

SEVERE CALCIUM DEFICIENCY IN A CAT ON AN EXCLUSION DIET

Dr Marco Fantinati, DVM, resident ECVN
Supervisor: Dr Nathalie Priymenko



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SIGNALMENT



Cat, Sphynx, Male Neutered, 3 years old

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CASE HISTORY (during these 15 months Sheldon was managed by a 1st veterinarian)

Bought from an "amateur" breeder at 10 weeks of age
Fed from **10 weeks to 5 months** a Pet Food for growing kittens: Purina® Pro Plan® Junior Optistart (chicken, rice, corn, pork,...)

→ Early development of slight signs of skin disease:

- Cutaneous bumps
- Redness and swelling
- Excessive licking and scratching

Sporadic vomiting

5 months of age, neutering and dietary transition to a light Pet Food: Purina® Pro Plan® Sterilised/Weight Loss Optirenal® (salmon, tuna, corn,...)

→ No amelioration of the clinical picture

6 months of age, dietary transition to an hypoallergenic Pet Food: Hill's™ Prescription Diet™ z/d™ Feline (rice, hydrolysed chicken liver,...)

→ Worsening of clinical signs

Dietary Transition to an exclusion diet: **raw lamb's meat (muscle) + cooked rice**, daily amount not specified

→ Attenuation of cutaneous signs

15 months of age, change of carbohydrates and proteins' sources: **cooked lamb's liver** (~80 g/d) + **cooked pasta** (~70 g/d)
total amount divided in multiple meals

→ Disappearance of cutaneous and gastrointestinal signs

At almost 3 years of age (at this time the owners asked for a second opinion)

PHYSICAL EXAMINATION

BW 3.2 kg (BCS 4/9)
Mild muscle loss
Lameness
Difficulty to jump
Overall activity decreased

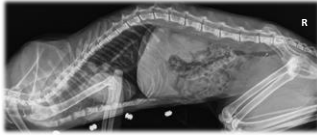
BLOOD ANALYSIS

No haematological anomalies

Total Calcium	1.53 mmol/L	[2.3 – 2.9]
Total Protein	58 g/L	[55 – 71]
Albumin	27 g/L	[27 – 39]
T4	13.1 nmol/L	[15 – 65]
Folate	6.15 ng/mL	[10 – 25]
Cobalamin	>1000 pmol/L	[300 – 1000]

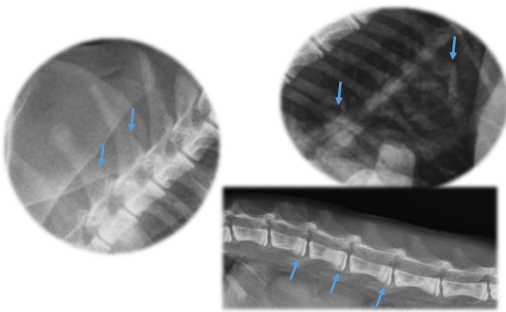
URINE ANALYSES

USG 1.030
pH 6.8



RADIOGRAPHY
Multiple fractures
Loss of contrast

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NUTRITION SERVICE ENVIT (the case was referred by the second clinic to our nutrition service) 2 weeks after previous consultation

PHYSICAL EXAMINATION

Incomplete physical examination due to severe pain at the slightest manipulation
Unable to stand or walk → lateral recumbency
BW 3.1 kg (BCS 4/9)
Mild muscle loss
Signs of pain at palpation of chest, spine and hindlimbs (meowing and vocalizations)
Lameness
Depressed mentation



NUTRITIONAL ASSESSMENT

History of Adverse Food Reactions

(Ingredients eaten during symptoms: chicken, salmon, tuna, corn, rice, yeasts, ...)
Unbalanced diet for almost 2 years (without minerals, vitamins, ...)
Dietary energy density too low (+210 kcal) to maintain ideal BW

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PRESENT DIET

Cooked lamb's liver (=80 g/d) + Cooked pasta (=70 g/d)
Dietary energy density too low (=210 kcal) to maintain ideal BW

	g/day	DM	Fat	Protein	NEE	Fibre	kcal ME	Ca	P	Mg	ALA	LA	Vit A (µg)	Vit D (µg)	Folic Acid (µg)	Cobalamin (µg)
as fed	150	50,19	5,03	21,19	21,16	1,33	214	0,13	0,38	0,03	0,032	0,55	5493,6	0,41	184	48,01
g/Mcal	234,53	23,51	99,02	98,88	6,2	1000	0,61	1,78	0,14	0,15	2,57	25671,03	1,92	859,8	224,35	
% ME		21	40	39												
% DM	100	10	42	42	2,65		0,26	0,76	0,06	0,064	1,1	10,95	8,17	0,37		0,1

