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ARBOR ASSAYS™
Interactive Assay Solutions™

MULTI SPECIES
MOST SENSITIVE

DetectX®

Cortisone
Enzyme Immunoassay Kit

1 Plate Kit Catalog Number K017-H1
5 Plate Kit Catalog Number K017-H5

Species Independent

Sample Types Validated:

Dried Fecal Extracts, Urine, Saliva, Plasma, and Serum

Please read this insert completely prior to using the product.
For research use only. Not for use in diagnostic procedures.

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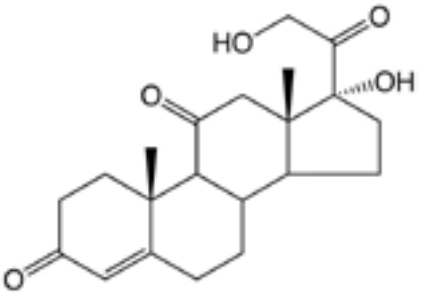
BACKGROUND

Cortisone ($C_{21}H_{28}O_5$, Kendall's Compound 'E') was identified by Mason, Myers and Kendall in 1936 as Compound E extracted from bovine suprarenal gland tissue that had the qualitative but not quantitative activity of cortin. The presence of multiple cortin-like compounds led the authors to speculate that the study of Compound E would reveal the nature of cortin[1]. Compound E is now called cortisone and the more active Compound F, cortisol, and the concentrations of these two glucocorticoids vary due to the activity of two 11β-hydroxysteroid dehydrogenases (11β-HSD)[2,3]. While most tissues have the ability to express either enzyme, 11β-HSD1 is found primarily in the liver where it converts cortisone to cortisol while 11β-HSD2 is found in tissues such as the kidney where cortisol receptor binding is required. 11β-HSD2 deactivates cortisol to cortisone, prohibiting receptor activation. This glucocorticoid "shuttle" helps to initiate and regulate the anti-inflammatory response, making cortisone one of the modern "wonder drugs". Monitoring the ratio of cortisone:cortisol has applications in diabetes, obesity, metabolic syndrome, osteoporosis, and chronic fatigue syndrome in addition to adrenal diseases[4-7]. Cortisone and cortisol concentrations exhibit a predictable diurnal pattern and can be measured in extracted dried feces, or in serum, plasma, saliva and urine. A 2010 publication[8] has suggested that salivary cortisone is a good surrogate marker for serum cortisol.



1. Mason, HL, et al., "Chemical Studies of the Suprarenal Cortex: II. The Identification of a Substance Which Possess the Qualitative Action of Cortin; Its Conversion into a Diketone Closely Related to Androstenedione" J. Biol. Chem., 1936 116:267-276.
2. Mason, HL, et. al., "Chemical Studies of the Suprarenal Cortex: IV. Structures of Compounds C, D, E, F, and G" J. Biol. Chem., 1938 124:459-474.
3. Hillier, SG. "Diamonds are Forever: the Cortisone Legacy" J. Endo., 2007 195:1-6.
4. van Raalte, DH, et al., "Novel Insights into Glucocorticoid-mediated Diabetogenic Effects: Towards Expansion of Therapeutic Options?" Eur. J. Clin. Invest. 2009 39(2):81-93.
5. Pierotti, S, et al., "Pre-receptorial Regulation of Steroid Hormones in Bond Cells: Insights on Glucocorticoid-induced Osteoporosis" J. Steroid Biochem. Mol. Biol. 2008 108(3-5):292-9.
6. Hadoke, PWF, et al., "Therapeutic Manipulation of Glucocorticoid Metabolism in Cardiovascular Disease" Br. J. Pharmacol. 2009 156:689-712.
7. Jerkes, WK, et al., "Diurnal Excretion of Urinary Cortisol, Cortisone, and Cortisol Metabolites in Chromic Fatigue Syndrome" J. Psychosomatic Res. 2006 60:145-153.
8. Perogamvros, I, et al., "Salivary Cortisone is a Potential Biomarker for Serum Free Cortisol" J Clin. Endocrin. Metab. 2010 August 4 (Epub ahead of print).

