BIOSURE
LEAD WITH EVIDENCE

Once Weekly
Sematide
(Semaglutide)
Single Dose Prefilled Syringe 0.25mg 0.50mg 1mg

SEMAGLUTIDE

A Pathway to Comprehensive Metabolic Care with Evidence

Moving from gluco-centricity to cardioprotection

Dr Qurban Hussain Khan, FHRS

Assistant Professor Cardiac Electrophysiology
Medical Superintendent, Rawalpindi Institute of Cardiology

FEROZSONS LABORATORIES LIMITED
BSF BIOSCIENCES

Cardiovascular burden and shared risk factors

Cardiovascular disease is the leading cause of death in people with T2D

35%

of people with T2D have CVD

86%

of CVD burden is atherosclerotic

~50%

of deaths in T2D are attributed to CVD

Shared modifiable risks

Elevated glucose, hypertension, dyslipidaemia, excess weight, smoking and sedentary lifestyle

Unmet needs reported in the source

HbA1c <7%: 25% Adherence: <50% Poor HRQoL: >60%

Mosenzon 2021; Einarson 2018; Turner 1998; Ji Xi 2019; Khunti 2017; Shah 2023

T2D defects and atherosclerotic pathways

Hyperglycaemia, dyslipidaemia and inflammation contribute through different mechanisms

Site	Core defect
β-cells	Less insulin secretion
α-cells	More glucagon secretion
Liver	More hepatic glucose production
Intestines	Reduced incretin effect
Adipose tissue	Increased lipolysis
Kidneys	More glucose reabsorption
Muscle	Reduced glucose uptake
Brain	Neurotransmitter dysfunction

Vulnerable plaque pathways

Dyslipidaemia

LDL, VLDL and IDL → oxidized LDL

Inflammation

IL-1β, TNF-α and IL-6 → CRP

Complications of vulnerable plaque

Context includes diabetes, hypertension, smoking, obesity, unhealthy lifestyle, stress, inflammatory disease and socioeconomic disadvantage.

Fonseca & Izar. Clinics 2016;71: 235–42; eight-defect diagram from supplied presentation

Why cardiovascular safety became central

The rosiglitazone experience and subsequent regulatory guidance

2007: rosiglitazone meta-analysis

Increased myocardial infarction risk was statistically significant. The increase in cardiovascular death had borderline significance.

Historical document	Focus
FDA, 2008	CV risk in new T2D therapies
EMA, 2012	Clinical investigation of diabetes medicines
EMA, 2015/2016	Assessment of cardiovascular safety

Cardiovascular outcomes require direct evaluation

Nissen & Wolski 2007; FDA 2008; EMA 2012 and 2015/2016; regulatory status in notes

Patient journey and treatment intensification

Illustrative sequence from the supplied presentation

T2D patient	Initial management	HbA1c above target	Still above target
Illustration begins at age ≥40 years	OADs or GLP-1RA Healthy diet and exercise Source period: 2 years	Add GLP-1RA or basal insulin	Adjunct treatment or further intensification

Reassess regularly and individualize treatment

The age and duration belong to the original illustration; the ADA algorithm shown next specifies review every 3–6 months.

Original journey: source slide 10; reassessment context: ADA 2026, Figure9.4

FEROZSONS LABORATORIES LIMITED
BSF BIOSCIENCES

Stages of cardiovascular–kidney–metabolic syndrome

A simple progression from prevention to clinical cardiovascular disease

Stage	Defining features
0 · No risk factors	Primordial prevention and cardiovascular health; Life's Essential 8
1 · Excess/dysfunctional adiposity	Overweight or obesity, abdominal obesity, impaired glucose tolerance
2 · Metabolic risk factors or CKD	Hypertension, high triglycerides, metabolic syndrome, T2D, moderate/high-risk CKD
3 · Subclinical CVD	Subclinical ASCVD or HF; very-high-risk CKD or high predicted CVD risk are equivalents
4 · Clinical CVD	Coronary heart disease, HF, atrial fibrillation, stroke or peripheral artery disease

Nonmetabolic hypertension and CKD can enter the pathway. Stage 3 kidney equivalents include G4–G5 CKD or very high risk on the KDIGO heat map.

