nd attempt with LMT-1000.

Comparison of Laser and Conventional Lancing Devices for Blood Glucose Measurement Conformance and Patient Satisfaction in Diabetes Mellitus

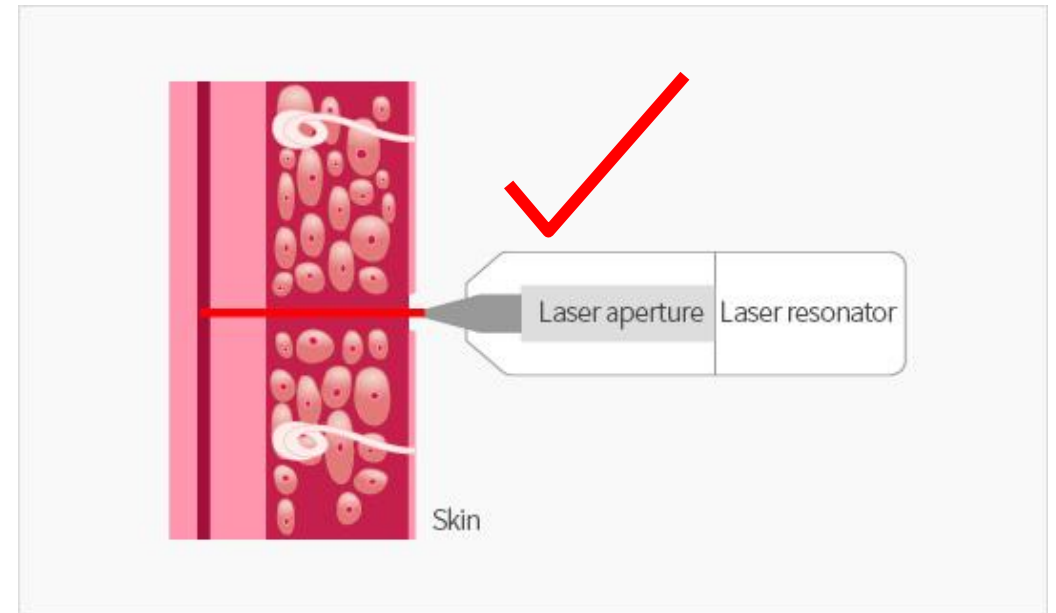
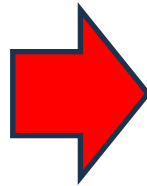
Jung A Kim^{1,2} , Min Jeong Park¹, Eyun Song¹, Eun Roh¹, So Young Park¹, Da Young Lee¹, Jaeyoung Kim³, Ji Hee Yu¹, Ji A Seo¹, Kyung Mook Choi¹, Sei Hyun Baik¹, Hye Jin Yoo¹ , Nan Hee Kim^{1,4} 

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3 HandyRay Glu - Diabetic patients' needs : No Contamination

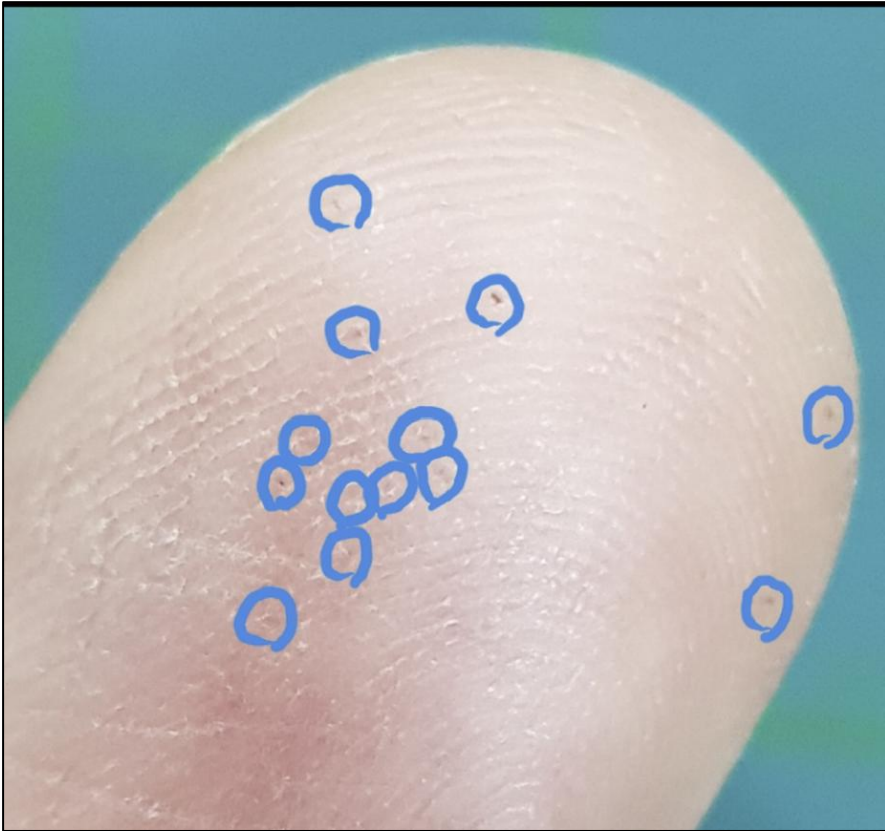
There is a risk of infection because it directly pierces the skin.



