FACT SHEET

Topic: **HIP DYSPLASIA (HD)**

Variety Affected: Toy, Miniature & Standard.

Description: Malformation of the hip joint in which the ball and socket do not properly fit together.

Symptoms: Mildly dysplastic dogs may not exhibit any outward signs. Moderate to severe cases may exhibit rear end lameness and/or discomfort when getting up. Arthritis often occurs over time from wearing on the hip joint.

Age at Onset: Varies, but there are two groups among the affected:

1. Young dogs 5 to 10 months, and
2. Older dogs with chronic degenerative joint disease.

Mode of Inheritance: Polygenic (multiple genes with differential weights working additively toward a threshold of manifestation) in addition to those genes interacting with environmental factors. Multiple genes are contributed by the parents in such a way that two HD affected dogs with similar symptoms can have different inheritance profiles. There need not be any common genes or shared environmental factors between the two affected dogs.

Method of Diagnosis: Radiograph (x-ray).

Age at Diagnosis: For Orthopedic Foundation for Animals (OFA) Certification, 24+ months. For OFA preliminary evaluation, younger than 24 months. OFA's three major categories and seven ratings are: Normal (Excellent, Good, Fair), Borderline, and Dysplastic (Mild, Moderate, Severe).

PennHIP 16+ weeks. PennHIP reports the breed-based hip percentile score. A Poodle with a score of 95 indicates that he is in the top/best 5 percent among Poodles, while another Poodle with a score of 30 indicates that he is in the bottom/worst 30% among Poodles.

Where To Submit X-Rays:

- OFA - http://www.offa.org/hipinfo.html

  X-ray film submission: Orthopedic Foundation for Animals (OFA)
  2300 Nifong Blvd.
  Columbia MO 65201-3806

  Electronic submission: http://www.offa.org/elecsubmission.html

  GDC (Institute for Genetic Disease Control in Animals) registrations were merged with OFA, and their past records are now available at the OFA web site. See contact info above.

- PennHIP - http://www.pennhip.org/

  X-ray submission: PennHIP Analysis Center
  20 Valley Stream Parkway, Suite 267
  Malvern PA 19355-1457

  Digital x-ray (CD) submission: PennHIP Administrative Center**,** MJR-VHUP
  Attn: Tom Gregor
  3900 Delancey Street
  Philadelphia PA 19104-6010

Clinical Signs of Dysplasia:

While most dogs with HD do not have clinical signs, those who do are first affected between 5 and 10 months of age. In those who do not, the signs may not be observed until later in life. The clinical signs of HD may include:

- a reluctance to go up/down stairs
- difficulty in rising from a sit/down position
- bunny-hopping gait when running
- lameness after exercise, or a wobbly gait
- a clicking sound when walking

Treatments:

Conservative medical maintenance involves pain control. Your vet may prescribe one or more medications to manage the symptoms of osteoarthritis secondary to HD. Use of supplements for joints may help pain and/or delay onset of arthritis. For more severe cases, surgical interventions may be required.

Drug treatments are generally used either for their pain-relieving and/or anti-inflammatory effects (Non-steroidal anti-inflammatory drugs, NSAIDS). Some of the more commonly used include:

- Firocoxib
- Deracoxib
- Meloxicam
- Carprofen
- Tepoxalin
- Etodolac

An in-depth consultation with your veterinarian is imperative in choosing and adjusting NSAIDs. You should watch for these side effects:

- Decrease or increase in appetite
- Vomiting
- Change in bowel movements (diarrhea, or black, tarry, or bloody stools)
- Change in behavior (decreased or increased activity level, coordination, seizure or aggression)
- Yellowing of gums, skin, or whites of the eyes (jaundice)
- Change in drinking and/or urination habits (frequency, color)
- Change in skin (redness, scabs, or scratching)

If you notice any of these possible side effects, stop the medication and contact your veterinarian.

FDA updates a list of approved NSAIDs and keeps a list of reported adverse reactions. For more information, see http://www.fda.gov/cvm/nsaids.htm and http://www.fda.gov/cvm/adetoc.htm.

Permanent Acupuncture Implants of Gold Beads: Recently there are a few long-term results reported by researchers who implanted gold beads (gold plated low-magnetic beads) at selective acupuncture points (back, hip, etc.) to alleviate the pain and improve functionality of the hind legs. A two-year follow-up study based on a double-blind protocol reported a positive effect of gold bead implants beyond the placebo effect for dogs younger than 7 years old.

