Equine Insulin (eINS)

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Contents

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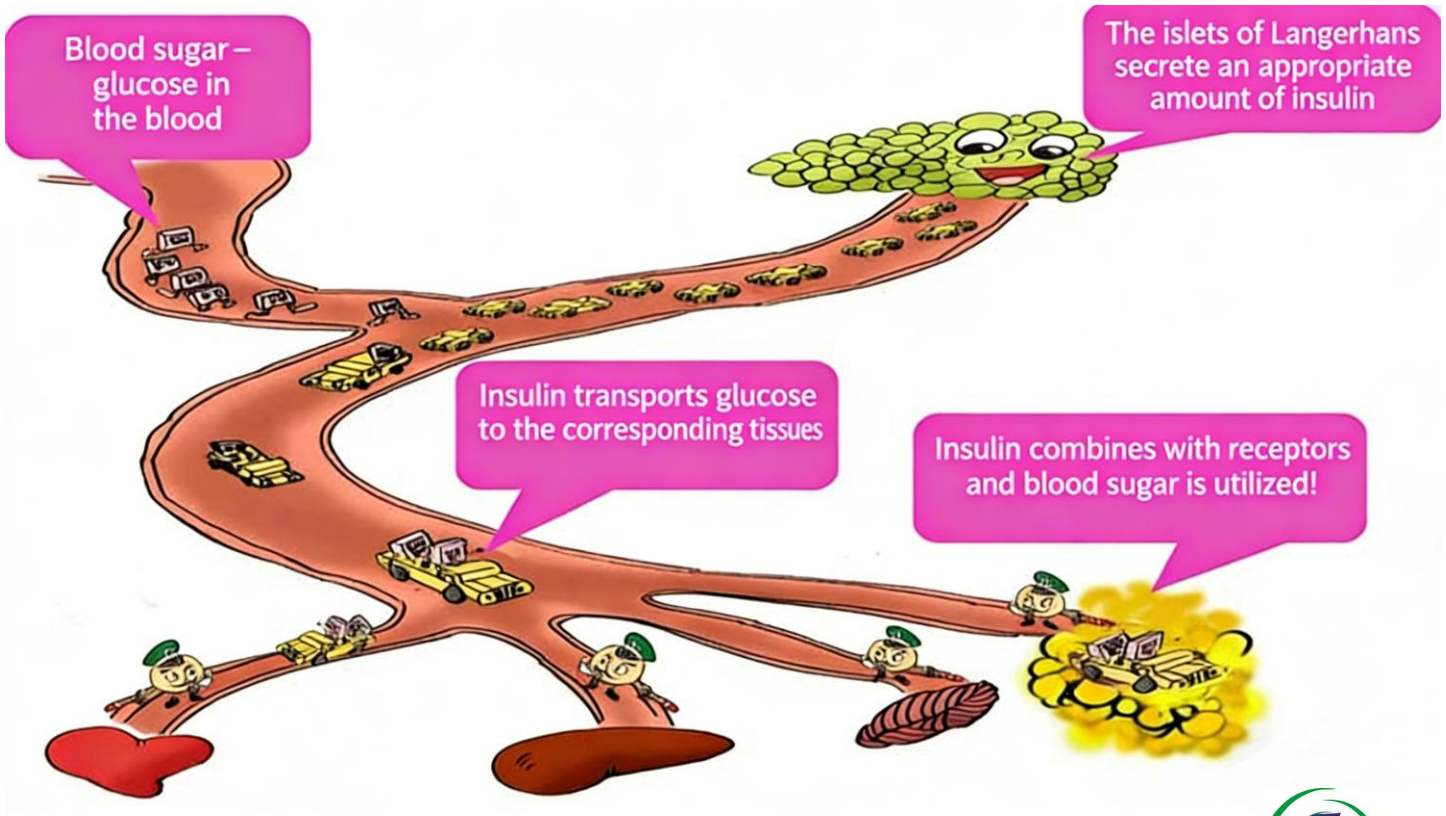
a. Insulin

Insulin is a hypoglycaemic hormone secreted by the pancreas. It is the only hormone in the body that lowers blood glucose levels. It also promotes the synthesis of glycogen, fats and proteins.



a. Insulin Dysregulation (ID)

Insulin metabolism disorder, also known as insulin dysregulation (ID), includes hyperinsulinemia and insulin resistance.

