**Cushings Disease & Insulin Resistance**

This is a very basic overview of these diseases. Please seek professional veterinary help if you suspect that your horse may have ECD or IR.

One other place where you can learn more about ECD and IR is located at the website:  
[http://pets.groups.yahoo.com/group/EquineCushings/](http://pets.groups.yahoo.com/group/EquineCushings/)

**What are Cushing's Disease (ECD) and Insulin Resistance (IR)?**

ECD is a disease that affects the pituitary gland. It is often caused by a tumor in the pituitary gland, but not always. The main sign of ECD is the increase of Cortisol in the blood. The production of Cortisol is produced in the adrenal gland. Why does the body begin to overproduce Cortisol? Cortisol is a hormone that is commonly produced by the adrenal gland during times of stress (otherwise known as excitement, fear, pain, trauma, exercise, and transport, to name a few). In the case of ECD, there is an abnormally high level of Cortisol in the body. It is typically caused by the over production of ACTH, a hormone produced by the pituitary gland. Why is this a concern? High levels of cortisol are a concern because they can impair the immune system functions, cause resistance to insulin, impair the ability to use protein in the body, and cause electrolyte abnormalities.

There is also a condition in conjunction with ECD called precushings. This is where a horse may have some of the symptoms of ECD, but ECD cannot be confirmed with testing.

IR is similar to type 2 diabetes in people. It is a condition where the cells in the body cannot respond to insulin the way they should. Insulin is a hormone produced in the pancreas that allows the body to take in glucose from dietary carbohydrates and proteins (amino acids). This is necessary to manufacture enzymes, cell structures, and muscle. When glucose and proteins are not taken in correctly, the body produces more insulin than normal to try to correct the situation. IR can be seen with ECD, but it can also be seen in conjunction with hypothyroidism.

**What is the difference between ECD and IR?**

The difference in ECD and IR can be found when you look at the bloodwork that your vet will take when your horse is diagnosed. You must look at the ACTH, serum insulin, and glucose. Remember, IR can be present without ECD and vice versa.

In an ECD horse there is an elevated ACTH level in the blood. If the ACTH level remains high for too long, it results in an elevated level of Cortisol. This cortisol is what causes IR in horses with ECD. Cortisol causes the insulin to not work quite right.

In IR without ECD, we find that the insulin is elevated while the ACTH level is in the normal range. The high levels of insulin in the body cause chemical and vascular changes in the body which can lead to laminitis.

**What are the symptoms of ECD and IR?**

**ECD Symptoms:**
1. Abnormal hair coat (longer than normal, often curly) that does not shed out normally in the spring.
2. Mammary enlargement and/or milk production in some mares
3. Fatty sheath and/or heavy sheath secretions in some geldings
4. Any or all of the symptoms listed below for insulin resistance and/or hypothyroidism

**IR Symptoms:**
1. Easy weight gain
2. Abnormal fat deposits such as a cresty neck or lumpy, cellulite-like fat at the tail base. These fat
deposits will usually persist even if the horse loses weight elsewhere on his body
3. Puffiness (fat) in the hollows above the eyes
4. History of laminitis – commonly induced by grass
5. Advanced symptoms include increased thirst and urination, loss of body condition, especially muscle, weakness, low energy levels

**Symptoms of Hypothyroidism:**
1. symptoms are VERY nonspecific and many overlap considerably with those of insulin resistance.
2. Slow shedding/longer than normal coat may be seen.
3. Energy levels poor, exercise tolerance poor.
4. Horse may be irritable and sensitive to touch.
5. Cannot be diagnosed with any certainty by symptoms alone. Need to do blood tests.

**Symptoms of Laminitis:**
These vary greatly depending on the severity of the laminitis. From least severe to most they include:
1. Less spontaneous activity
2. Less spontaneous trotting/cantering
3. “Depression”
4. Reluctance to turn (puts more weight on one foot)
5. Reluctance to move forward when lead
6. Lying down more than normal (when pain severe, stay down most of the time)
7. Standing with the front feet further in front of the body than normal and the hind feet further under the body than normal
8. Stiffness in the shoulder muscles
9. Buckling at the knee
10. Refusal to move
11. Hind end muscles tightly bunched up (shifting most of their weight to the hindquarters)

**Examination of the feet may show (usually worst in front feet):**
1. Feet feel warmer/hotter than usual
2. Pulses in the arteries running over the sesamoid bones at the back of the ankle are very strong and pounding
3. Puffiness or redness at the coronary band
4. Pain on sole pressure about ¼ to ½ inch in front of the point of the frog
5. A bruised appearance to the sole
6. Red or black discoloration of the white line
7. Widening of the white line
8. Appearance of rings on the feet that are close together at the toe but get progressively wider over the quarters and heels

**How can ECD and IR be diagnosed?**
There are several ways that ECD and IR can be diagnosed. All of them are tests done by your vet.