The risk of infection is minimized by HandyRay Glu use because it does not directly pierce the skin.

3 HandyRay Glu - Diabetic patients' needs : No Scars

Lancet Use



VS

HandyRay Glu Use

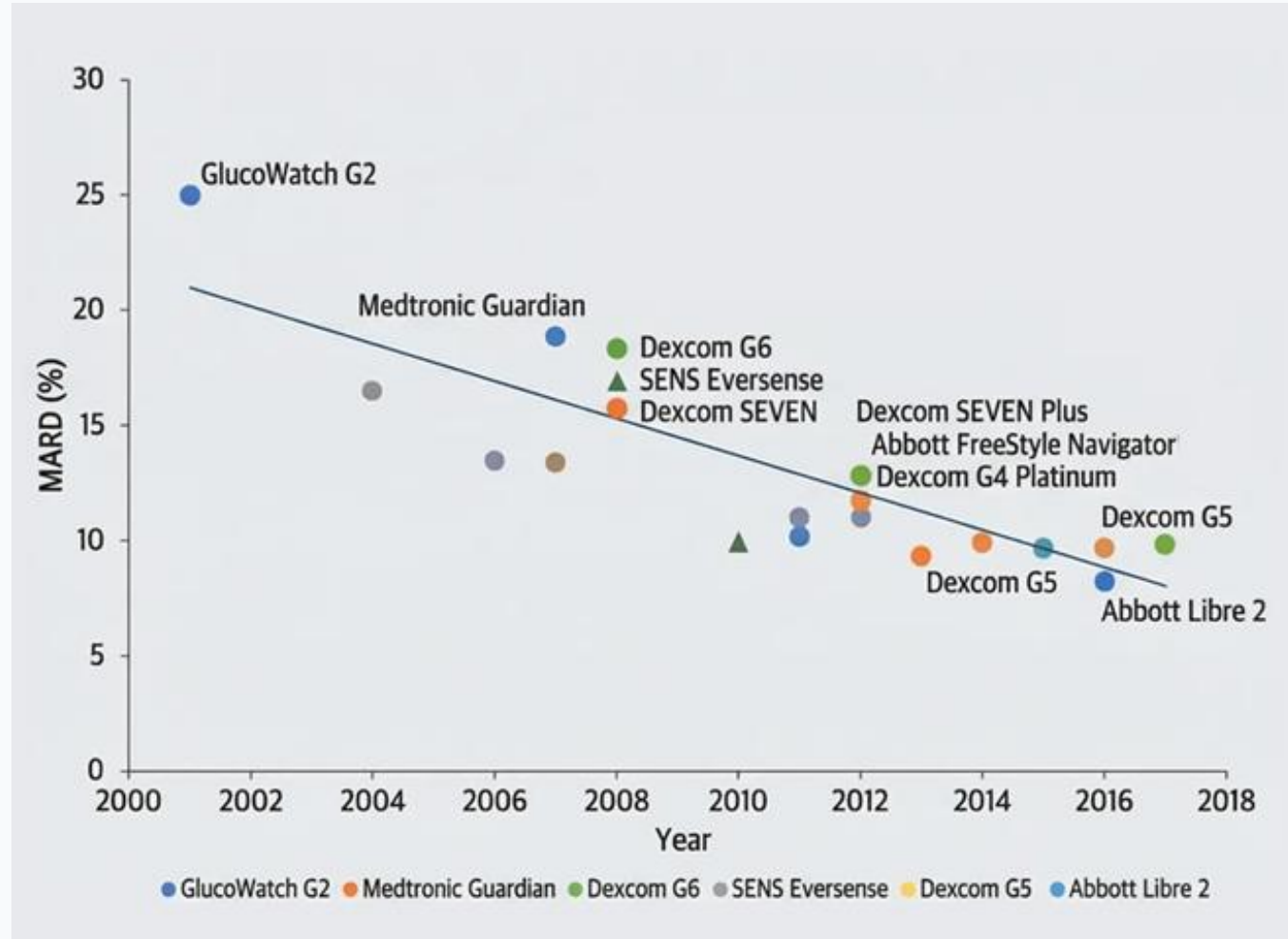


4 Key issue for Diabetes care / CGMs

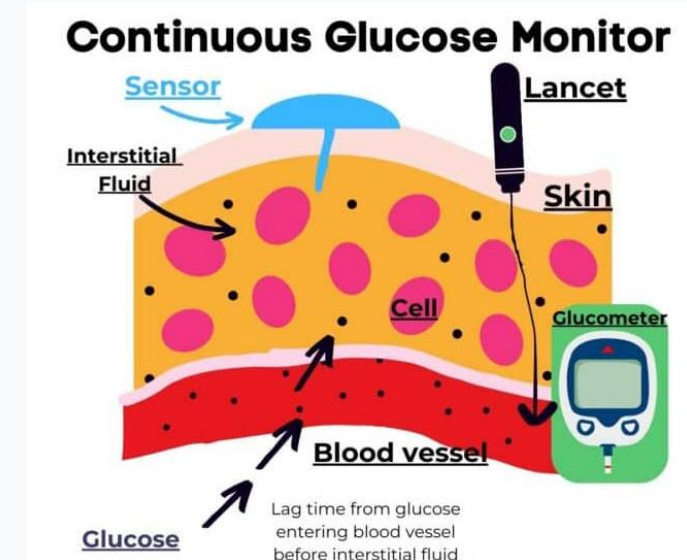


- 1 Ongoing cost burden
- 2 Digital fatigue
- 3 Technical complexity
- 4 Limitations of insurance coverage structure
- 5 Measurement accuracy and error issues (MARD)