Disease-Modifying Osteoarthritis Agents: You may also consider the following supplements to your dog's diet, or injectables, known as disease-modifying osteoarthritis agents.

- Glucosamine and chondroitin sulfate combination may provide a protective effect to the cartilage in the joints as a dietary supplement.
- There is also a faster-acting injectable form of glucosamine/chondroitin sulfate available with a prescription.
- Other supplements that have anecdotal success, if not scientifically proven efficacy, include fish oil, Vitamin C, green-lipped mussels, shark cartilage and seaweed extracts.

Your best bet with treatment and supplements is to proceed thoughtfully, research various options on the web sites [e.g., OFA and American College of Veterinary Surgeons (ACVS) on HD), ask your vet a lot of questions or seek a second opinion. You may also want to consult with an orthopedic specialist when surgical intervention is a possibility. Orthopedic specialty surgeons are listed at http://www.acvs.org/AnimalOwners/DiplomateDirectory/.

Surgical Interventions: Surgical interventions may be required for severely dysplastic dogs.

- For younger dogs (less than 10 months) with no sign of osteoarthritis, a triple pelvic osteotomy (TPO) can be performed to reestablish joint stability and encourage normal joint development.
- For older dogs (over 10 months) with osteoarthritis that cannot be medically managed, or when a weight loss has not slowed the clinical symptoms, a femur head and neck surgery (FHO) or a total hip replacement (THR) are options. THR is noted for its good immediate and long-term functionality; however, it comes with a substantial price tag.

There is a procedure available for puppies younger than 20 weeks to stop the growth of the pubis in order to increase the angle of hip socket coverage over the femur head, called juvenile pubic symphysiodesis (JPS). Puppies who may have palpable and radiographic laxity without any lameness may be candidates for this procedure. However, ACVS (2008) recommends a conservative treatment for young dogs because 75% of young dogs treated conservatively return to acceptable clinical leg function with maturity while 25% require further medical or surgical

management at a later point. A surgery to sever the pain synapses is one option. An experimental stem-cell therapy holds some promise. It involves injecting the stem cells harvested from the dog's own fatty tissues in hope of regenerating the diseased area. According to a cross-sectional research study in the Journal of the American Veterinary Medical Association (2008), neutered males up to 4 years showed a higher prevalence of HD than the intact males, suggesting a possible protective effect of male hormone. There are also ongoing genome projects attempting to identify the HD genes. A promising model is a combination of a major HD gene component plus a polygenic component where the multiple genes act additively with an interaction with environmental factors. Identification of the specific genes is currently in progress. For some breeds, separate and different quantitative trait loci (QTLs) responsible for the right hip and for the left hip were identified, hinting at the complexity of HD.

Breeding Recommendations:

The principle for prevention/reduction in HD incidences is a careful selection of breeding stocks. Every dog being used in a breeding program should have its hips x-rayed prior to being bred. Dogs who have normal hips should be considered for breeding, and a dog with fair hips but with a good family history for hips and over 75% of its siblings being normal is a good prospect. However, a dog with excellent hips, but with a weak family history with less than 75% siblings with normal hips, is a poor breeding prospect. Dogs who produce dysplastic offspring are carriers for hip dysplasia, although they may have normal hips themselves. OFA recommends the following breeding principles and they emphasize the importance of evaluating the HD incidences in the breeding stock's family history, both in its depth (grandparents, great grandparents) and in its breadth (siblings, half siblings, lateral relatives). The environmental factors alone do not trigger HD, but they may interact with the existing genetic susceptibilities to HD (e.g., high caloric intakes, over supplementation in young dogs, and being raised on slippery floors).

OFA's recommended breeding principals include:

- Breed normals to normals.
- Breed normals with normal ancestry.
- Breed normals from litters (siblings) with a low incidence of HD.
- Select a sire that produces a low incidence of HD in his progeny.

Dr. Jerold Bell's breeding recommendations for polygenic diseases using HD as an example:
http://www.vin.com/proceedings/Proceedings.plx?CID=TUFTSBG2003&PID=5115&O=Generic

For more information regarding Hip Dysplasia:

PennHIP FAQ: http://www.pennhip.org/

OFA write-up on HD: http://www.offa.org/

OFA Overview dated 2006: http://www.offa.org/monograph2006web.pdf

ACVS write-up on HD dated 2008:

http://www.acvs.org/AnimalOwners/HealthConditions/SmallAnimalTopics/HipDysplasiainDogs/

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