AHA scientific advisory. Circulation 2023. doi: 10.1161/CIR.0000000000001184

T2D treatment for cardiovascular and kidney protection

Use agents with proven benefit, independently of background metformin or HbA1c

ASCVD / high CV risk

GLP-1RA or SGLT2i with proven CVD benefit

If glycaemia remains above goal, consider adding the other class.

Pioglitazone is also listed; lower doses may be better tolerated.

Heart failure

SGLT2i with proven benefit in HFrEF or HFpEF

For symptomatic HFpEF with obesity: SGLT2i and/or a dual GIP/GLP-1RA or GLP-1RA with proven benefit.

Chronic kidney disease

SGLT2i or GLP-1RA with proven CKD benefit

Background: maximally tolerated ACEi/ARB.
SGLT2i start: eGFR ≥20.
Glucose efficacy reduced: eGFR <45.
Above goal: consider both classes.

CKD: repeat eGFR <60 mL/min/1.73m² or ACR ≥30 mg/g (3 mg/mmol). High-risk definitions vary, often age ≥55 plus ≥2 risk factors.

ADA. Diabetes Care 2026;49(Suppl 1):S183–S215. Figure9.4

Once Weekly
Sematide
(Semaglutide)
Single Dose Prefilled Syringe 0.25mg 0.50mg 1mg

Weight, glycaemia and other metabolic priorities

Healthy lifestyle, diabetes education and support, and social determinants of health

Efficacy	Weight loss	Glucose lowering
Very high	Semaglutide; tirzepatide	High-dose dulaglutide; semaglutide; tirzepatide; insulin; oral combinations; GLP-1RA+insulin
High	Dulaglutide; liraglutide	Other GLP-1RAs; metformin; pioglitazone; SGLT2i; sulfonylurea
Intermediate	Other GLP-1RAs; SGLT2i	DPP-4i
Neutral for weight	Metformin; DPP-4i	Choose an agent/combination adequate for the individualized glycaemic goal

MASLD/MASH Proven or potential benefit: GLP-1RA, dual GIP/GLP-1RA, pioglitazone or GLP-1RA+pioglitazone. Use insulin in decompensated cirrhosis.

Review every 3–6 months. For unmet goals, hypo/hyperglycaemia or access barriers: DSMES, diagnostic/personal CGM, and action on SDOH.

ADA. Diabetes Care 2026;49(Suppl 1):S183–S215. Figure9.4

FEROZSONS LABORATORIES LIMITED
BSF BIOSCIENCES

Semaglutide as a human GLP-1 analogue

Three molecular changes explain the structural design

8

Alanine → Aib

Protects against DPP-4 degradation

26

Lysine + spacer + C18 fatty diacid

Supports strong albumin binding

34

Lysine → arginine

Prevents fatty-diacid attachment at the wrong site

Precursor: GLP-1 from rDNA technology

The source describes chemical substitution at 8 and 34 and lipid-chain incorporation at 26.

Lau 2015; Kapitza 2015; Lund 2014. Full citations and residue sequences in notes

GLP-1RA actions and the reported clinical effects

A simpler view of the gut–brain–pancreas axis

Pancreas

Glucose-dependent insulin release; glucagon suppression

Stomach and brain

Slower gastric emptying; appetite and satiety signalling

Clinical domains

Glycaemia, body weight, cardiovascular and kidney outcomes

Source-reported measure	Figure
HbA1c reduction	~1.2 percentage points
Weight reduction	~4–6 kg (5–6 kg on one source slide)
Postprandial glucose	Up to 35% reduction
MACE / renal risk	26% / ~40% reduction*
SURE: HbA1c <7%	52.6%
SURE: weight loss ≥3%	60.1%
SURE: combined response	29.4%

*Populations and endpoint definitions are not specified in the source. SURE composite: HbA1c fall ≥1 point plus weight loss ≥3%.