4 MARD Value - CGM Measurement Accuracy and Error Problem



BGM is still needed for confirmation in hypoglycemia, symptom–reading mismatch, or abnormal values (backup)



CGM measures interstitial fluid (Not blood), so readings may lag during rapid glucose changes

MARD (%) =

mean % error vs reference blood glucose (lower = better)

CGM accuracy has improved over generations

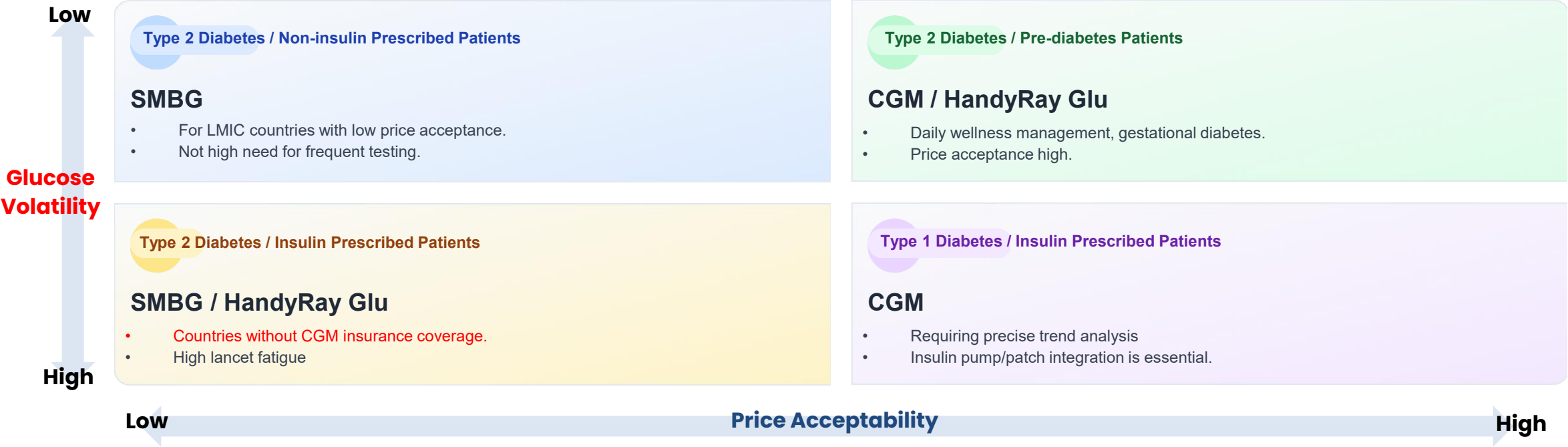
(~20% → ~10% / single-digit in 2026)

