

Canine and Feline Small Intestinal Disease (SID)

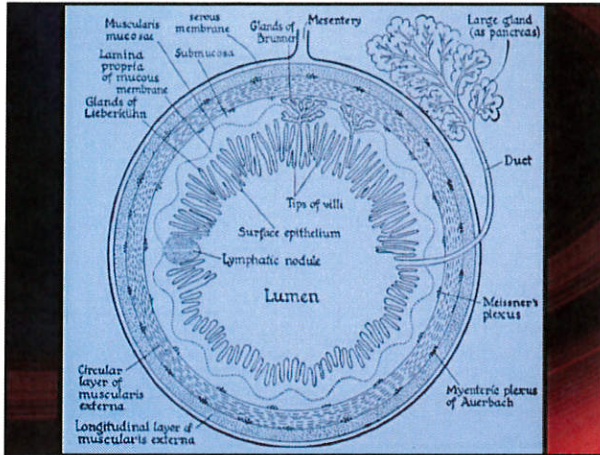
David A. Williams



Laboratory Tests

- Complete Blood Count
- Serum Biochemical Profile
- Urinalysis
- All often unremarkable in SID



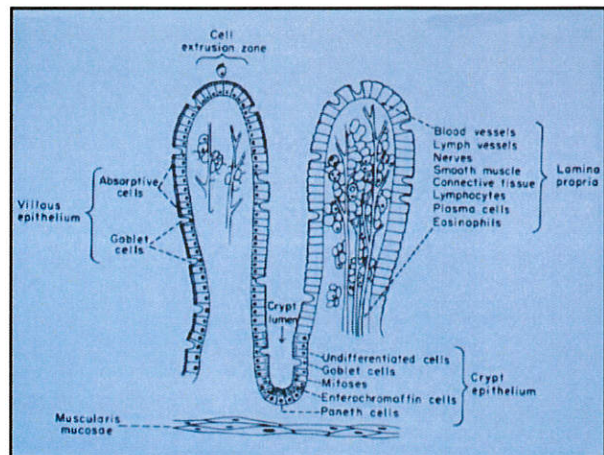


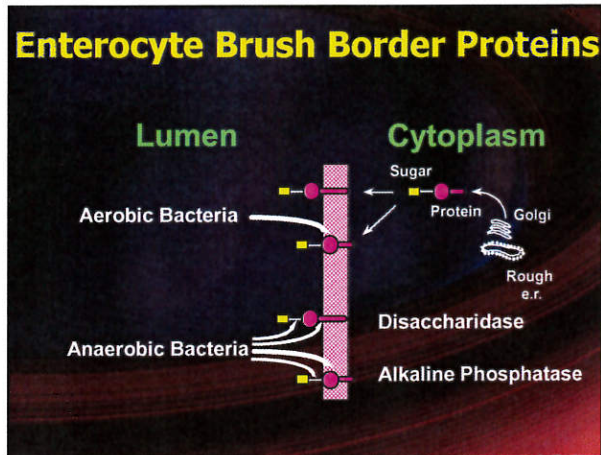
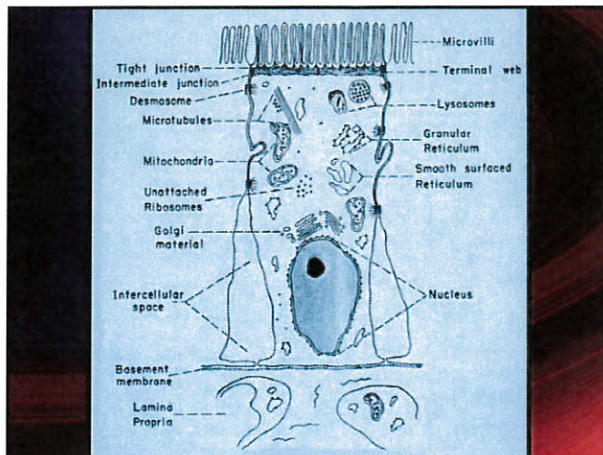
Dysfunction in Small Intestinal Disease

- Premucosal
 - intraluminal
- Mucosal
- Postmucosal
 - hemolymphtic

Dysfunction in Small Intestinal Disease

- Premucosal
 - EPI !
 - SIBO / Dysbiosis
 - (Bile acid deficiency)
 - (Gastric acid hypersecretion)
 - (both very rare)



