

DIAGNOSTIC APPROACH TO HYPOGLYCEMIA

David Bruyette, DVM, DACVIM
Chief Medical Officer
Anivive Lifesciences
3250 Airflite Way, Suite 400
Long Beach, CA 90807
David@anivive.com



www.veterinarydiagnosticinvestigation.com

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

INSULINOMA

May produce a variety of hormones

Insulin

Pancreatic polypeptide

Somatostatin

Glucagon

Gastrin

INSULINOMA

Signalment

Median age 10 yrs (3.5 to 14)

No sex predilection

Breed predisposition

Boxer

German shepherd

Irish setter

Golden retriever

INSULINOMA

Clinical signs

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

INSULINOMA

Physical examination

Usually unremarkable

Geriatric abnormalities

Status epilepticus

Comatose

INSULINOMA

Peripheral Polyneuropathy

Hindlimb paresis

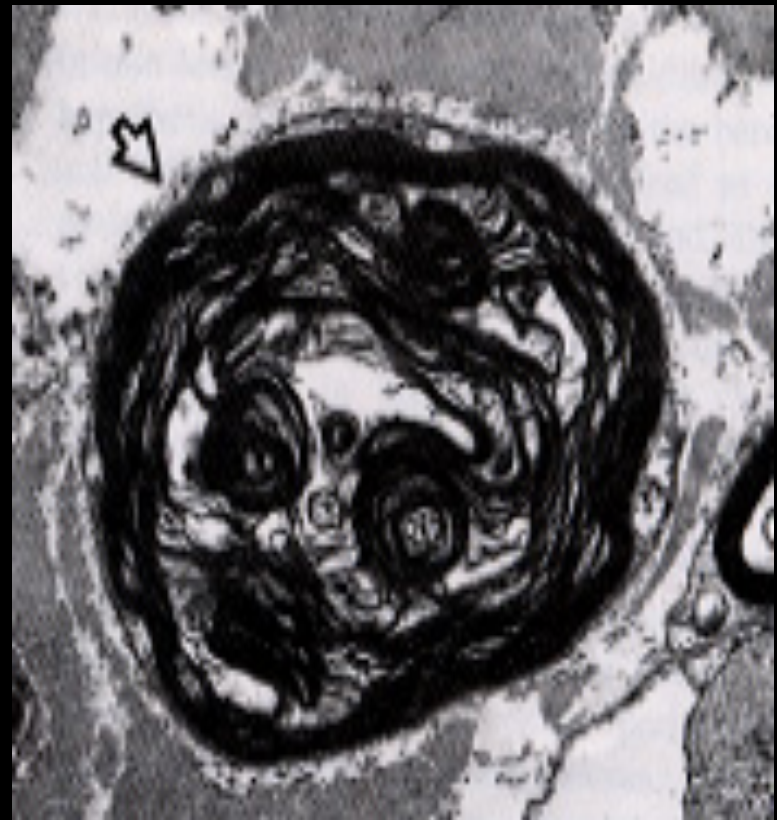
Quadriparesis

Proprioceptive deficits

EMG' s

Fibrillation potentials

Positive sharp waves



INSULINOMA

Diagnosis

Whipple's Triad

Fasting hypoglycemia

Clinical signs of hypoglycemia

Response to glucose administration

INSULINOMA

Diagnostic approach

Blood glucose < 60 mg/dl

Multiple samples

Close monitoring

INSULINOMA

Diagnostic approach

Insulin/glucose ratio