5 Comparison with HandyRay Glu, CGMs and Personal Blood Glucose Meter



Category	HandyRay Glu	CGM	Blood Glucose Meter
Blood Sampling Method	Laser blood sampling	Sensor insertion	Needle-based finger prick
Pain Level	Relatively low	Present during insertion	Present
Measurement Method	On-demand measurement	24-hour continuous monitoring	On-demand measurement
Cost	Medium	High	Low
Device Structure	All-in-one	Sensor + reader	Lancing device + meter
Data	App connectivity	Continuous data	Limited
Target Market	Children, elderly, early adopters	Type 1 Diabetes	Low-cost, traditional market

6 HandyRay Glu STP analysis [Segmentation]



CGM Optimized Group

- Type 1 patients with high variability.
- Frequent low blood glucose events.
- Need for active management.
- High out-of-pocket affordability.

HandyRay Glu Optimized Group

- Type 2 patients with low variability, stable stage.
- Individual out-of-pocket affordable.
- B2B, B2C healthcare businesses.
- NGOs & Public Institutions.

6 HandyRay Glu STP analysis [Targeting]



General Diabetes Patients (Type 2 Diabetes)

Key Characteristics & Needs

- Relatively lower measurement frequency compared to Type 1 Diabetes
- Differences in prescription & management based on severity
- Adaptability issues with new technologies like CGM, especially for elderly

HandyRay-Glu Value Proposition

- Minimized burden for repeated measurements
- Higher ease of use compared to CGMs
- Reduced financial burden compared to CGMs



Gestational Diabetes Patients

Key Characteristics & Needs

- Strict glucose management needed during pregnancy
- Concerns about fetal health
- Glucose variability due to hormonal changes

HandyRay-Glu Value Proposition

- Safe and accurate low-pain measurement
- Reduced stress during pregnancy
- Easy regular glucose monitoring



Pediatric Diabetes Patients (Low out-of-pocket affordability)

Key Characteristics & Needs

- Pain & psychological burden from lancing
- Difficulty of parent's (guardian) management
- Reluctance to measure using lancets

HandyRay-Glu Value Proposition

- Reduced burden with painless laser lancing
- Encourages consistent glucose management
- Sustainable diabetic management to low OOP house



6 HandyRay Glu STP analysis [Positioning]

Simple Usability & Low Cost



Traditional SMBG

- Pain from Blood Collection
- Infection Risk
- Simple Measurement

Cost-effectiveness, Balanced Burden Reduction & Convenience



HANDYRAY GLU

- Pain Reduction Technology
- Laser Sterilization Effect
- App Monitoring

Continuous Monitoring & Cost Burden



Continuous Glucose Monitoring (CGM)

- Skin Attachments
- High Cost
- Digital Fatigue

Advantages vs. Self-Monitoring Blood Glucose (SMBG)



- Painless Blood Collection Experience
- Reduced Infection Risk due to Hygienic Laser Blood Collection
- Improved Access to Diabetes Management (Less Pain)

Expanded Patient Management Scope



- Inclusion of Diverse Diabetes Patient Groups
- Easy Transition for Existing SMBG Users
- Providing an Alternative for Patients Discontinuing CGM

Advantages vs. Continuous Glucose Monitoring (CGM)



- Prevention of Skin Troubles due to No Skin Attachments
- Economical Structure: One-time Purchase, Long-term Use
- Less Digital Fatigue (e.g., Alarms Based on Blood Glucose Levels)

Improved Quality of Diabetes Management



- Improved Continuity and Accessibility of Blood Glucose Management
- Establishment of Customized Blood Glucose Management Strategies by Patient Type (Aided by App Monitoring)

HandyRay Glu acts as an intermediary between SMBG and CGM, creating a niche market in the blood glucose market by improving the continuity and accessibility of blood glucose management.

THANK YOU