



Cutaneous Adverse Food Reactions

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Learning Objectives


- Examine the etiopathogenesis and epidemiology of adverse food reactions
- Recognize the clinical signs in both canine and feline species
- Discuss current testing methods including advantages and disadvantages of each
- Review the food elimination dietary trial and approach to long term management

Cutaneous adverse food reaction (CAFR) is best term in veterinary medicine

Etiopathogenesis

- Non-seasonal pruritic dermatosis associated with antigenic ingredient(s) in diet
- **Proteins**
 - Usually complex water-soluble glycoprotein as basic food ingredient
 - 10-70 kDa
 - Relatively stable to heat, acid and proteases
- Size of food molecules important
 - <10 kDa = hypoallergenic (humans)
- Carbohydrates
- Food additives and preservatives

Food Allergens

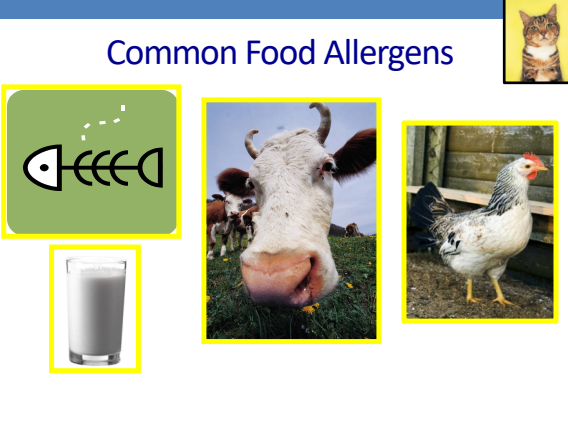


- More than one protein or component may be involved
 - 2.4 - mean number of allergens causing reaction on re-challenge
 - 80% react to 1-2 proteins
 - 64% react to 2 or more proteins
- Beef, dairy > wheat, eggs, chicken

Common Food Allergens

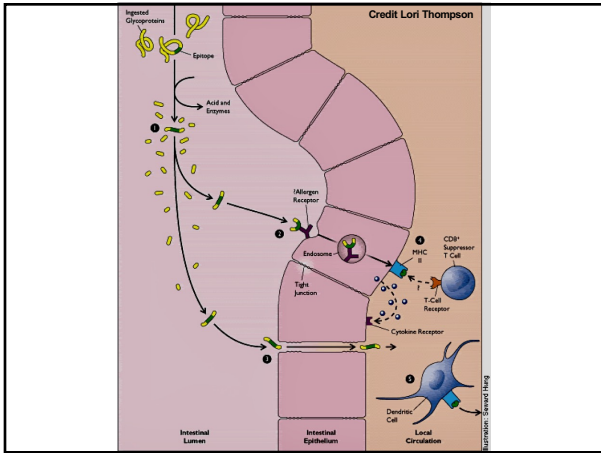



Common Food Allergens



Intestinal Mucosal Barrier

<p>Limits Penetration</p> <ul style="list-style-type: none"> • Enterocytes • Protective coating (secretory IgA) • Gastric acid, intestinal enzymes, bile salts • Gut associated lymphoid tissue (GALT) • Circulatory IgA 	<p>Increases Permeability</p> <ul style="list-style-type: none"> • Young age • Parasitism • Viral enteritis • Early weaning • Dysbiosis? <div style="border: 1px solid black; padding: 5px; width: fit-content; margin-left: auto; margin-right: auto;"> <p style="text-align: center;">Digestability and normal peristalsis</p> </div>
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Epidemiology

- 10-15% of all allergic dermatoses
- 20-35% of dogs with non-seasonal pruritus
- No sex predilection
- Dogs: 4 months-14 years; 38% < 1 year of age and 78% < 3 years of age
 - Often 3-5 months of age
- Cats: 4-5 years of age (mean)
- 25% of cases have a concurrent allergy