FEDIAF Minimum Recommended for Adult Cats (100 kcal/kg^{0,67}): 1.48 g Ca/Mcal ME

While theoretically Folic Acid's requirements (188 µg/Mcal according to FEDIAF) were satisfied by the lamb's liver content, their blood levels were below the reference values
→ it could be argued that these micronutrients can fluctuate in the liver depending on the lamb's diet

NUTRITIONAL RISKS

Macrominerals deficiencies

Calcium/Phosphorus imbalance

Fat-soluble Vitamins excesses

Water-soluble Vitamins deficiencies

Low-fibre diet

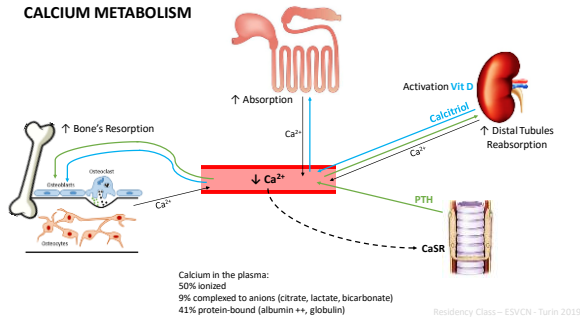
Essential Fatty Acids deficiencies

DIFFERENTIAL DIAGNOSIS

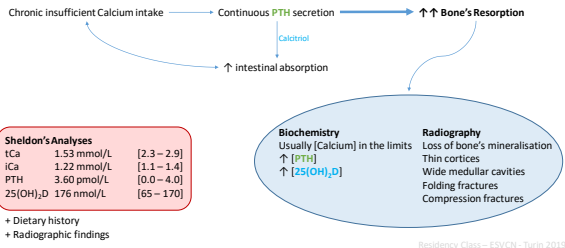
Nutrition-Related Skeletal Disorders

- Nutritional Secondary Hyperparathyroidism
- Hypervitaminosis A
- Hypervitaminosis D
- Rickets/Osteomalacia
- Panosteitis

CALCIUM METABOLISM



NUTRITIONAL SECONDARY HYPERPARATHYROIDISM



PROBLEM LIST

Chronic dietary Calcium Deficiency
 NSHP
 Multiple fractures
 Hypofatemia
 History of Adverse Food Reactions
 BCS 4/9
 Mild muscle atrophy

Folic Acid deficiencies can affect amino acid metabolism, nucleotide metabolism and mitochondrial protein synthesis contributing to body weight and muscle loss

KEY NUTRITIONAL FACTORS

- | | |
|---|---|
| Macrominerals
- Correct Calcium deficiency
- Correct Ca/P ratio
Protein (moderate to high requirements)
- Correct muscle waste
Fat (low to moderate requirement)
- Achieve ideal BW
- Correct possible essential fatty acids' deficiencies
- Energy source
- Palatability | Fibre (moderate requirement)
- Maintain GI motility
Omega 3 (EPA/DHA)
- Anti-inflammatory effects
B-complex Vitamins
- Correct Foliates' deficiency |
|---|---|

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BALANCED DIET

ENERGY REQUIREMENTS
Ideal BW 3.6 kg (+10%BW+muscle gain)
MER = 100 x 3.6^{0.67} = 236 kcal
DER = 1.2 (breed) x 236 = 283 kcal

DIET
100 g raw lamb's meat (neck)
2 ml rapeseed (colza) oil
40 g cooked zucchini
50 g cooked pasta

SUPPLEMENTS
½ Calcidia® (1 sachet contains 1.54 g of Ca)
0.4 mg PO SID of Folic Acid
7 gtt Tonivit® (2 gtt/kg BW)

	g/day	DM	Fat	Protein	NFE	Fibre	kcal ME	Ca	P	Mg	ALA	LA	Vit A (µg)	Vit D (µg)	Folic Acid (µg)	Cobalamin (µg)
as fed	192	50.13	16.12	20.37	13.06	1.55	283	0.38	0.25	0.04	0.7	0.9	1435.5	30	432	11.3
g/100kcal		212.02	68	86	55	6.57	1000	1.6	1	0.17	3	3.8	6082.63	127	1830.5	47.88
% ME		50	32	18												
% DM		100	32	40.6	26	3.1		0.76	0.5	0.08	1.4	1.8	2.86	0.06	0.86	0.023
								+160%					- 76%		+113%	

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LAST FOLLOW UP

Bone mineralisation already evident after 3 – 4 weeks of balanced diet

Regained mobility: Sheldon now can stand, walk and jump again

Ideal BW and BCS achieved in 4 months

Progressive augmentation of muscle masses



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