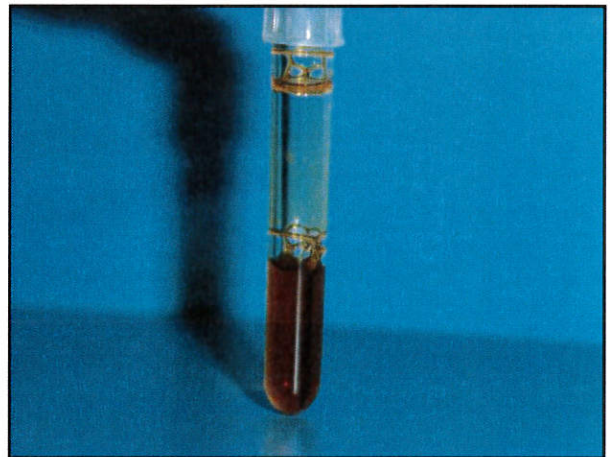
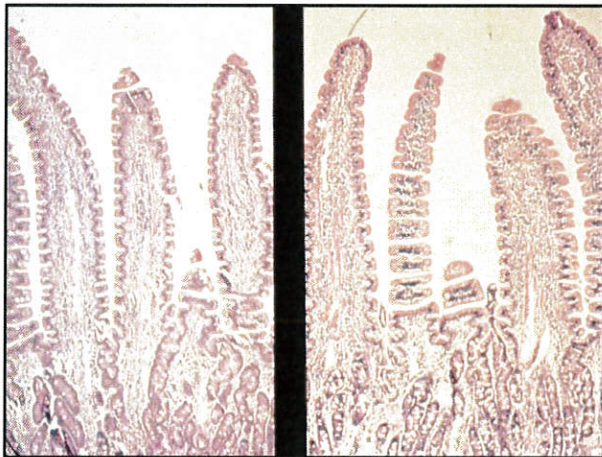
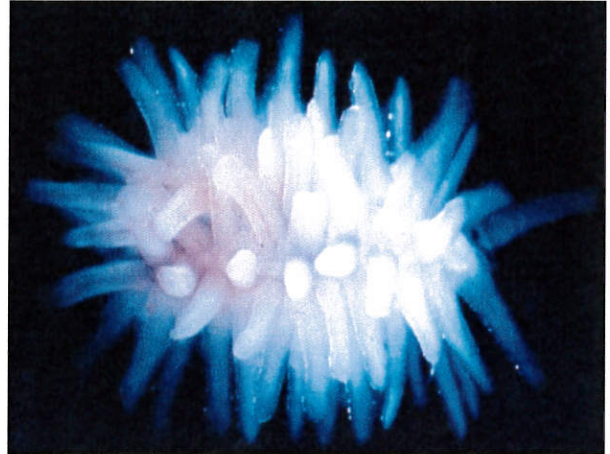
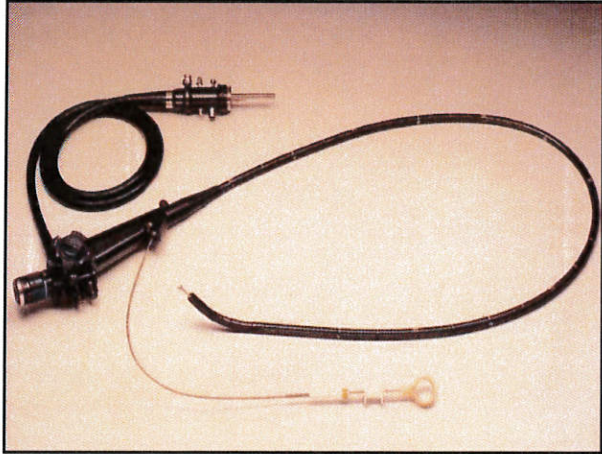