Epidemiology

- 68% of dogs have consumed offending ingredient for an average of 2 years
- 10 to 15% have concurrent gastrointestinal signs (cats > dogs)
- May be poorly steroid and oclacitinib responsive compared to atopic dermatitis
 - 36% of dogs may not respond to corticosteroids

Common Breeds

Boxer, cocker spaniel, springer spaniel, collie, pug, dalmatian, German shepherd, Lhasa apso, West Highland white terrier, miniature schnauzer, dachshund, shar pei, labrador, golden retriever, Rhodesian ridgeback

Common Breeds



Clinical Signs - Cutaneous



- Pruritus in 99% of cases
 - Periocular
 - **Feet**
 - Axillae
 - **Inguinal**
 - Lumbosacral
 - **Perianal area**
 - Otitis externa (common: 26-80%)
 - May be the only clinical sign in 25% of cases
- } Identical to atopic dermatitis!

Cutaneous Signs



- Primary lesions
 - Papules
- Secondary Lesions
 - Excoriations
 - Alopecia
 - Crusts
 - Hyperpigmentation
 - Lichenification
 - Secondary infections



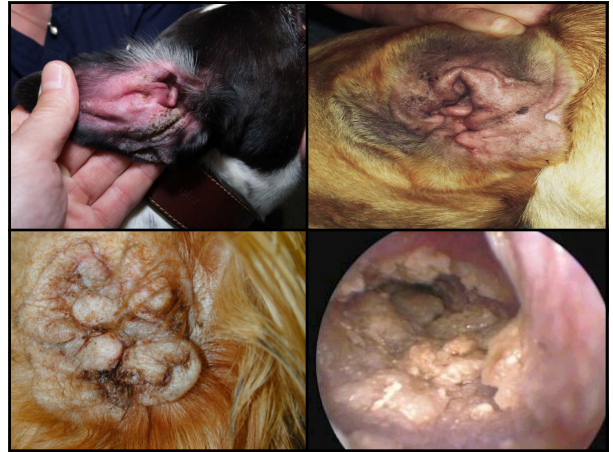
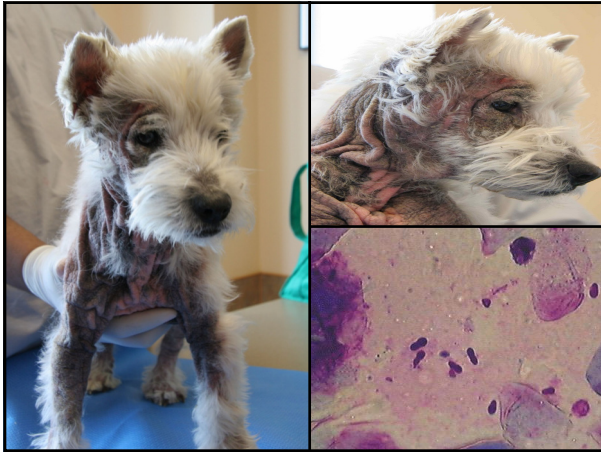
Credit Chiara Noli




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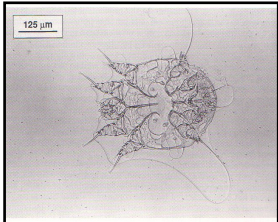
Credit Chiara Noli




Differential Diagnoses



- Flea allergy dermatitis
- Ectoparasites
 - *Sarcoptes*
 - *Cheyletiella*
 - *Demodex*
- Atopy
- Folliculitis

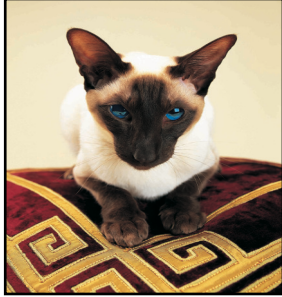



Feline CAFR




- Non-seasonal pruritus
- Incidence varies
 - 17% of cases in one study

Common Breeds

Cutaneous Signs

- Cervicofacial pruritus most common presentation
- Miliary dermatitis
- Eosinophilic dermatoses
- Self-induced alopecia

