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Development of an assay to measure cortisol using a standard glucose meter

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When an animal is stressed many changes occur, such as altered behavior and reduced resistance to disease, and these effect population performance (Millspaugh 2004). Cortisol is a stress hormone produced by the adrenal glands to regulate cardiovascular function, and energy utilization. Clinicians and wildlife biologists monitor cortisol levels in animals to determine their stress levels . Current tests must be done in a research lab; I want to develop a test that can be used at home or in the field. Four methods were compared: a glucose meter, FOX (ferric-xylene orange complex) assay, o-dianisidine assay, and a lanthanide-based luminescent sensing probe, all of which detect H₂O₂, which is produced by glucose oxidase. The glucose oxidase will be used as a label for cortisol in an immunoassay. I assessed the sensitivity of the four methods. O-dianisidine assay detected 2.5 μ M H₂O₂, lanthanide detected 5 μ M H₂O₂, FOX detected 25 μ M H₂O₂, the glucose meter detected 500 μ M H₂O₂. I have found that the OneTouch Sure Step® glucose meter detects H₂O₂ in the absence of glucose. The optimal method for field/home testing has to have great sensitivity and also be easy to quantitate. Even though the meter had the lowest sensitivity, it is the most convenient and inexpensive approach for quantitation. We are using modeling and other approaches to develop the best method(s) for cortisol measurement that will not only aid conservation biology, but it can also be used to monitor patient hormonal levels for treatment of endocrine disorders including Cushing's syndrome.