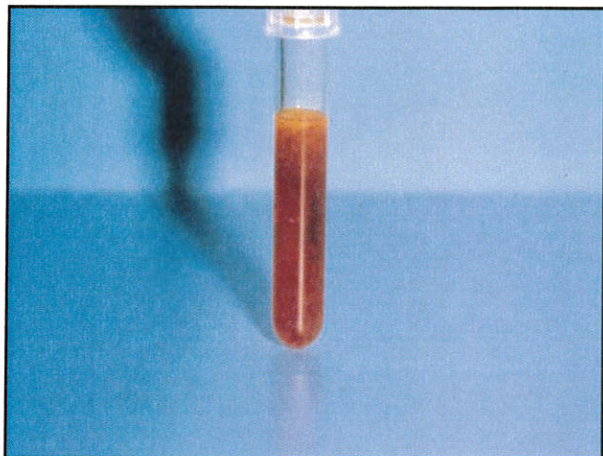
Dysfunction in Small Intestinal Disease

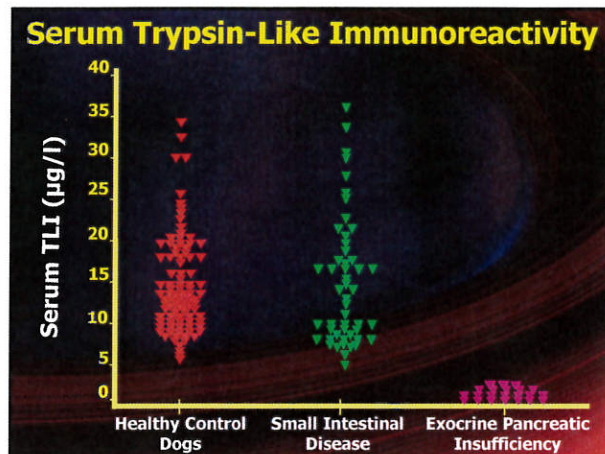
- **Mucosal**
 - Idiopathic inflammatory bowel disease (IBD)
 - Specific infectious enteropathies
 - (histoplasmosis, phycomycosis, salmon poisoning, other microbes – “dysbiosis”)
 - Neoplastic enteropathies
 - (lymphoma, adenocarcinoma)

Dysfunction in Small Intestinal Disease

- **Postmucosal**
 - Lymphatic obstruction
 - Neoplastic, granulomatous
 - Idiopathic lymphangiectasia
 - Vascular disease
 - Portal hypertension
 - Decreased cardiac output







Small Intestinal Disease

- There is no single "perfect" (sensitive and specific) test for small intestinal disease in dogs or cats!
- Even intestinal biopsy is often not very useful
- Do what is easy, inexpensive, minimally invasive, and most likely to change how you manage the patient first
- Take time to explain the complexities to clients, and that patience may be required to find the best management practices

Cobalamin and folate in dogs and cats

Folate – FF
Folate First

Cobalamin – BBB
Bacteria Bind CoBalamIn/B₁₂

4 year old female spayed Chihuahua

- Chronic diarrhea
- Getting worse
- Some days "not quite herself" or "not hungry"
- Weight loss (still plump!)

4 year old female spayed Chihuahua

- Physical exam – NR
- In house CBC, panel and UA – NR
- Whole body radiographs – NR
- GI Panel to GI Lab

4 year old female spayed Chihuahua

- TLI – 5 ug/L
(5-35ug/L)
- Folate 1.5 ug/L
(7.2-17.4 ug/L)
- Cobalamin 530 ng/L
(250-950 ng/L)

Subnormal serum folate

- Increased utilization
- Decreased absorption
- Decreased intake

- Folate supplementation
 - Diarrhea resolved over 2-3 weeks
 - Serum folate normalized at 5 weeks

1 year old intact male Golden Retriever

- Chronic diarrhea
- Otherwise healthy
- Guide dog training facility

1 year old intact male Golden Retriever

- Physical exam – NR
- CBC, panel and UA – NR
- Abdominal radiographs – NR
- Abdominal ultrasound – NR
- Gastroscopy and Duodenoscopy -
Minimal to mild lymphocytic
inflammatory bowel disease
- GI Panel to GI Lab

1 year old intact male Golden Retriever

- TLI – 6.5 ug/L
(5-35ug/L)
- Folate 35.5 ug/L
(7.2-17.4 ug/L)
- Cobalamin 325 ng/L
(250-950 ng/L)

Supranormal serum folate

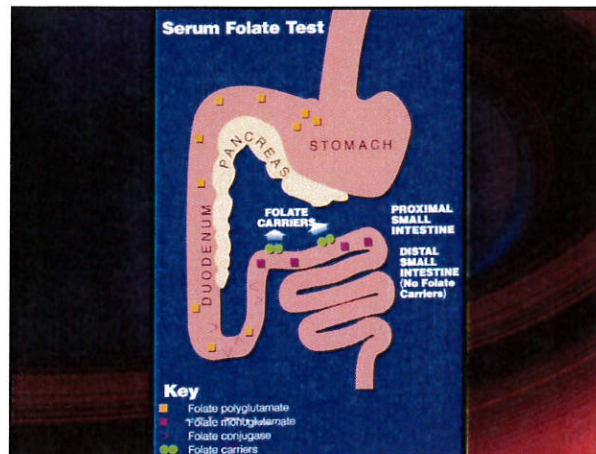
- Increased uptake
 - Exogenous sources
 - Diet (other oral intake)
 - Supplementation
 - Endogenous
 - Intestinal microflora ("SIBO", dysbiosis)
 - Mixed Exogenous and Endogenous

1 year old intact male Golden Retriever

- Tylosin for 6 weeks
- Highly digestible low residue diet
containing a prebiotic
- Change environment
- Stool improved markedly within
one week.