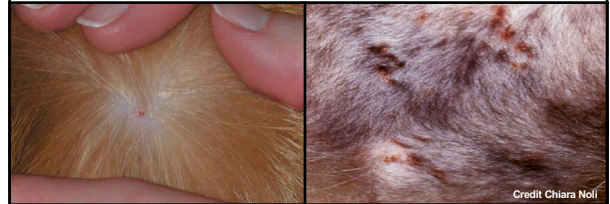




Face and Neck Pruritus



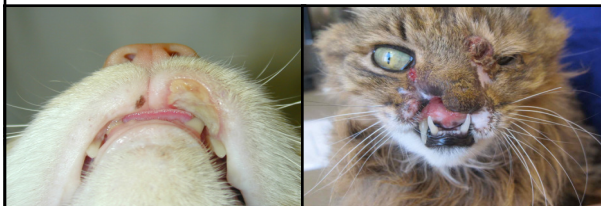
Miliary Dermatitis



Credit Chiara Noli



Indolent Ulcer



Eosinophilic Granuloma



Credit Chiara Noli



Eosinophilic Plaque



Credit Chiara Noli



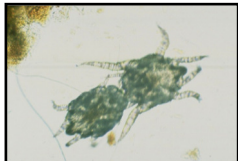
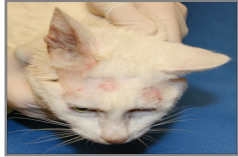
Feline Self-Induced Alopecia

Credit Chiara Noli

Differential Diagnoses

Cervicofacial pruritus

- Notoedric mange
- *Otodectes*
- Atopy
- Dermatophytosis
- Viral dermatitis
- Pemphigus foliaceus
- Mosquito bite hypersensitivity



Differential Diagnoses

Generalized lesions

- Flea allergy dermatitis
- Atopy
- Dermatophytosis
- Malassezia dermatitis
- Ectoparasites
 - *Cheyletiella*
 - *Demodex*



Clinical Signs - Gastrointestinal

- Intermittent diarrhea or vomiting
- Chronic soft stool
- Borborygmus and flatulence
- Increased frequency of defecation (3+ times/day)
- Role in diet-responsive chronic enteropathy

Diagnostic Tests

- Serologic tests – ELISA/RAST
- Intradermal skin test
- Patch test
- Basophil degranulation test
- Gastroscopic food sensitivity test
- Hair/saliva testing
- Food elimination dietary trial

Serum and Skin Allergy Testing

- ELISA/RAST and skin testing are inconclusive
- Multiple studies that demonstrate lack of specificity and sensitivity
- Why?
 - Not all CAFR is IgE-mediated
 - These tests utilize ground up and solubilized raw ingredients that may or may not contain the antigens that are present after cooking and digestion
 - False positives common
- No correlation between results of allergen-specific IgE/IgG serology or intradermal skin testing for food allergens and clinical hypersensitivity

Hair and Saliva Testing

- ImmuneIQ™
 - Designed by Rob Ryan of VetDVM, LLC, Boulder, CO
 - Requires filling a bag with hair and collecting a cheek swab
 - Tests 125 irritants for \$87
 - Optional add-on toxin, bacteria/virus and mold/fungus panels including ringworm!
 - Report available within 3 days and designed to be read *without the assistance of a veterinarian*

ImmuneIQ™

- 10 fur/saliva samples submitted for analysis from normal, food allergic/atopic dog and five samples of “fake” fur from a stuffed toy and tap water in blinded fashion
- Testing performed for 128 food and environmental allergens
- Distribution of results were no different than from those expected by random chance
- Test reliability = poor to slight

Coyner K, Schick A. Inaccuracy of a hair and saliva test for allergies in dogs. WCVJ (2016) abstract.