The relationship between the two is as follows:

Insulin resistance initially occurs when tissues become less sensitive to insulin. To maintain normal blood glucose levels, pancreatic β-cells compensate by secreting more insulin, leading to hyperinsulinemia. Chronic hyperinsulinemia, in turn, further exacerbates tissue resistance to insulin (for example, by inhibiting insulin receptor expression), creating a vicious cycle.

a. Equine Metabolic Syndrome (EMS)

Insulin dysregulation (ID) is a key feature of Equine Metabolic Syndrome (EMS). EMS is a characteristic combination of clinical signs and clinical pathological changes in equine species, putting them at high risk for the development of laminitis.

Horse affected by EMS and laminitis

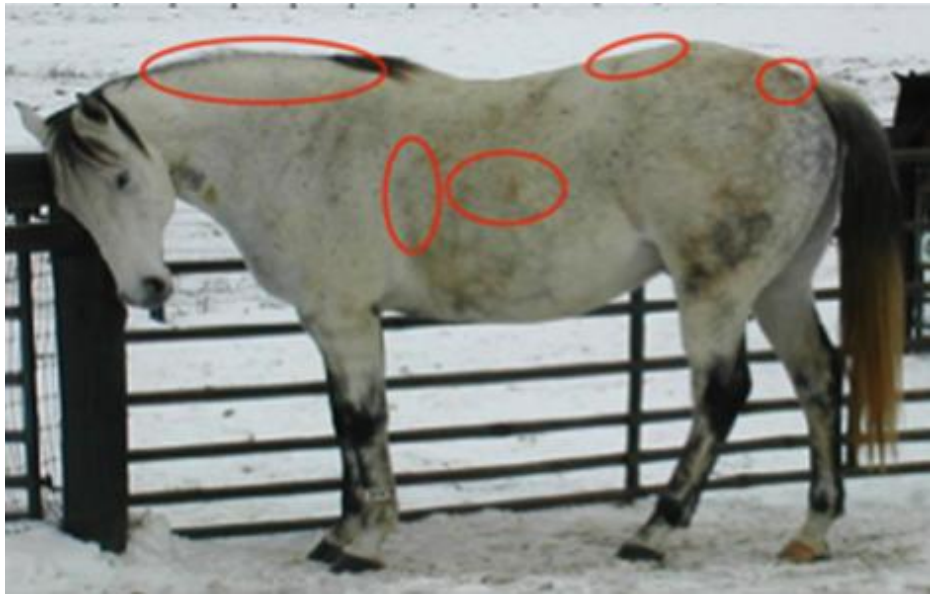
a. Equine Metabolic Syndrome (EMS)

EMS has the following typical developmental patterns:

1. It mainly occurs between the ages of 5 and 16, with no recognised sex predisposition.

2. It is most commonly seen in ponies, Saddlebreds, Tennessee Walking Horses, Paso Finos, Morgans, mustangs and Quarter Horses.

3. Thoroughbreds and Standardbreds are rarely affected.



In horses with EMS, fat accumulates in the neck, along both sides of the chest, the back and the rump. Fat deposition also occurs in the abdominal omentum.

a. Equine Metabolic Syndrome (EMS)

High plasma insulin concentrations increase the susceptibility of horses to EMS-associated laminitis:

- ❑ Insulin has vasoregulatory effects. Dysregulation of insulin reduces the production of nitric oxide and promotes vasoconstriction.
- ❑ Alterations in glucose and insulin concentrations may also lead to changes in epidermal cell function and glucose uptake by epidermal lamellar cells.