Glucose/insulin ratio

Amended insulin/glucose ratio

INSULINOMA

Diagnostic approach

Insulin/glucose pairs

Normal to elevated insulin

Hypoglycemia

INSULINOMA

Diagnostic approach

CBC, SMA and UA

Radiography

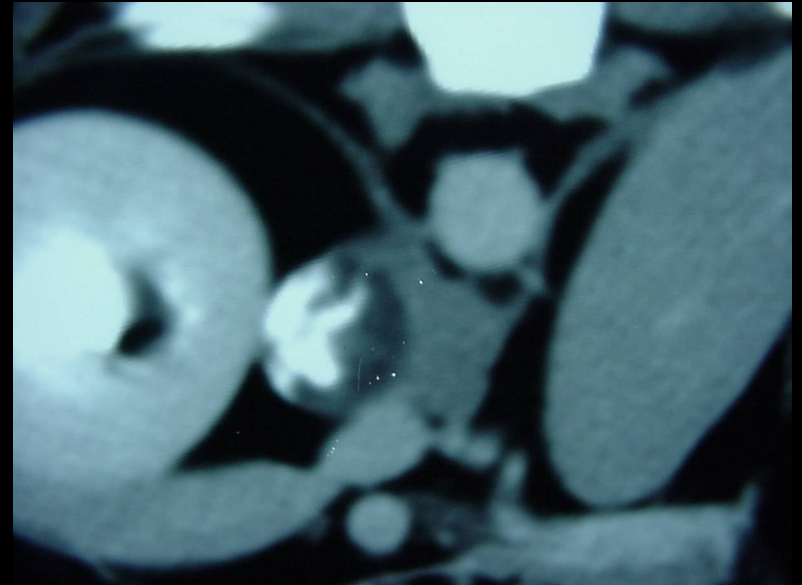
Thorax and abdomen

Ultrasonography

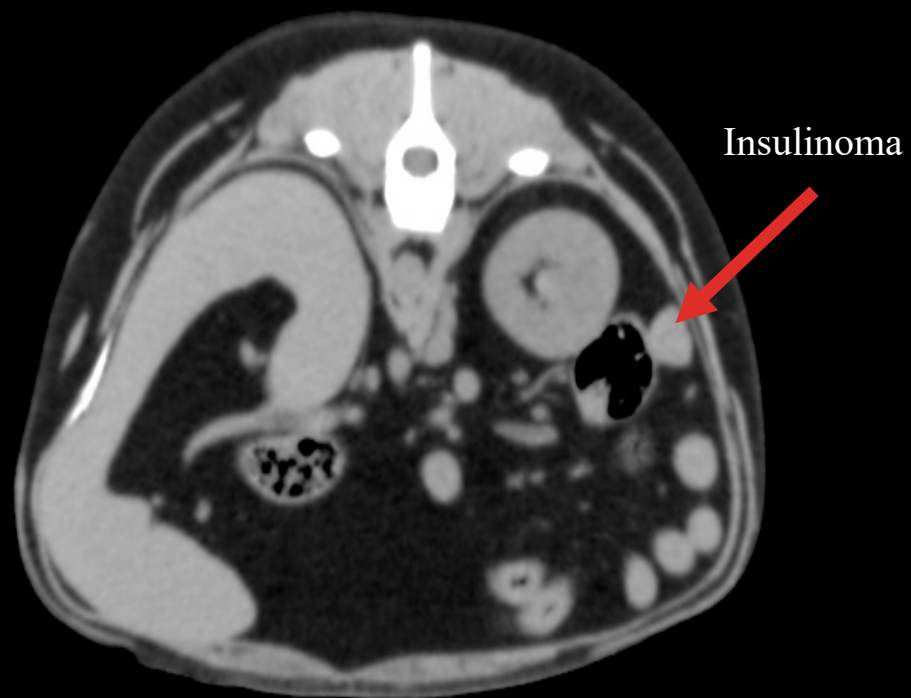
Pancreatic mass

Lymphadenopathy

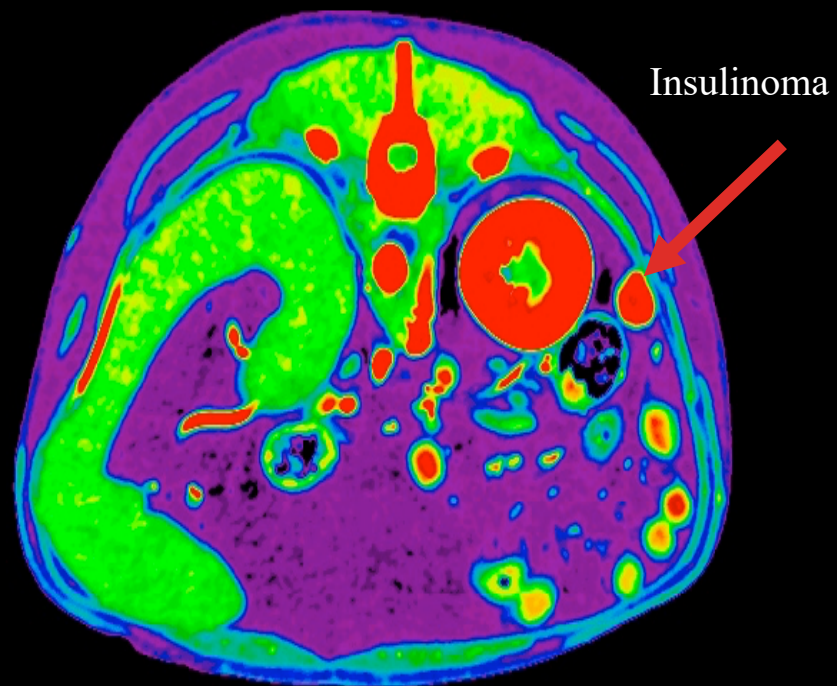
Metastasis



Pre-Contrast



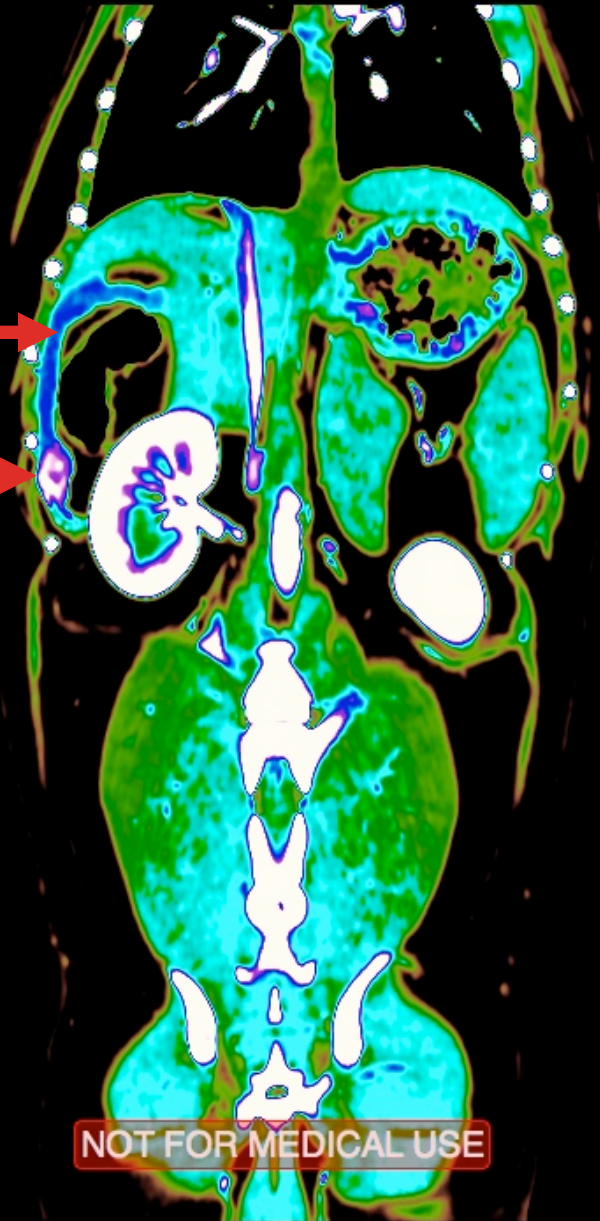
Post-Contrast



Pancreas

Insulinoma

NOT FOR MEDICAL USE



Insulinoma



INSULINOMA

Emergency Treatment

IV Dextrose (50%)

