



DIAGNOSTIC APPROACH TO HYPOGLYCEMIA

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APPROACH TO HYPOGLYCEMIA

Fasting glucose concentration

Declining insulin concentrations

Gluconeogenesis

Glycogenolysis



APPROACH TO HYPOGLYCEMIA

Fasting glucose concentration
70 mg/dl

Counterregulatory Hormones

Epinephrine

Glucagon

Cortisol

Growth hormone



APPROACH TO HYPOGLYCEMIA

Clinical signs and severity of hypoglycemia

Rate of fall

Glucose concentration

Duration of hypoglycemia



APPROACH TO HYPOGLYCEMIA

Adrenergic signs

Restlessness; Muscle fasciculations

Neuroglycopenic signs

Hunger

Weakness/collapse

Ataxia

Seizures

Blindness



ETIOLOGY OF HYPOGLYCEMIA

Laboratory error

Hypoadrenocorticism

Juvenile (puppy)

Sepsis

Glycogen storage

Hepatic disease

Hunting dog

Neoplasia (non-pancreatic)

Ketotic hypoglycemic

Islet cell tumors



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May produce a variety of hormones

Insulin

Pancreatic polypeptide

Somatostatin

Glucagon

Gastrin



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Signalment

Median age 10 yrs (3.5 to 14)

No sex predilection

Breed predisposition

- Boxer

- German shepherd

- Irish setter

- Golden retriever

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Clinical signs

Seizures	(68%)	Depression/lethargy	(19%)
Collapse	(34%)	Ataxia	(19%)
Generalized weakness	(33%)	Exercise intolerance	(10%)
Posterior weakness	(33%)	Weight gain	(8%)