ASSAY PRINCIPLE

The DetectX® Cortisone Enzyme Immunoassay Kit is designed to quantitatively measure cortisone present in extracted dried fecal samples, urine, saliva, plasma, and serum samples. Please read the complete kit insert before performing this assay. This kit measures total cortisone in serum and plasma and in extracted fecal samples. A cortisone standard is provided to generate a standard curve for the assay and all samples should be read off the standard curve. Standards or diluted samples are pipetted into a clear microtiter plate coated with an antibody to capture rabbit antibodies. A cortisone-peroxidase conjugate is added to the standards and samples in the wells. The binding reaction is initiated by the addition of a polyclonal antibody to cortisone to each well. After a two hour incubation the plate is washed and TMB substrate is added. The substrate reacts with the bound cortisone-peroxidase conjugate to produce a colored product. After a short incubation, the reaction is stopped and the intensity of the generated color is detected in a microtiter plate reader capable of measuring 450 nm wavelength. The concentration of the cortisone in the sample is calculated, after making suitable correction for the dilution of the sample, using software available with most plate readers.

RELATED PRODUCTS

Kits	Catalog No.
Corticosterone Chemiluminescent ELISA Kits	K014-C1/C5
Corticosterone ELISA Kits	K014-H1/H5
Cortisol ELISA Kits (Strip Wells)	K003-H1/H5
Cortisol ELISA Kits (Whole Plate)	K003-H1W/H5W
Cortisone Chemiluminescent ELISA Kits	K017-C1/C5

SUPPLIED COMPONENTS

Coated Clear 96 Well Plates
A clear plastic microtiter plate(s) with break-apart strips coated with goat anti-rabbit IgG.

Kit K017-H1 **or** -H5	1 **or** 5 Each	Catalog Number X016-1EA

Cortisone Standard
Cortisone at 1,000 ng/mL in a special stabilizing solution.

Kit K017-H1 **or** -H5	125 µL **or** 625 µL	Catalog Number C054-125UL **or** -625UL

DetectX® Cortisone Antibody
A rabbit polyclonal antibody specific for cortisone.

Kit K017-H1 **or** -H5	3 mL **or** 13 mL	Catalog Number C206-3ML **or** -13ML

DetectX® Cortisone Conjugate
A cortisone-peroxidase conjugate in a special stabilizing solution.

Kit K017-H1 **or** -H5	3 mL **or** 13 mL	Catalog Number C207-3ML **or** -13ML

Assay Buffer Concentrate
A 5X concentrate that must be diluted with deionized or distilled water.

Kit K017-H1 **or** -H5	28 mL **or** 55 mL	Catalog Number X088-28ML **or** -55ML

Dissociation Reagent

Kit K017-H1 **or** -H5	1 mL **or** 5 mL	Catalog Number X058-1ML **or** -5ML

NOTE: Dissociation Reagent is to be used only with Serum and Plasma samples.

Wash Buffer Concentrate
A 20X concentrate that must be diluted with deionized or distilled water.

Kit K017-H1 **or** -H5	30 mL **or** 125 mL	Catalog Number X007-30ML **or** -125ML

TMB Substrate

Kit K054-H1 **or** -H5	11 mL **or** 55 mL	Catalog Number X019-11ML **or** -55ML

Stop Solution
A 1M solution of hydrochloric acid. **CAUSTIC**.

Kit K054-H1 **or** -H5	5 mL **or** 25 mL	Catalog Number X020-5ML **or** -25ML

Plate Sealer

Kit K017-H1 **or** -H5	1 **or** 5 Each	Catalog Number X002-1EA

STORAGE INSTRUCTIONS

All components of this kit should be stored at 4°C until the expiration date of the kit.

OTHER MATERIALS REQUIRED

Distilled or deionized water.

Colorimetric 96 well microplate reader capable of reading optical density at 450 nm.

Ethanol or methanol for extraction of dried fecal samples.

Software for converting raw relative optical density readings from the plate reader and carrying out four parameter logistic curve (4PLC) fitting. Contact your plate reader manufacturer for details.

PRECAUTIONS

As with all such products, this kit should only be used by qualified personnel who have had laboratory safety instruction. The complete insert should be read and understood before attempting to use the product.

The antibody coated plate must be stored desiccated. The silica gel pack included in the foil ziploc bag will keep the plate dry. The silica gel pack will turn from blue to pink if the ziploc has not been closed properly.