Horses with EMS exhibit the following responses to high-carbohydrate diets:

- ❑ Excessive increases in insulin.
- ❑ Higher-than-expected blood glucose concentrations.
- ❑ Very slow return of blood glucose levels to baseline.

b. Pituitary Pars Intermedia Dysfunction (PPID)

Pituitary Pars Intermedia Dysfunction (PPID), also known as Equine Cushing's Disease.

Essence: It is caused by hyperplasia or tumour of the pituitary pars intermedia cells, leading to excessive secretion of adrenocorticotropic hormone (ACTH), which in turn results in elevated levels of adrenal cortisol.

Typical Manifestations: Commonly seen in older horses (>15 years). Symptoms include polyuria and polydipsia, regional fat accumulation (such as pendulous abdomen), muscle wasting, abnormal coat (hair loss, coarse or long hair), decreased immunity and easy fatigue.

Horse with PPID

b. Pituitary Pars Intermedia Dysfunction (PPID)

Pituitary pars intermedia dysfunction (PPID) and equine metabolic syndrome (EMS) can occur simultaneously in middle-aged and older horses. These two conditions commonly coexist. Their clinical signs include lameness, weight gain and a cresty neck associated with EMS, as well as hypertrichosis indicative of PPID. Therefore, horses with EMS should be monitored for the development of PPID. Conversely, any horse with PPID should be tested for insulin dysregulation. Horses with PPID alone, without EMS, rarely develop laminitis.

Horse with EMS and PPID

c. Diagnostic Methods for Equine Metabolic Syndrome (EMS)

1. Basal Insulin Test

A blood insulin concentration >20 mIU/L indicates insulin dysregulation. Horses with EMS, aside from impaired oral carbohydrate load tolerance, are otherwise normal and should undergo an oral sugar test (OST) or an oral glucose test (OGT).

2. Insulin Testing Methods

Four types of Immunoassays:

1. Immunofluorescence Chromatographic Assay (IFCA)
2. Enzyme-Linked Immunosorbent Assay (ELISA)
3. Radioimmunoassay (RIA)
4. Chemiluminescent Immunoassay (CLIA)

d. Treatment of Equine Metabolic Syndrome (EMS)

Dietary Management

- ❑ Choose low-NSC (non-structural carbohydrate) feeds, such as timothy hay and fescue.
- ❑ Control Feed Intake: For overweight horses, limit daily hay intake to 1.5% – 2% of body weight.
- ❑ Restrict Free Feeding: Reduce or prohibit pasture grazing.

Increase Exercise

- ❑ Start with Low Intensity: For overweight horses or those with a history of laminitis, begin with hand-walking as the primary activity (10 – 15 minutes/day, 2 – 3 times/week). Avoid weight-bearing or strenuous exercise to prevent excessive hoof stress. Gradually increase exercise intensity and duration once the horse adapts.
- ❑ Avoid Overexertion: Monitor the horse's respiration and gait during exercise. If signs of hoof pain appear (e.g., lameness), stop immediately and adjust the exercise plan.

Medication Treatment

If dietary and exercise adjustments are insufficient, administer levothyroxine or metformin. The usual dosage is 15 – 30 mg/kg, taken orally, twice daily (under veterinary guidance to avoid hypoglycaemia).

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Equine Insulin (eINS) Rapid Quantitative Test

Woodley have developed a rapid, accurate and reliable, highly sensitive detection method for Insulin in horses.

The InSight Equine-IA eINS Rapid Quantitative Test is a fluorescence immunoassay used with the InSight Equine-IA Equine Immunoassay Analyser for the quantitative determination of insulin concentration in equine serum or plasma.

The test is used as an aid to insulin dysregulation (ID).

It can be stored at room temperature.

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Thank You

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