Salivary Testing

- Nutriscan® food sensitivity and intolerance test
 - Developed by W. Jean Dodds, DVM in 2011
 - Latent or pre-clinical form of food sensitivity
 - Food antigens in the gut → early production of IgA and IgM antibodies in saliva
 - Tests 24 common food ingredients using 2 ml of saliva collected from a cotton rope that cat/dog chews
 - Claims to identify the exact food causing intolerance in less than two weeks

Nutriscan®

- 12 saliva samples submitted for Nutriscan® analysis from normal, food allergic and atopic dogs with one negative control (tap water) in blinded fashion
- All samples including water were positive for beef, corn, milk and wheat, as well as IgM positive to soy
- No objective data to support the validity of this testing method

Diagnosis of CAFR

The only accurate method for diagnosing CAFR is to feed a restricted diet of a single novel or hydrolyzed protein and a single (preferably novel) carbohydrate for a minimum of 8-10 weeks

Dietary History

- Specific foods
- Commercial snacks/treats
- Supplements
- Chewable medications
- Chew toys
- Human foods
- Access to other pet's foods
- Who feeds the pet?



Hidden Allergens

- Flavored heartworm and flea/tick preventatives
- Flavored toothpaste
- Gelatin capsules
- Glucosamine and chondroitin
- Probiotics
- Vitamin supplements
- Fish oil
- Animal fats
- Meat by products and bone meal



Food Elimination Dietary Trials



Client Preparation

- Food trial requires a compliant client
- You cannot perform a food trial on a free-roaming pet
- Everyone in the household must be motivated and able to comply with the dietary trial



Food Elimination Dietary Trial

- A novel (never consumed) protein +/- carbohydrate
- Single whole or hydrolyzed protein source
- Additive free
- Eight-ten weeks in duration
- If improvement is noted, important to challenge with previous diet and/or individual protein and carbohydrate sources

Food Trial Duration

- Retrospective evidence based literature review from 1980-2014
- After 5 weeks in dogs and 6 weeks in cats, more than 80% of patients achieved remission of clinical signs
- After eight weeks, clinical remission was reached in > 90% of dogs and cats with CAFR

Olivry T, Mueller R, Prelaud P. Critically appraised topic on adverse food reactions of companion animals (1): duration of elimination diets. *BMC Veterinary Research* 2015;11(225).

Treats

- Provide specific recommendations for treats
 - Used canned formula or bake treats from diet
 - Fresh or dehydrated fruits and vegetables
 - Royal Canin® Hydrolyzed Protein treats
 - Hill's Prescription Diet Hypo-Treats
 - Purina Pro Plan Veterinary Diets Gentle Snackers®

Bowls, Toys and Other Pets

- Exchange plastic or rubber bowls for stainless steel, glass or ceramic
- Replace rubber or rope toys that trap food particles
- Wash hands before handling pet's food
- Use separate utensils/cups between pets
- Feed pets separately, pick up bowls between feedings or consider feeding all the same diet

Pitfalls for Owners

- Pet is free-roaming or neighbors feed
- Garbage eating
- Coprophagia
- Hunting
- Social events and household visitors
- The internet and pet store wisdom
- Other dogs or cats in the household
- Young children and the elderly

Food Elimination Diets

Home Cooked Diets

Home Cooked Diets

- What are the advantages?
 - Limited ingredients with no additives or preservatives
 - May combine with other nutritional strategies if other medical conditions exist
 - Involves owner in treatment
 - Palatable
 - Required to diagnose CAFR in rare cases

Home Cooked Diets

- What are the disadvantages?
 - May not be balanced for growth or long term feeding
 - Protein source may be limited
 - Recipe drift may result in nutritional imbalances
 - No dry or kibble formula available

Choice of Ingredients

- Proteins
 - Horse
 - Ostrich/emu
 - Goat
 - Rabbit
 - Duck
 - Wild boar
 - Venison
 - Kangaroo
- Carbohydrates
 - White/sweet potato
 - Barley
 - Oat
 - Quinoa
 - Pumpkin
 - Pea
 - Squash



Additional Resources

- Balance IT: www.balanceit.com
- Veterinary Nutrition Consultations, Inc: www.petdiets.com
- University of CA Davis Nutrition Support Service: nutrition.vetmed.ucdavis.edu
- Tufts Clinical Nutrition Service: vetnutrition.tufts.edu/petfoodology/
- American College of Veterinary Nutritionists: www.acvn.org