This kit utilizes a peroxidase-based readout system. Buffers, including other manufacturers' Wash Buffers, containing sodium azide will inhibit color production from the enzyme. Make sure **all** buffers used for samples are **azide free**. Ensure that any plate washing system is rinsed well with deionized water prior to using the supplied Wash Buffer as prepared on Page 8.

The Stop Solution is acid. The solution should not come in contact with skin or eyes. Take appropriate precautions when handling this reagent.

SAMPLE TYPES

This assay has been validated for urine, saliva, plasma, and serum samples and cortisone is identical across all species. It has also been validated for dried fecal extract samples. Samples containing visible particulate should be centrifuged prior to using. Moderate to severely hemolyzed samples should not be used in this kit.

SAMPLE PREPARATION

Serum and plasma samples need to be treated with the supplied Dissociation Reagent. Addition of this reagent will yield the total sample cortisone concentration. **Dissociation Reagent is to be used only with Serum or Plasma samples.** Free cortisone can be measured in saliva and urine samples as directed below.

Dried Fecal Samples

Dried fecal samples must be extracted. Detailed extraction protocols are available online: www.ArborAssays.com/resources/#protocols. The ethanol concentration in the final Assay Buffer dilution added to the well should be < 2.5%.

Saliva Samples

Saliva samples should be collected in a Sarstedt Salivette® Saliva Collection Device or frozen and thawed, then centrifuged at 14,000 rpm for 15 minutes. The supernatant should be diluted ≥ 1:5 with the supplied Assay Buffer prior to running the assay. See our Saliva Sample Handling Instructions at www.ArborAssays.com/resources/#protocols.

Urine Samples

Urine samples must be diluted > 1:5 with the supplied Assay Buffer prior to running the assay. Due to the levels found in urine, dilutions may need to be > 1:100.

Serum and Plasma Samples

Allow the Dissociation Reagent (DR) to warm completely to **Room Temperature** before use. We suggest pipeting 5 µL of DR into 1 mL Eppendorf tubes. Add 5 µL of serum or plasma to the DR in the tube, vortex gently and incubate at room temperature for 5 minutes or longer. Dilute with 490 µL of supplied Assay Buffer. This 1:100 dilution can be diluted further with Assay Buffer. Final serum and plasma dilutions should be ≥ 1:100.

NOTE: Dissociation Reagent is to be used only with Serum and Plasma samples.

Tissue Culture Media

For measuring cortisone in tissue culture media (TCM), samples should be read off a standard curve generated in TCM. Samples may need to be diluted further in TCM. We have validated the assay using RPMI-1640.

Use all Samples within 2 Hours of preparation, or stored at ≤ -20°C until assaying.

REAGENT PREPARATION

Allow the kit reagents to come to room temperature for 30 minutes. Ensure that all samples have reached room temperature and have been diluted as appropriate prior to running them in the kit.

Assay Buffer

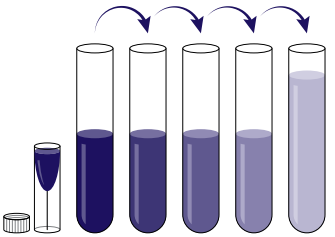
Dilute Assay Buffer Concentrate 1:5 by adding one part of the concentrate to four parts of deionized water. Once diluted this is stable at 4°C for 3 months.

Wash Buffer

Dilute Wash Buffer Concentrate 1:20 by adding one part of the concentrate to nineteen parts of deionized water. Once diluted this is stable at room temperature for 3 months.

Standard Preparation

Label test tubes as #1 through #6. Pipet 450 µL of Assay Buffer into tube #1 and 300 µL into tubes #2 to #6. Carefully add 50 µL of the cortisone stock solution to tube #1 and vortex completely. Take 100 µL of the cortisone solution in tube #1 and add it to tube #2 and vortex completely. Repeat the serial dilutions for tubes #3 through #6. The concentration of cortisone in tubes 1 through 6 will be 100,000, 25,000, 6,250, 1,562.5, 390.6, and 97.66 pg/mL.



Use all Standards within 2 hours of preparation.