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Physical examination

Usually unremarkable

Geriatric abnormalities

Status epilepticus

Comatose

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Peripheral Polyneuropathy

Hindlimb paresis

Quadriparesis

Proprioceptive deficits

EMG's

Fibrillation potentials

Positive sharp waves





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Diagnosis

Whipple's Triad

Fasting hypoglycemia

Clinical signs of hypoglycemia

Response to glucose administration

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Diagnostic approach

Blood glucose < 60 mg/dl

Multiple samples

Close monitoring



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Diagnostic approach

Insulin/glucose ratio

Glucose/insulin ratio

Amended insulin/glucose ratio



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Diagnostic approach

Insulin/glucose pairs

Normal to elevated insulin

Hypoglycemia

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Diagnostic approach

CBC, SMA and UA

Radiography

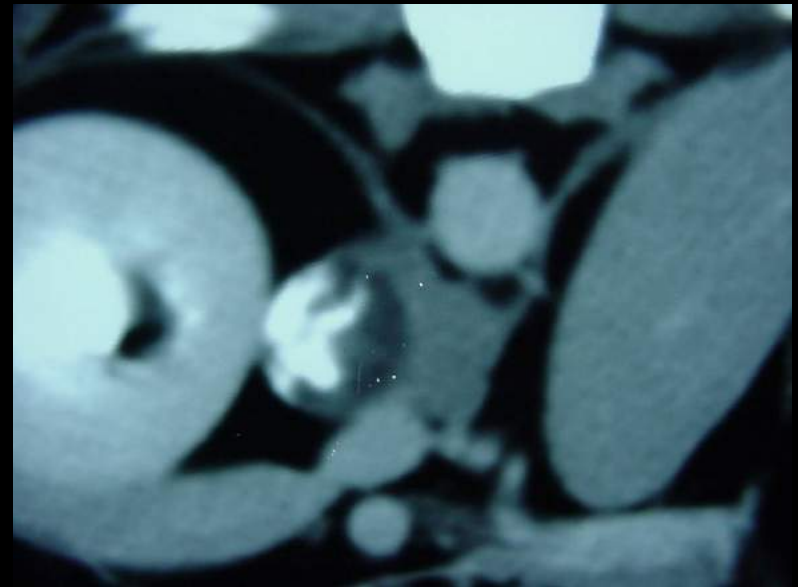
Thorax and abdomen

Ultrasonography

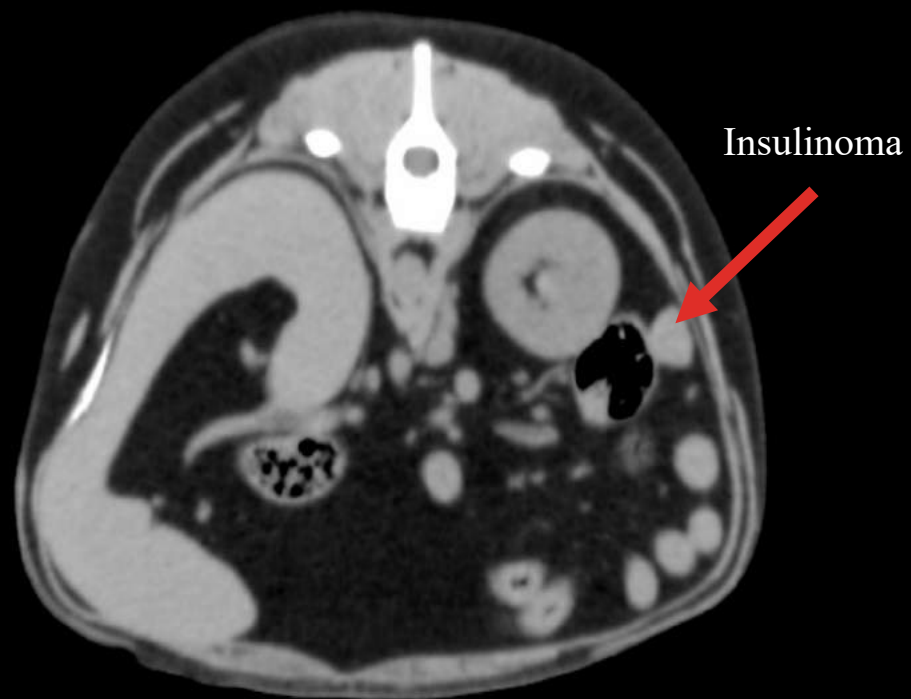
Pancreatic mass

Lymphadenopathy

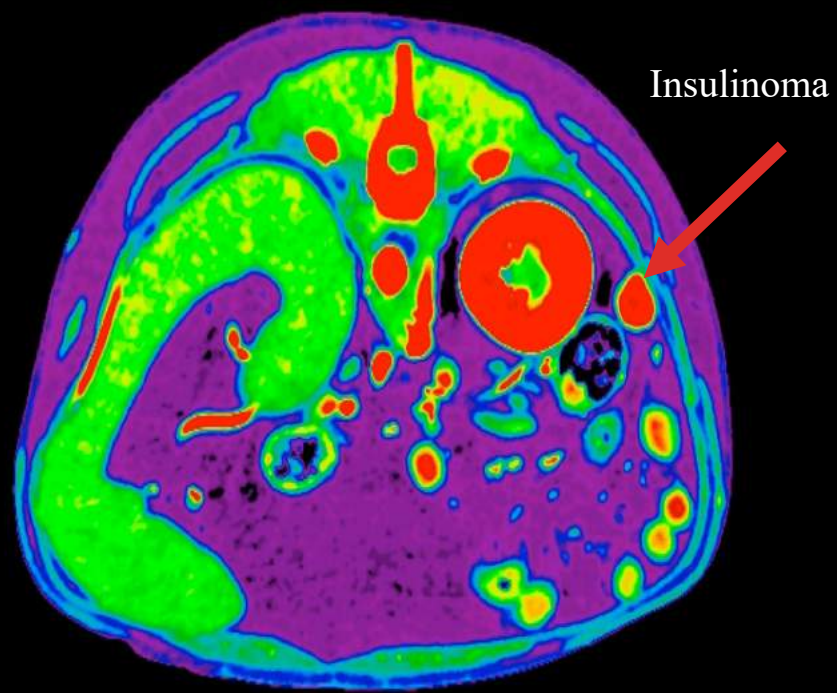
Metastasis



Pre-Contrast



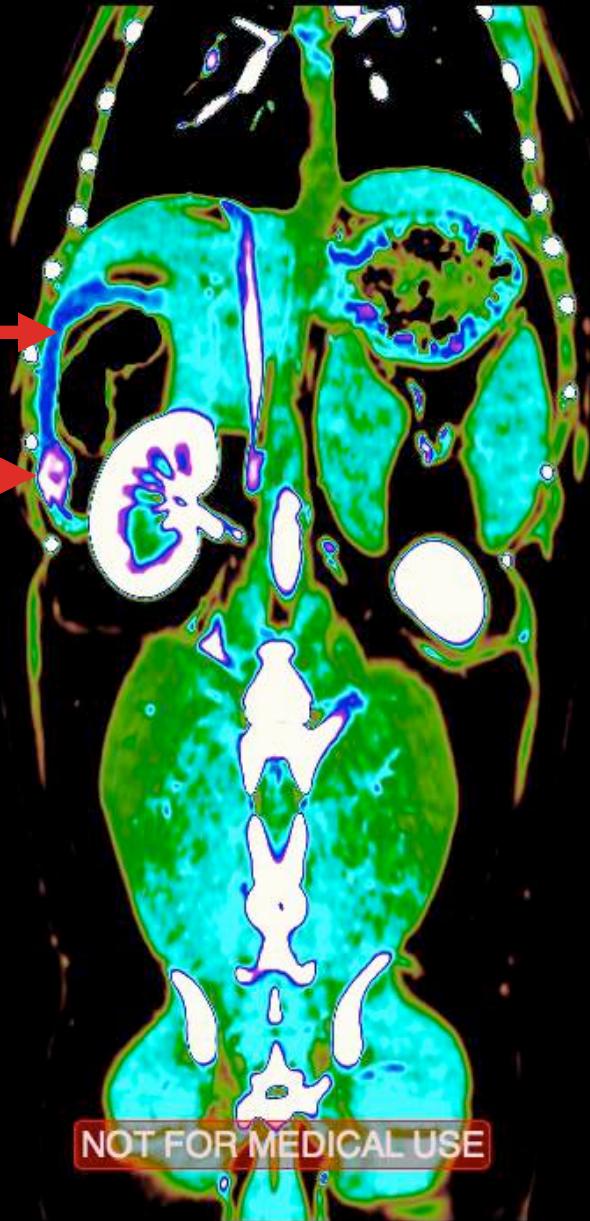
Post-Contrast



Pancreas

Insulinoma

NOT FOR MEDICAL USE



Insulinoma



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Emergency Treatment

IV Dextrose (50%)

0.5 ml/kg

Followed by 5 % dextrose infusion

Cerebral edema

Mannitol

Glucocorticoids



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Treatment

Surgery

Confirmation

Staging

51 % have visible metastasis

22 % hepatic

15 % lymph node

Removal



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Surgery