Wang et al. Diabetes Ther 2024;15: 497–519; SURE figures as presented in source

Once Weekly
Sematide
(Semaglutide)
Single Dose Prefilled Syringe 0.25mg 0.50mg 1mg

Biosynthetic peptides: the source regulatory framework

Historical FDA context and the manufacturing points in the original presentation

Source ANDA criteria

Same active ingredient

Reference listed drug may be of rDNA origin

Comparable impurity profile

Source threshold: no new impurity >0.5%

Safety, purity and potency

Attention to immunogenicity and therapeutic equivalence

Manufacturing concepts

Structural identity

Structure matched to the reference product

No host-cell impurities

Chemical synthesis rather than living host cells

Consistency between lots

Controlled production of the same active ingredient

Source definition: peptides ≤40 amino acids. Named examples: glucagon, liraglutide, nesiritide, teriparatide and teduglutide.

FDA 2021framework; withdrawal and 2026update linked in speaker notes

FEROZSONS LABORATORIES LIMITED
BSF BIOSCIENCES

Why real-world evidence matters

Routine-care evidence complements randomized trials

Global contribution

Effectiveness beyond RCTs

Comorbidities, adherence and socioeconomic constraints

Regulatory and policy use

Label expansion, HTA, reimbursement and formularies

Value and sustainability

Outcome-based pricing and real-world patient outcomes

Pakistan and LMIC relevance

Local evidence

Address under-representation in global research

Economic insight

Cost-effectiveness and allocation of constrained budgets

Equity and capacity

Inform guidance, strengthen local research and improve access

The source stresses patient outcomes, evidence-informed policy, equitable care and stronger health systems.

Global and Pakistan context as supplied; uncited numerical claims retained in notes

BIOSURE
LEAD WITH EVIDENCE

Once Weekly Sematide (Semaglutide)
Single Dose Prefilled Syringe 0.25mg 0.50mg 1mg

BIOSURE: rationale and objectives

Biosynthetic semaglutide in routine care in Pakistan

Evidence gap

Limited routine-care data on biosynthetic semaglutide, particularly in Pakistan, including glycaemic effects, medication adherence and health-related quality of life.

Real-world, non-interventional, multicentre study

Outcomes over 30 weeks

Primary

Change in HbA1c (% and mmol/mol)

Secondary
HbA1c <8%, <7.5%, <7%; fall ≥1 point
Weight loss ≥3% or ≥5%
Combined HbA1c fall ≥1 point + weight loss ≥3%
HRQoL, medication adherence and safety

BIOSURE objectives as supplied; publication and ethics details appear later

FEROZSONS LABORATORIES LIMITED
BSF BIOSCIENCES

BIOSURE design and investigational product

Prospective, open-label, observational study over 30 weeks

Adults ≥18 years with T2D diagnosed ≥12 weeks before inclusion

Treatment initiation or switch from another GLP-1RA was independent of enrolment. Initial and maintenance doses were individualized and could be adjusted.

Subcutaneous prefilled syringe. Diet, exercise and other glucose-lowering drugs allowed. Discontinuation possible at any time at physician discretion.

Baseline
Assess + start

→

Week 12
Review + adjust dose

→

Week 30
Final outcomes



Once-weekly Sematide
0.25 mg · 0.50 mg · 1 mg
Single-dose syringe; Rx only

Sematide (semaglutide), BF Biosciences; design and product from source

FEROZSONS LABORATORIES LIMITED
BF BIOSCIENCES

BIOSURE participant flow

All counts retained from the original flow diagram

437	Screened
↓	
309	Consented
↓	
268	Baseline
↓	
235	3-month follow-up
↓	
221	Completed study
↓	
217	Effectiveness set

Before baseline

Screening exclusions: consent, 7; language, 49; no smartphone, 1; prediabetes, 13; uncontrolled hypertension/obesity without T2D, 58.