	Std 1	Std 2	Std 3	Std 4	Std 5	Std 6
Assay Buffer (µL)	**450**	300	300	300	300	300
Addition	Stock	Std 1	Std 2	Std 3	Std 4	Std 5
Vol of Addition (µL)	**50**	100	100	100	100	100
Final Conc (pg/mL)	100,000	25,000	6,250	1,562.5	390.6	97.66

ASSAY PROTOCOL

We recommend that all standards and samples be run in duplicate to allow the end user to accurately determine cortisone concentrations.

1. Use the plate layout sheet on the back page to aid in proper sample and standard identification. Determine the number of wells to be used and return unused wells to the foil pouch with desiccant. Seal the ziploc plate bag and store at 4˚C.
2. Pipet 50 µL of samples or standards into wells in the plate.
3. Pipet 75 µL of Assay Buffer into the non-specific binding (NSB) wells.
4. Pipet 50 µL of Assay Buffer into the maximum binding (B0 or Zero standard) wells.
5. Add 25 µL of the DetectX® Cortisone Conjugate to each well using a repeater pipet.
6. Add 25 µL of the DetectX® Cortisone Antibody to each well, **except the NSB wells**, using a repeater pipet.
7. Gently tap the sides of the plate to ensure adequate mixing of the reagents. Cover the plate with the plate sealer and shake at room temperature for 2 hours. We recommend shaking at around 700–900 rpm. If the plate is not shaken, signals bound will be approximately 20% lower.
8. Aspirate the plate and wash each well 4 times with 300 µL wash buffer. Tap the plate dry on clean absorbent towels.
9. Add 100 µL of the TMB Substrate to each well, using a repeater pipet.
10. Incubate the plate at room temperature for 30 minutes without shaking.
11. Add 50 µL of the Stop Solution to each well, using a repeater pipet.
12. Read the optical density generated from each well in a plate reader capable of reading at 450 nm.
13. Use the plate reader's built-in 4PLC software capabilities to calculate cortisone concentration for each sample.

Watch our Data Reduction video at: www.ArborAssays.com/resources/#videos

NOTE: If you are using only part of a strip well plate, at the end of the assay throw away the used wells and retain the plate frame for use with the remaining unused wells.

CALCULATION OF RESULTS

Average the duplicate OD readings for each standard and sample. Create a standard curve by reducing the data using the 4PLC fitting routine on the plate reader, after subtracting the mean OD's for the NSB. The sample concentrations obtained, calculated from the %B/B0 curve, should be multiplied by the dilution factor to obtain neat sample values.

Or use the online tool from MyAssays to calculate the data:
www.myassays.com/arbor-assays-cortisone-enzyme-immunoassay-kit.assay