Folate

- Also known as vitamin B9, folacin or folic acid
- Methyl group transfer (homocysteine to methionine)
- Rapidly dividing cells
- From latin – folium (leaf)



Folate absorption

- Passive transfer across specific carriers located only in the upper small intestine
- Oral supplementation easily overcomes malabsorption!

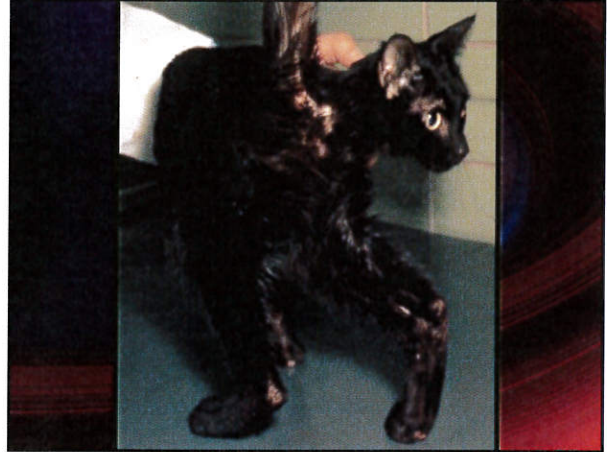
Serum Folate

- Decreased with disease of the upper small intestine
- Decreased with dietary insufficiency

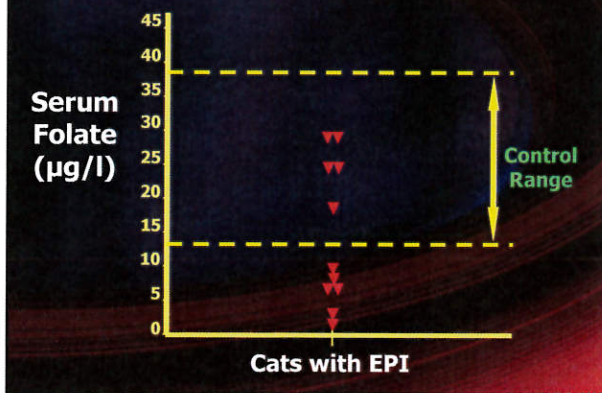
Folate Deficiency – Dogs and Cats

- Diarrhea?
- Anorexia? Weight loss?
- Hair coat – quality and color?

Humans – megaloblastic anemia
Role in heart disease, spina bifida, depression, infertility, retinal degeneration, others



Serum Folate in Cats With EPI



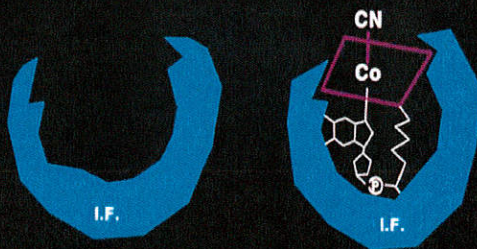
Cobalamin

- Also known as vitamin B12
- Cyanocobalamin & others
- Methyl group transfer functions related to folate (homocysteine to methionine)
- Rapidly dividing cells
- Pernicious anemia in man

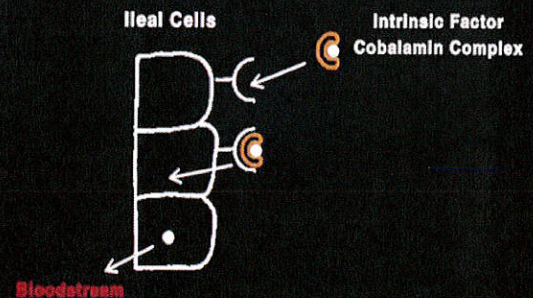
Cobalamin

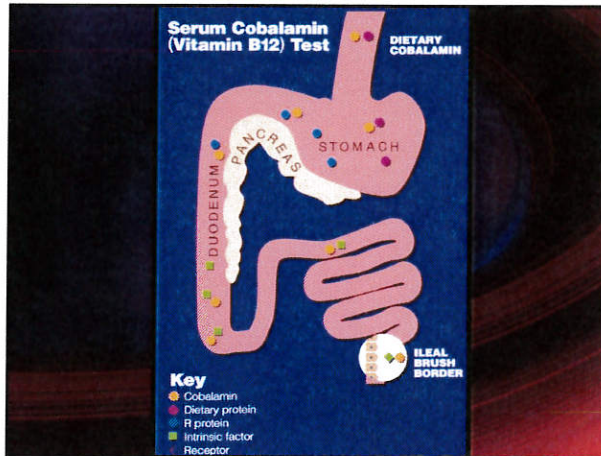
- All made by bacteria until cyanocobalamin was synthesized by man
- Plentiful in liver and meat products
- Plentiful in dog and cat foods
- Very little needed to maintain normal function