After consent: declined participation, 29; did not start semaglutide, 12.

During follow-up

Treatment stopped, 34: GI effects, 23; pancreatitis, 1; worsening retinopathy, 1; nonadherence, 9.
Study noncompletion, 10: lost, 8; withdrew, 2. Unknown EOS treatment status, 13.

Original study flow; category overlap and analysis populations require clarification

Where the participants came from

Geographic distribution of 268 participants across 16 named locations

Location	n
Islamabad Capital Territory	81
Rawalpindi	60
Peshawar	33
Multan	31
Lahore	17
Karachi	9
Bahawalpur	9
Uch Sharif	8

Location	n
Malakand Division	7
Hyderabad	3
Bannu	3
Quetta	2
Kashmir	2
Interior Sindh	1
Pishin	1
Sadiqabad	1

Regions shown in the source: Punjab, Sindh, Baluchistan, Khyber Pakhtunkhwa, ICT and Kashmir. Federal/provincial capitals and other cities represented.

Original participant distribution; locations are not necessarily separate recruiting centres

Baseline characteristics

Demographics, clinical measures and patient-reported outcomes

Profile	Value
Age, years	47.28 (11.88)
Male / female	142 / 126
T2D duration, years	9.52 (6.94)
BMI, kg/m²	33.71 (6.85)
Sedentary / light–moderate / active	104 / 151 / 13
Never/former / current smoker	214 / 54
Hypertension / dyslipidaemia / CVD	151 / 135 / 60
DTSQs (0–36)	23.80 (6.52)
SF-36 (0–100)	60.92 (15.20)

Clinical / laboratory measure	Mean (SD)
HbA1c, %	9.27 (1.49)
FPG, mg/dL	152.06 (32.50)
Weight, kg	91.76 (14.40)
SBP / DBP, mmHg	135.39 (14.49) / 84.54 (8.86)
eGFR, mL/min/1.73m²	80.08 (21.01)
LDL, mg/dL	111.14 (24.30)
Triglycerides, mg/dL	159.81 (50.09)
ALT, U/L	35.98 (13.23)

Values reproduced from baseline slide; means (SD), unless counts are stated

Glycaemic response and target attainment

Reported HbA1c change from baseline to 6 months



HbA1c category	Baseline	6 months
<7.0%	3.9%	38.7%
7.0–7.9%	14.3%	37.9%
≥8.0%	81.8%	23.6%

Nearly 10-fold increase in HbA1c <7% attainment

−1.86 percentage points

The original summary gives conflicting target percentages; all alternatives and the timing discrepancy remain in notes.

Source HbA1c figure; original target denominator N=258 at both timepoints

Weight, BMI and waist circumference

Progressive reductions across the reported follow-up visits

Measure	Baseline	3 months	6 months	Source total change
Weight, kg	91.8	88.8	83.9	−7.9 (−8.6%)
BMI, kg/m²	33.6	32.5	30.7	−2.9 (−8.6%)
Waist, cm	103.7	100.2	96.9	−6.7 (−6.5%)

Weight-loss category	3 months	6 months
<3% loss or gain	66.8%	4.6%
3–4.9% loss	14.7%	18.9%
≥5% loss	18.4%	76.5%

95.4%

achieved ≥3% weight loss at 6 months

BMI = kg/m². Waist measured midway between the lower rib and iliac crest. Original summary alternatives are preserved in notes.

Source anthropometry figures; weight-target denominator N=258

Age and sex subgroup responses

Mean reductions from baseline to 6 months

Age group	HbA1c fall: men	HbA1c fall: women	Weight loss: men	Weight loss: women
<40 years	1.72 points	1.94 points	7.1 kg	7.4 kg
40–60 years	1.73 points	2.10 points	7.2 kg	8.3 kg
>60 years	1.98 points	1.54 points	10.0 kg	10.5 kg

HbA1c Greater reduction in women aged ≤60; in men above 60.

Weight Women slightly greater in each age group; greatest loss above 60.