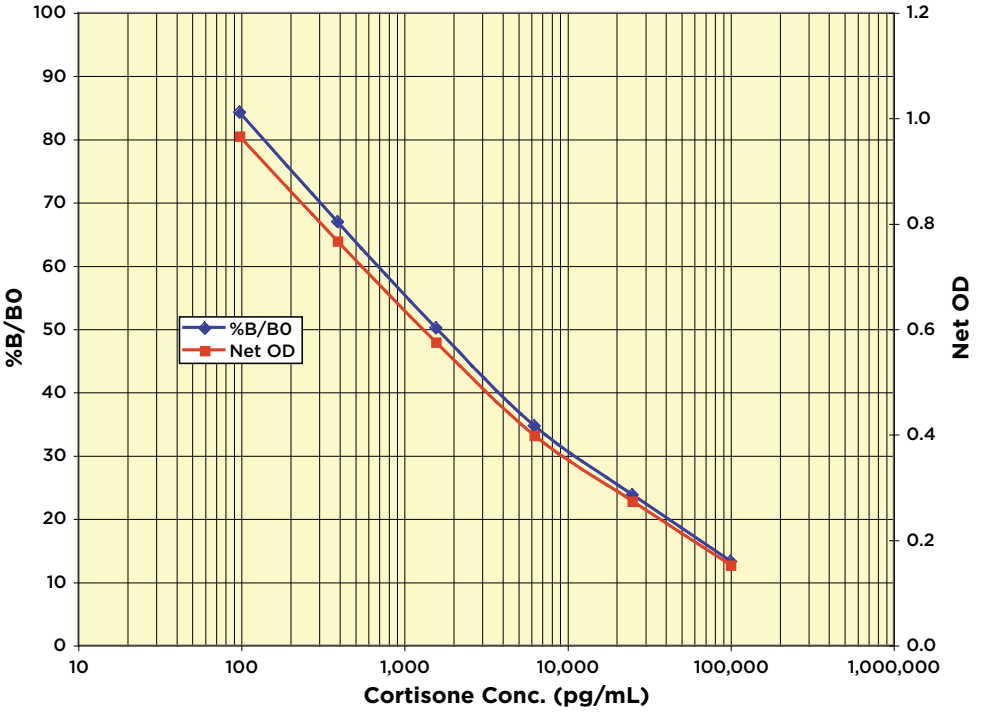
TYPICAL DATA

Sample	Mean OD	Net OD	% B/B0	Cortisone Conc. (pg/mL)
NSB	0.066	0		-
Standard 1	0.243	0.177	14.05	100,000
Standard 2	0.372	0.306	24.299	25,000
Standard 3	0.54	0.474	37.62	6,250
Standard 4	0.746	0.68	53.97	1,562.5
Standard 5	0.966	0.9	71.43	390.6
Standard 6	1.167	1.101	87.38	97.66
B0	1.326	1.26	100	0
Sample 1	0.479	0.413	32.81	9,959
Sample 2	0.677	0.611	49.35	2,095

Always run your own standard curve for calculation of results. Do not use this data.

Conversion Factor: 100 pg/mL of cortisone is equivalent to 277.6 pM.

Typical Standard Curves



Always run your own standard curves for calculation of results. Do not use this data.

VALIDATION DATA

Sensitivity and Limit of Detection

Sensitivity was calculated by comparing the OD's for twenty wells run for each of the B0 and standard #6. The detection limit was determined at two (2) standard deviations from the B0 along the standard curve. **Sensitivity was determined as 29.0 pg/mL.**

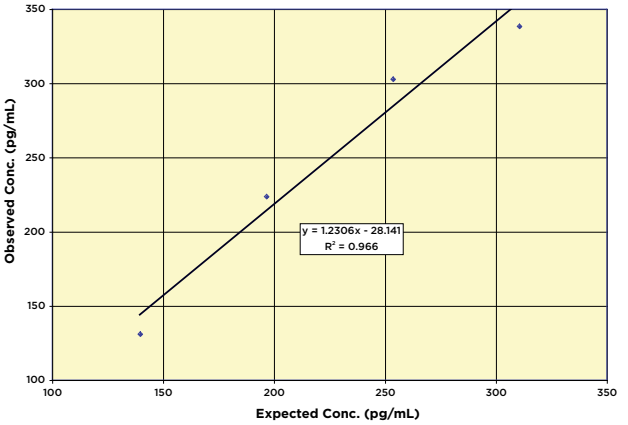
The Limit of Detection for the assay was determined in a similar manner by comparing the OD's for twenty runs for each of the zero standard and a low concentration human sample. **Limit of Detection was determined as 60.9 pg/mL.**

Linearity

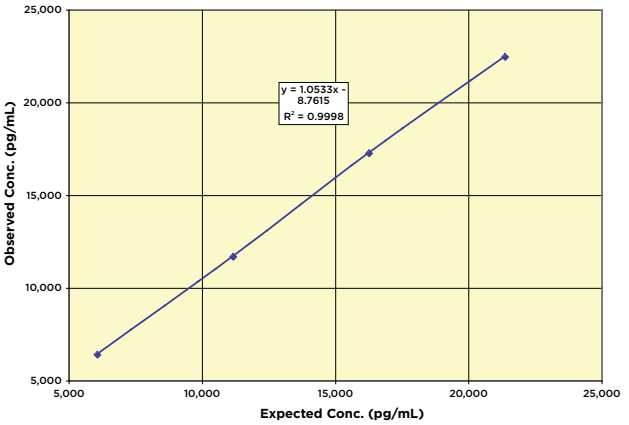
Linearity was determined in urine and serum samples diluted with Assay Buffer by mixing samples with high and low levels of cortisone in the ratios given below. The measured concentrations were compared to the expected values based on the ratios used.