INTRINSIC FACTOR - COBALAMIN



COBALAMIN ABSORPTION





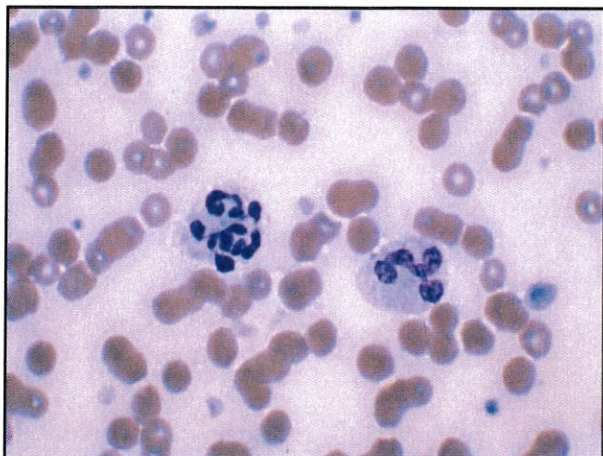
Cobalamin absorption

- Active transfer in a complex form across specific carriers located only in the last 10% of the small intestine (ileum)
- Oral supplementation often does not overcome malabsorption!



Inherited Selective Cobalamin Malabsorption

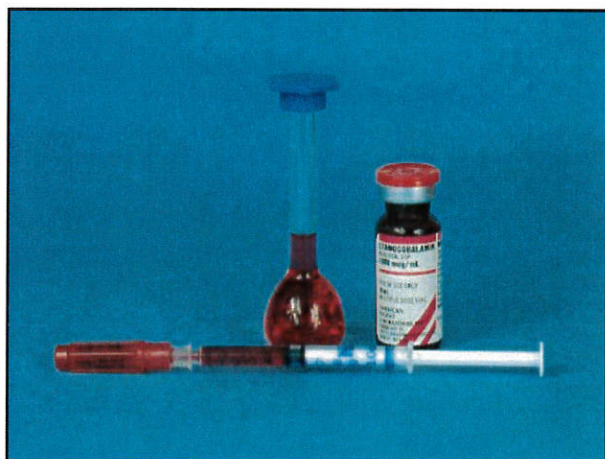
- First recognized in Giant Schnauzers
- Anorexia
- Failure to gain weight
- 7-12 weeks of age