Localization

Right lobe	(36 %)
Left lobe	(38 %)
Body	(7 %)
Multiple	(14 %)
No mass	(20 %)



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Surgical Procedure

Suture fracture technique

Dissection technique

Similar complication rates

Post-operative pancreatitis

No mass ???

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Pathology and Natural
Behavior

Small, tan nodules

14 % have multiple masses

Diffuse hyperplasia is rare



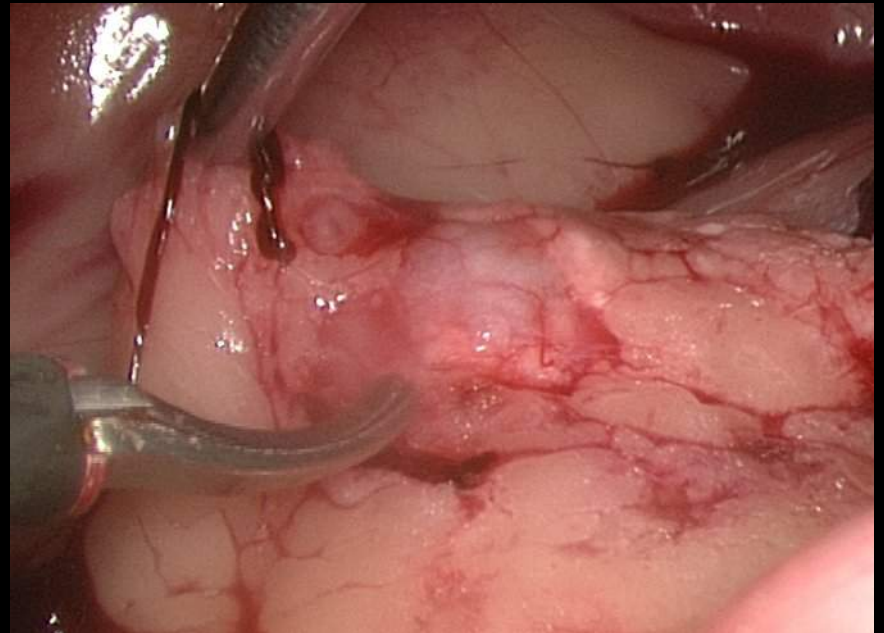
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Pathology and Natural
Behavior

Normal appearing islets

Irregular nests

Stromal proliferation





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Medical Therapy

Frequent feedings

Owner awareness of hypoglycemia

Prednisone

0.25 to 2.0 mg/kg BID



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Medical Therapy

Diazoxide

Benzothiadiazene

Inhibition of insulin release

Hepatic gluconeogenesis

Decreased glucose uptake

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Medical Therapy

Diazoxide

5.0 to 30.0 mg/kg BID

In conjunction with thiazide diuretic

2.0 to 4.0 mg/kg BID

Vomiting, diarrhea, anorexia

Administer with meals

Availability

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Somatostatin

Octreotide acetate

50 - 100 mcg SC or IV TID to QID

Limited use in dogs

3/5 responded for 9 – 12 months



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Streptozotocin

500 mg/m² IV infusion

Selective beta cell toxin

Limited renal toxicity with diuresis

Treatments q 3 weeks; 5 treatments



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Prognosis

Median survival

11.5 months (114 dogs)

With metastasis

8.4 months

No metastasis

14.5 months

Diabetes is a good prognostic
indicator