Original subgroup values; positive reductions indicate improvement

Changes in cardiometabolic risk factors

Baseline to 6 months, as displayed in the source outcome figure

Measure	Baseline	6 months	Change	p-value
FPG, mg/dL	153.1	115.2	−37.9	<0.001
SBP, mmHg	135.4	124.8	−10.6	<0.001
DBP, mmHg	84.2	79.4	−4.8	<0.001
HDL, mg/dL	44.5	48.8	+4.3	<0.001
LDL, mg/dL	113.0	124.2	+11.2	<0.001
Triglycerides, mg/dL	156.0	150.5	−5.5	0.142

LDL increased in the source data. The triglyceride change was not statistically significant. These should not be described as universal lipid improvement.

Source risk-factor figure; units and reported p-values retained

Clinical interpretation of the blood-pressure findings

The source links lower blood pressure to haemodynamics and treatment burden

Concept in the source	Simplified explanation
Myocardial workload	Lower blood pressure may reduce haemodynamic strain
Kidney circulation	The source proposes renal protection when DBP falls below 80 mmHg
Treatment burden	Complementary SBP/DBP reductions may reduce need for additional medication
Pakistan context	Limited access to acute tertiary cardiac care increases the value of risk-factor management

Risk-factor improvement is distinct from proof of fewer clinical events

Interpretation in the supplied material; cardiovascular/renal events were not demonstrated here

Concomitant therapy and insulin-sparing effects

Numbers of patients receiving each therapy at baseline and 6 months

Therapy	Baseline n	6-month n	Reported change
SGLT2 inhibitors	204	203	−0.5%
Metformin	190	200	+5.3%
Premixed insulin	95	54	−43.2%
Sulfonylureas	89	68	−23.6%
DPP-4 inhibitors	68	8	−88.2%
Basal insulin	61	7	−88.5%
Thiazolidinediones	42	5	−88.1%

8.02 units/day **~1,444 units over 6 months** **~4.8 pens**

Source therapy counts; categories may overlap

FEROZSONS LABORATORIES LIMITED
BSF BIOSCIENCES

Once Weekly
Sematide
(Semaglutide)
Single Dose Prefilled Syringe 0.25mg 0.50mg 1mg

Safety, retention and tolerability

Original attrition categories and reported hypoglycaemia findings

Early discontinuation, n=51	n	%
Lost to follow-up	22	43.1
Fatigue	11	21.6
GI: nausea/diarrhoea	10	19.6
Unspecified adverse event	5	9.8
Headache	3	5.9

81.0%

217/268 retained in this source summary

18.9% mild, mostly resolving GI symptoms

Reported high-risk hypoglycaemia

66% → 16%

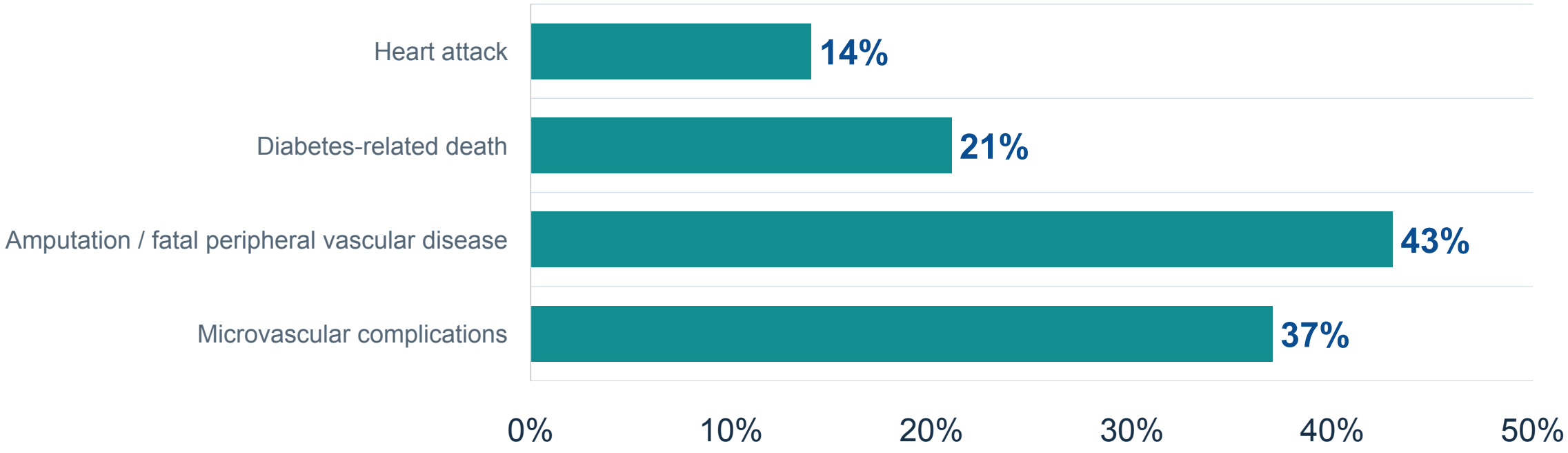
Source-reported relative reduction: 76%. Definitions and denominators need clarification; treatment changes may contribute.