Novel Protein Diets

Prescription Novel Protein Diets

- What are the advantages?
 - Complete and balanced formulas
 - Useful for diagnosis and long-term feeding
 - Moderate cost
 - Palatable
 - Easy for pet owners
 - Often available in canned and dry formulas

Prescription Novel Protein Diets

- What are the disadvantages?
 - Limited novel proteins based on dietary history
 - Cross reactivity
 - Some products are enriched with fatty acids that may improve pruritus and complicate interpretation of food trial
 - Raw material availability – shortages
 - May be more expensive than most OTC diets

Food Allergen Cross Reactivity

- Closer taxonomic relationship between meat sources → higher risk of cross reactivity
- Beef may cross react with other ruminants (venison, lamb) as observed with avian meats
- Serologic cross reactivity has been demonstrated for beef, lamb meat and cows' milk allergens

Bexley J, Nuttall TJ, Hammerberg B et al. Serological cross reactivity between beef, lamb and cows' milk allergen extracts in dogs. WCV08 (2016) abstract.

Over-the-Counter Novel Protein Diets

- Concern is with cross contamination in production and poor quality control
- Four OTC venison diets evaluated for soy, beef, and poultry proteins by ELISA
 - Did not list soy, beef, or poultry in product ingredient list
 - 75% of diets tested positive for soy, poultry and/or beef
- Other studies have supported contamination

Hydrolyzed Protein Diets

Hydrolyzed Protein Diets

- Protein → peptides and amino acids by proteolytic enzymes
- Limited studies support reduction, but not complete elimination, of immunological and clinical allergenicity
- 20-50% of dogs ingesting hydrolysates derived from protein to which they are hypersensitive may exhibit an increase in clinical signs of CAFR
- Best used in animals suspected not to be allergic to the parent protein

Hydrolyzed Protein Diets

- What are the advantages?
 - Sustainable - little to no competition with human food supply
 - Sufficient quantity produced and readily available
 - Cost effective source – most expense involved in processing and quality control
 - Available in canned and dry formulas +/- treats

Hydrolyzed Protein Diets

- What are the disadvantages?
 - May not be balanced for growth
 - Formula may be limited
 - Hyperosmolar qualities – occasional GI upset
 - Higher cost
 - Variable palatability

Follow Up

- Schedule re-examinations monthly during food trial
- Assess body weight and compliance
- Any “breaks” in the trial?
- Is improvement noted and sustained?



Not Improved on Food Trial

- Check compliance
- Evaluate for infection and/or parasites
- Extend food trial for total of 12 weeks
- Consider another diagnosis such as atopic dermatitis

Temporarily Improved on Food Trial

- Due to “loosening of attention” by owner
 - Typically in the second month
- Therapy during the first month
 - Antimicrobials, flea control, antipruritic medications → relapse following discontinuation



Improved on Food Trial

- If sustained improvement of 50% or more is documented, important to challenge to determine if diet is responsible
- Mix the previous diet 50:50 with the trial food
- Have the owners keep a daily log during the 14 day challenge
 - Document increase in itch, erythema, papules, skin infection, presence of otitis, gastrointestinal signs etc.

Food Challenge

- Recurrence of clinical signs → CAFR
 - Return to feeding the trial diet until remission of signs
- No recurrence → no CAFR
 - Effect of concurrent treatments such as flea control, antimicrobial and/or antipruritic therapies
 - Seasonal change if the animal has atopic dermatitis
 - Effect of diet enriched with fatty acids if the animal has atopic dermatitis

CARF - Key Points

- Spell it out for owners to provide them the tools to succeed
- Switch the diet slowly over 5-7 days
- Encourage owners to keep a diary and report any inappetence, vomiting or diarrhea immediately
- Contact owners two weeks after initiation of trial to check in and provide encouragement
- Remind them to be patient – there may be no improvement for the first 3-4 weeks of the trial
- Recheck monthly for the duration of the food trial