An Emergency Room (ER) physician complains about a series of discrepant hCG results on an ER patient. To determine if a young (17 years old) patient is pregnant, a urine sample had been sent to the Chemistry laboratory for a Stat. qualitative hCG analysis. The results were reported as negative.

Convinced that this patient really is pregnant, the physician sends a serum sample to the laboratory almost five hours later for this patient for a Rule/out Ectopic panel (qualitative hCG, followed by, if necessary, quantitative hCG and progesterone analyses. The results of these analyses are: Qualitative hCG, positive; Quantitative hCG, 7051 mIU/mL. Really confused, the ER physician orders another urine sample to be sent for a repeat qualitative hCG test; the result for this sample is positive.

The ER physician calls the laboratory director and asks for some clarification of the discrepant results.

QUESTIONS

1. What steps do you think that the supervisor should take to resolve the problem?
2. What additional analyses can be quickly performed to determine the origin of the two urine samples?

Questions to consider

1. What methods are used for qualitative hCG assays?
2. Do the urine and serum qualitative hCG assays employ different techniques?
3. What are causes of false positive and false negative hCG results?

Answer:

1. The laboratory supervisor uses the following process to investigate the samples: 1)Retrieves all three samples and checks both the bar-coded and Addressograph labels to ensure that a positive identification can be made. All the labels correctly have the patient’s name. 2) Has all three analyses repeated. The repeat results agree with the original results. The supervisor and laboratory director believe that the basis for the discrepant results is a mislabeled sample. Since results from the serum sample and one of the urine samples agree, they believe that one of the urine samples is not from the patient and has been mislabeled. They take the sample to another laboratory to perform additional analyses.

2. One easy test to perform is a dipstick urinalysis (See Urinalysis methods in CD-ROM) on both samples and see if there are any obvious differences. In addition, one could analyze the samples for creatinine, protein, or any other common urine constituent.

The supervisor choses to perform a dipstick analysis. The significant results of the dipstick analyses are as follows:

Initial (negative for hCG) urine sample

Ketones: very large

Specific gravity: 1.030
pH: 5.0
Appearance: clear, yellow
Second (positive for hCG) urine sample
Ketones: negative
Specific gravity: 1.015
pH: 7.5
Appearance: moderately turbid, yellow

CONCLUSION: The two urine samples are chemically and visually quite different samples, most likely coming from two patients with very different problems. One must assume that the first urine sample is the incorrect, mislabeled one because (1) the second urine sample and the serum results agree and (2) it is unusual for the laboratory to mislabel several specimens from the same patient taken at different times. These results are communicated to the ER physician, who fully accepts the explanation.

Answers to Questions to Consider
1. Solid-phase ‘sandwich assays are universally employed for qualitative hCG assays, usually using an enzyme to develop the visual results. See methods for hCG in CD-ROM.
2. Modern qualitative hCG assays do not differ at all; usually the same kit, using the same technology, is used for both serum and urine sample types. See methods for hCG in CD-ROM.
3. Serum: False positive results may be seen in patients with compromised renal function; the hCG molecule and its degraded core fragments are filtered at the glomerulus and found in urine. Renal failure may result in these molecules being retained in blood.

Urine: A concentrated, morning sample will have approximately the same level of hCG as will serum. However, false negative results may be seen in dilute urine samples, and such samples are the most frequent cause of discrepant results between urine and serum samples taken at approximately the same time of the day. In fact, a negative urine result does not exclude a pregnancy with the same confidence as does a serum hCG result. In addition, postmenopausal women can excrete low quantities of hCG in urine.

Human anti-mouse antibodies (HAMAs) can cause false positive or false negative results in immunoassays, including the ones used for qualitative hCG analysis. See p 262 in textbook. See hCG methods in CD-ROM.