Source safety figures; definitions and differing flow counts are retained in notes

FEROZSONS LABORATORIES LIMITED
BSF BIOSCIENCES

HbA1c reduction and complications: UKPDS context

Associations reported for a 1 percentage-point lower HbA1c



Historical association, not a BIOSURE event-outcome estimate

UKPDS graphic reproduced in the original presentation; original bibliographic source not supplied

FEROZSONS LABORATORIES LIMITED
BSF BIOSCIENCES

Once Weekly
Sematide
(Semaglutide)
Single Dose Prefilled Syringe 0.25mg 0.50mg 1mg

Economic and health-system relevance

Medication requirements, affordability and implementation in Pakistan

~1,444

insulin units saved per patient over 6 months

+0.0987

QALY gain reported by the source*

Patient burden

Potentially fewer medicines, monitoring demands and healthcare visits

Access and affordability

Advanced therapies are underused where out-of-pocket costs are high

Health-system priorities

NCD prevention, quality of life and value-based care

*The source supplies no economic methods or prices; a cost-effectiveness conclusion cannot be confirmed from these slides.

Economic claims as presented in source; methods and price assumptions are not supplied

FEROZSONS LABORATORIES LIMITED
BSF BIOSCIENCES

Publications, ethics and registration

The study documentation shown in the original presentation

Institution / registry	Identifier
National Bioethics Committee, Pakistan	NBC-1286
Alliance Healthcare IRB & Ethics Committee	IRB&EC /2025-GH/0228
Bahauddin Zakariya University, Multan	BZU-FOPDPP-2464
USM Human Research Ethics Committee	USM/JEPeM/PP/25040370
NMRR, Malaysia	NMRR ID-24-03741-SIN
Australian New Zealand Clinical Trials Registry	ACTRN12625000610437

Protocol Journal of Pharmaceutical Policy and Practice 2026;19(1): 2631932

Study article Real-world effectiveness and safety of biosynthetic semaglutide in Pakistan

Protocol: doi: 10.1080/20523211.2026.2631932; study article: Diabetes, Obesity and Metabolism

BIOSURE
LEAD WITH EVIDENCE

Once Weekly Sematide (Semaglutide)
Single Dose Prefilled Syringe 0.25mg 0.50mg 1mg

Comprehensive metabolic care: the BIOSURE message

Glycaemia, body weight, blood pressure and treatment burden

−1.86 points
HbA1c

~7.8 kg
Weight

−10.6/−4.8
SBP/DBP, mmHg

Potential value in routine practice

Better metabolic control, lower treatment burden and a possible reduction in patient costs. Local evidence matters where affordability and access constrain care.

Thank you

BIOSURE conclusions as supplied; numerical conflicts and evidence limits retained in notes

FEROZSONS LABORATORIES LIMITED
BSF BIOSCIENCES