0.5 ml/kg

Followed by 5 % dextrose infusion

Cerebral edema

Mannitol

Glucocorticoids

INSULINOMA

Treatment

Surgery

Confirmation

Staging

51 % have visible metastasis

22 % hepatic

15 % lymph node

Removal

INSULINOMA

Surgery

Localization

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

INSULINOMA

Surgical Procedure

Suture fracture technique

Dissection technique

Similar complication rates

Post-operative pancreatitis

No mass ???

INSULINOMA

Pathology and Natural
Behavior

Small, tan nodules

14 % have multiple masses

Diffuse hyperplasia is rare



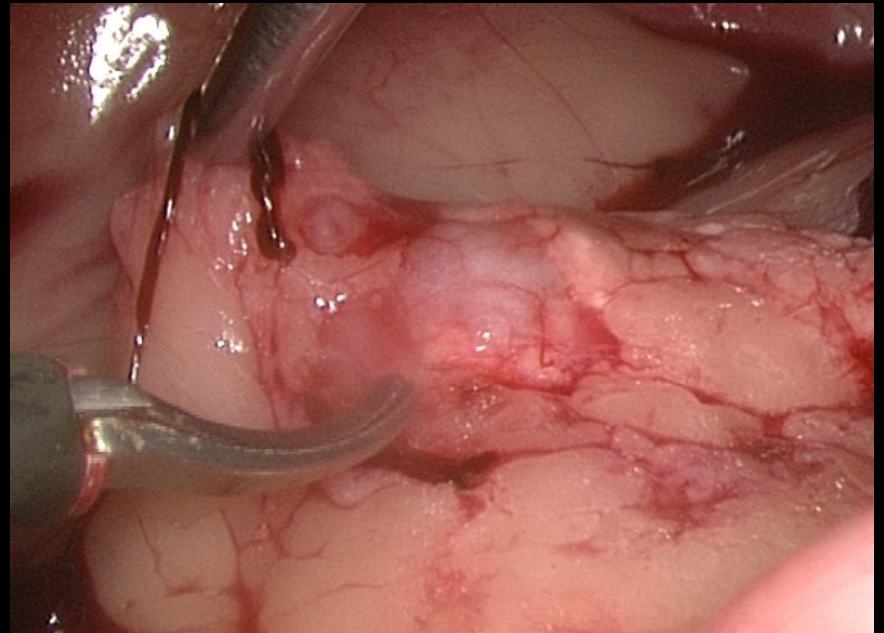
INSULINOMA

Pathology and Natural
Behavior

Normal appearing islets

Irregular nests

Stromal proliferation



INSULINOMA

Medical Therapy

Frequent feedings

Owner awareness of hypoglycemia

Prednisone

0.25 to 2.0 mg/kg BID

INSULINOMA

Medical Therapy

Diazoxide

Benzothiadiazene

Inhibition of insulin release

Hepatic gluconeogenesis

Decreased glucose uptake

INSULINOMA

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

INSULINOMA

Somatostatin

Octreotide acetate

50 - 100 mcg SC or IV TID to QID

Limited use in dogs

3/5 responded for 9 – 12 months

INSULINOMA

Streptozotocin

500 mg/m² IV infusion

Selective beta cell toxin

Limited renal toxicity with diuresis

Treatments q 3 weeks; 5 treatments

INSULINOMA

Prognosis

Median survival

11.5 months (114 dogs)

With metastasis

8.4 months

No metastasis

14.5 months

Diabetes is a good prognostic
indicator