Cobalamin Deficiency In Dogs

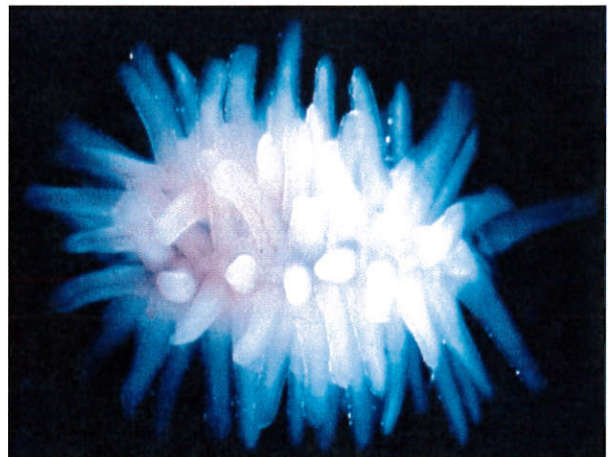
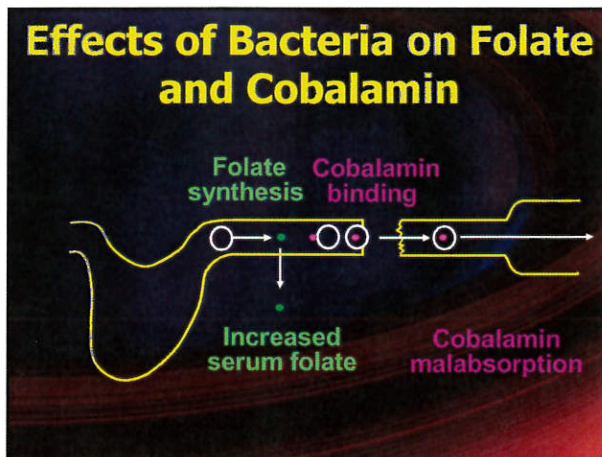
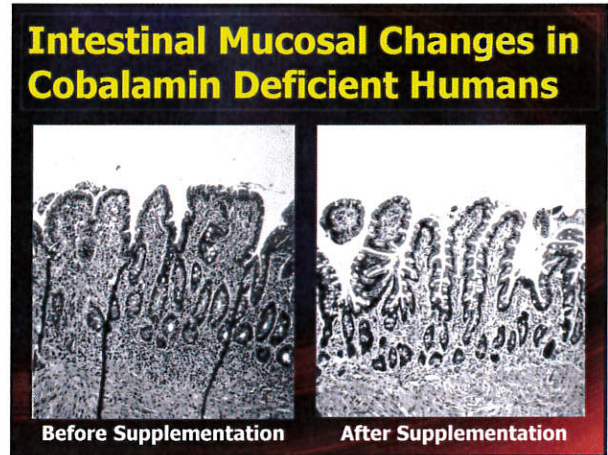
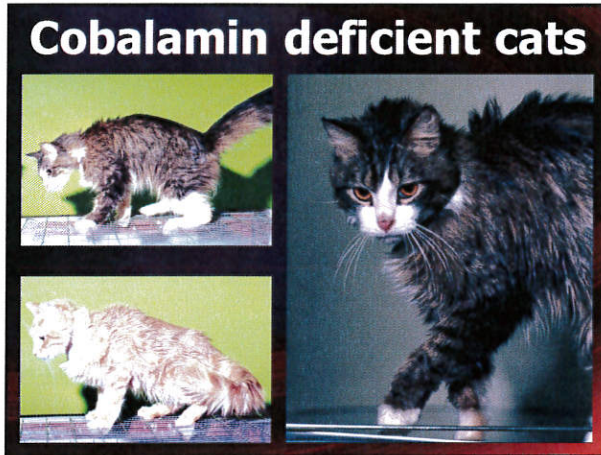
- **Mild non-regenerative anemia**
- **Mild neutropenia**
- **Hypersegmented neutrophils**
- **Giant platelets**

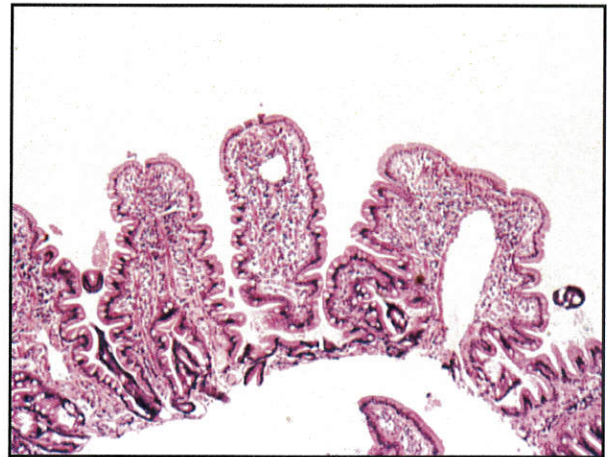
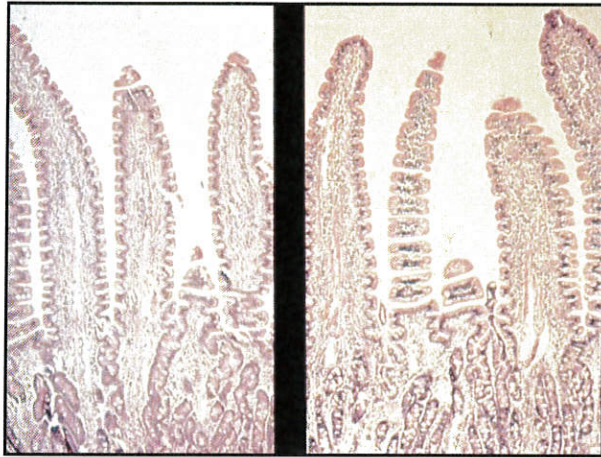
- **Usually none of the above!**