1. **Blood ACTH:** This is the test that is typically used to diagnose ECD. Remember the ACTH level can be elevated due to stress, but not nearly as high as the levels of ACTH in a horse with ECD.
2. **Cortisol Rhythm Test:** This is a screening test for ECD. Unfortunately this test can show false positives and false negatives. The rate of false positives is approximately 35%. This test involves sampling the blood twice in one day. Once in the am and once in the pm.
3. **Dexamethasone Suppression Test:** This is another type of screening test. It involves the injection of drug dexamethasone into the horse. There will then be a collection of blood samples in either an 8 or 12 hour period. This test can potentially increase the risk of causing or worsening laminitis. There is a potential for false positives and negatives, but this test is felt to diagnostic by some veterinarians.
4. TRH Stimulation Test: This test involves the injection of TRH into a horse. The TRH causes a spike in cortisol in a horse with a pituitary tumor. Samples are drawn between 15 and 30 minutes after TRH is injected. This is probably highly diagnostic for ECD.

5. Combined TRH test and Desamethosone test: Involves both tests described above.

6. Urinary Cortisol Creatinine Ratio: This is a test of the cortisol levels in urine. This test is not 100% diagnostic, but it is highly suggestive because it is more accurate than blood cortisol levels in determining increased production of cortisol.

7. Blood Insulin Test: A test that shows the levels of insulin in the blood.

8. T4 and T3 Test: These tests measure the function of the Thyroid.

9. Chemistry Screen: This screening checks for organ function, dehydration, blood sugar, and electrolyte abnormalities. This test should be used in conjunction with testing for blood cholesterol and triglyceride levels for ECD and IR horses.

Care and Management of ECD and IR can be easy. If your horse has ECD, he or she may need a prescription medication, but it may also be controlled by an herbal supplement, depending on the severity of the ECD. You need to determine the right diet for your horse and be able to balance it properly. If you plan to feed hay from a local distributor, you will need to have each bale of hay analyzed to determine the NCS (nonstructural carbohydrate level- this is primarily the sugars in the hay.) You will want to use grass hay only with Timothy or Timothy mixed with Orchard grass being your best choice. You may also choose to add beet pulp that does not have molasses to the hay. This is in replacement of all grain!

You will also want to examine the minerals in your hay to determine what supplements that it needs added to be balanced. One supplement that can help tremendously is Chasteberry. It comes either in powder form or berry form (the berry form will need to be ground.) for more information on feeding a horse with ECD or IR, please see the website http://pets.groups.yahoo.com/group/EquineCushings/. On this website you can find an emergency diet for a horse with ECD or IR as well as information on feeds, information on distributors in your area, a glossary of abbreviations and terms, and most importantly you will be able to get advice from one of the leading authorities on ECD and IR, Dr. Eleanor Kellon, DMV. Please join the list and take a moment to read through all the starting files, fill out a Case history for your horse, and then post to the group for information and support as you begin the process to help your horse live and flourish despite one of these diseases.

If you have a horse diagnosed with ECD or IR and have trouble finding a feed store in your area that is willing to carry the products that you need for your horse, feel free to email me and I will give you a copy of the letter that I am sending to my feed stores. This letter is my way to help educate the owners and buyers at the feed stores on ECD and IR. It gives them statistics on the numbers of horses that could possibly be diagnosed with ECD and IR (to show the amount of business they can gain by carrying the products needed), a list of products that can be used by horses with ECD and IR, a description of the diseases and their symptoms, and an understanding that these products do not need to be used solely by horses with ECD or IR, but also for horses that do not have these diseases, but could possibly be predisposed for these diseases. You cannot predict what horses get these diseases, but you can begin balancing a horse's diet early in an effort to limit the side effects of these diseases.

Examples of products that might be used for horses with ECD and IR (please be sure to check labelling for the NSC level and the guaranteed analysis):

Ontario Dehy Timothy Balanced Hay Cubes
Beet Pulp without Molasses
Chasteberry Pwder or Berries
Blue Seal Hunter
Blue Seal Carb Guard
Poullin Carb Safe Complete
Sterett Low NSC Pellets (aka Mid Valley Milling)
Buckeye Safe and Easy
Brandi Qualset - 2007