High Sample	Low sample	Expected Conc. (pg/mL)		Observed Conc. (pg/mL)		% Recovery	
		Serum	Urine	Serum	Urine	Serum	Urine
80%	20%	310.7	21,373	338.3	22,447	108.9	105.0
60%	40%	253.7	16,274	302.8	17,263	119.4	106.1
40%	60%	196.7	11,175	223.7	11,676	113.8	104.5
20%	80%	139.7	6,075	130.9	6,405	93.7	105.4
				Mean Recovery		**108.9%**	**105.3%**

Serum Linearity



Urine Linearity



Intra Assay Precision

Three samples were diluted with Assay Buffer and run in replicates of 20 in an assay. The mean and precision of the calculated cortisone concentrations were:

Sample	Cortisone Conc. (pg/mL)	%CV
1	14,123	7.4
2	2,105	12.1
3	349.2	6.2

Inter Assay Precision

Three samples were diluted with Assay Buffer and run in duplicates in 19 assays run over multiple days by multiple operators. The mean and precision of the calculated cortisone concentrations were:

Sample	Cortisone Conc. (pg/mL)	%CV
1	12,165	12.7
2	1,976	10.2
3	366.1	12.9

SAMPLE VALUES

Eight human serum and six human plasma samples were tested in the assay. Neat sample values ranged from 18.5 to 62.2 ng/mL with an average of 38.6 ng/mL. Two normal human saliva samples were tested in the assay and read between 6.0 ng/mL and 12.8 ng/mL. Nine normal human urine samples were also tested. The samples read from 78.4 to 344.8 ng/mL with an average of 203.6 ng/mL.

Dried fecal samples were processed as described on page 7 and run in the assay. Cortisone values obtained ranged from 1.1 to 62 ng/100 mg dried fecal material. It has been shown that radiolabeled administered glucocorticoids are excreted in differing amounts in urine and feces[7] across species, with fecal excretion ranging from 7% of administered glucocorticoid in the pig to 82% in the cat[8-10]. Palme has also shown that the peak of fecal concentrations occur at 12 hours for sheep, but takes 48 hours to peak in pigs. It is necessary to evaluate the timing and relative fecal or urine excretion of glucocorticoids for each species.

9. Möstl, E., et al, Vet. Res. Commun. “Measurement of Cortisol Metabolites in Faeces or Ruminants.” 2002, 26:127-139.
10. Palme, R., et al, Animal Reprod. Sci., “Excretion of infused ^{14}C-steroid hormones via faeces and urine in domestic livestock.” 1996, 43:43-63.
11. Teskey-Gerstl, A., et al, J. Comp. Physiol. B, “Excretion of corticosteroids in urine and faeces of hares (Lepus europaeus).” 2000, 170: 163-168.
12. Schatz, S. and Palme, R., Vet. Res. Commun., Measurement of Faecal Cortisol Metabolites in Cats and Dogs: A Non-Invasive Method for Evaluating Adrenocortical Function.”, 2001, 25:271-287.

CROSS REACTIVITY

The following cross reactants were tested in the assay and calculated at the 50% binding point.

Steroid	Cross Reactivity (%)
Cortisone	100%
5α-Dihydrocortisone	31.7%
Prednisone	9.0%
5β-Dihydrocortisone	4.4%
11-Dehydrocorticosterone	0.62%
20α-Dihydrocortisone	0.26%
1α-Hydroxycorticosterone	< 0.1%
20β-Dihydrocortisone	< 0.1%
Corticosterone	< 0.1%
Cortisol	< 0.1%
Dexamethasone	< 0.1%
Estradiol	< 0.1%
Progesterone	< 0.1%

LIMITED WARRANTY

Arbor Assays warrants that at the time of shipment this product is free from defects in materials and workmanship. This warranty is in lieu of any other warranty expressed or implied, including but not limited to, any implied warranty of merchantability or fitness for a particular purpose.

We must be notified of any breach of this warranty within 48 hours of receipt of the product. No claim shall be honored if we are not notified within this time period, or if the product has been stored in any way other than outlined in this publication. The sole and exclusive remedy of the customer for any liability based upon this warranty is limited to the replacement of the product, or refund of the invoice price of the goods.

CONTACT INFORMATION

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OFFICIAL SUPPLIER TO ISWE

Arbor Assays and the International Society of Wildlife Endocrinology (ISWE) signed an exclusive agreement for Arbor Assays to supply ISWE members with assay kits and reagents for wildlife conservation research.

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ASSAYS™
FOR SERIOUS SCIENCE

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