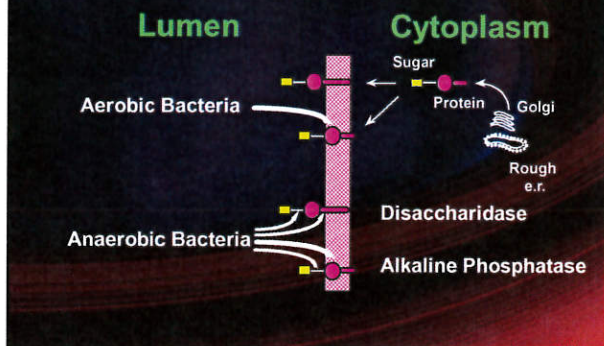
Inherited Selective Cobalamin Malabsorption

- **Giant Schnauzer**
- **Border Collie**
- **Beagle**
- **Komondor**
- **Other dog breeds**
- **Cat ?**

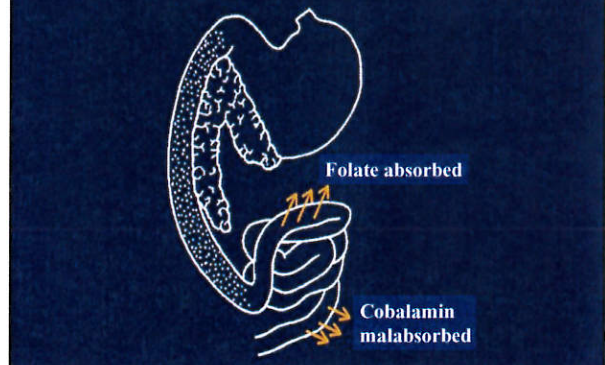




Enterocyte Brush Border Proteins



BACTERIAL OVERGROWTH



Intestinal Obstruction

- Neoplasia
- Foreign body
- Intussusception
- Stricture
- Herniation / Incarceration
- Diverticulae
- Adhesion
- Regional Enteritis
- Phycomycosis
- Pseudo-Obstruction

Therapy for Bacterial Overgrowth in the Small Intestine

- Metronidazole
20mg/kg q12h
- Tylosin
15mg/kg q12h
- Diet change !!!

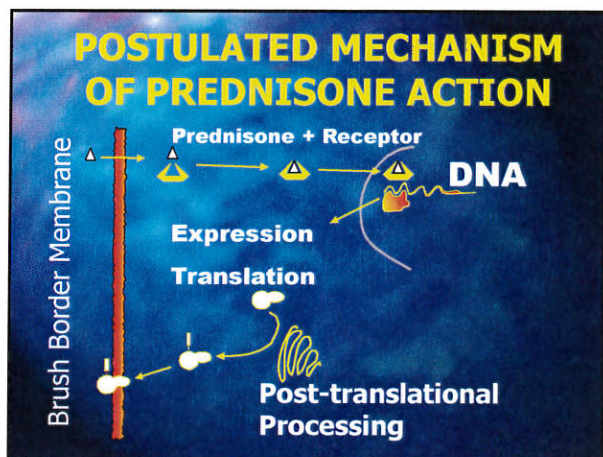


Small Intestinal Disease?

- Is pancreatic function adequate?
- Is there dietary sensitivity?
- Is there specific GI infection?
- Is there malabsorption?
- Is there protein-losing enteropathy?
- Is there SIBO / dysbiosis?
- Is there neoplasia?
- Is there villous atrophy?
- Is there intestinal inflammation?

Therapeutic options

- Treat specific underlying disease - infectious, obstructive or neoplastic
- Dietary manipulations
 - low fat (dog) or carbohydrate (cat)
 - highly digestible (low non-fermentable fiber)
 - adequate fermentable fiber
 - MCT oil / Purina EN
 - Novel antigen (elimination) or hydrolysed
- Antibiotics, Prebiotics, Probiotics – SIBO (ARD)
- Vitamin supplements
- Glucocorticoids - prednisolone
- Immunosuppressives
 - azathiaprine, chlorambucil
 - cyclosporine, other potent immunosuppressives?



Natasha

- 12 yo F(S) DSH Cat
- Gradual weight loss
- Increasingly irritable

Natasha

- CBC, serum biochemical panel, urinalysis, fecal parasite exam
- Abdominal ultrasound
- Clean teeth and dental radiographs
- Serum T4
- Serum fTLI, fPL, folate, cobalamin
- Serum tocopherol
- Fecal α_1 -proteinase inhibitor



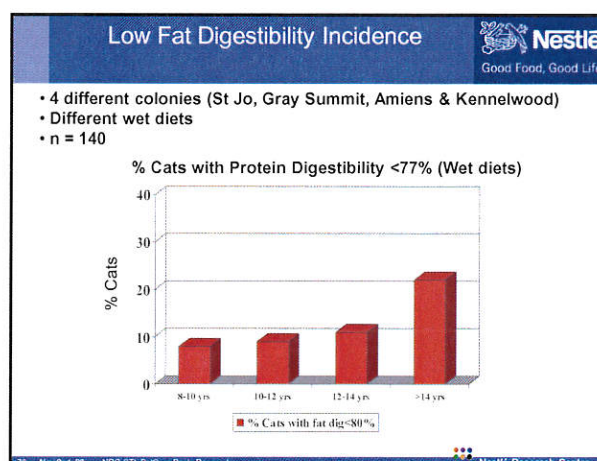
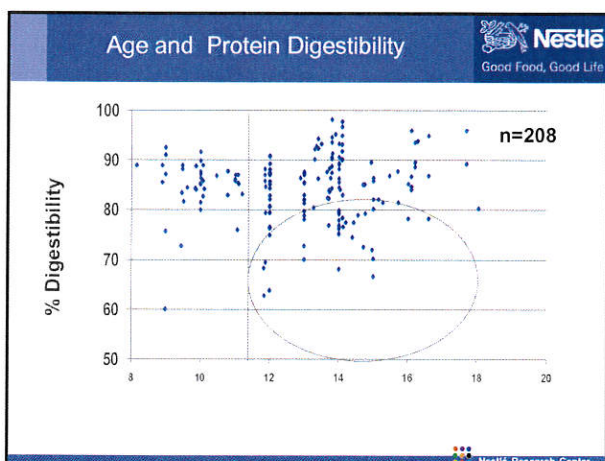
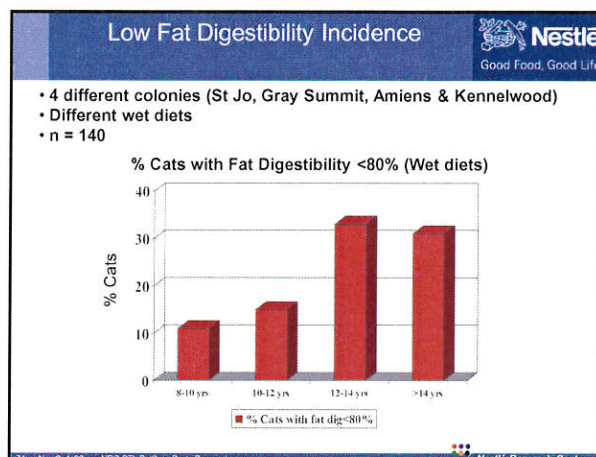
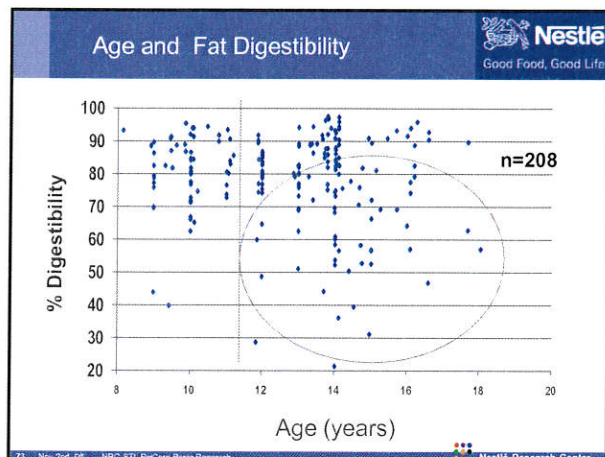
Natasha

- Increased serum fTLI, fPL
- Subnormal serum cobalamin
- Subnormal serum tocopherol
- Increased fecal α_1 -proteinase inhibitor
- Chronic enteropathy and chronic pancreatitis
- Classical "skinny old cat"


Natasha


- Low carb / high protein diet
- Cobalamin SQ
- Oral tocopherol supplement
- Consider oral prednisolone reducing to 2.5 mg every other day






Low Fat Digestibility Incidence





Normal Fat Digestibility



Low Fat Digestibility

77 Nov 2nd 08 NRC-STL PetCare Basic Research Nestlé Research Center

SKINNY OLD CATS: What Changes...What it means...How to feed them? Identifying cats with reduced digestive capacity




Table 4. Examples of abnormal levels of parameters and percent of cats with low digestibility.

Parameter	Abnormal levels	Percent with low (<40%) fat digestibility	Percent with low protein (<7%) digestibility
Vitamin E	< 5 mg/L	100	80
Vitamin B12	< 100 ng/L	92	67

→ Serum vitamin E and B12 have a strong inverse association with reduced digestive function
→ Easy to perform under clinical conditions vs. digestibility testing

