Advancing Excellence

Educational Exercise

Fetal Fibronectin Case Studies

Note: Fetal fibronectin cases are educational exercises. Participation is optional and responses to the questions below will not be graded and will not appear in the individual participant evaluations. The answers and a brief discussion will appear in the Participant Summary Report (PSR) for this survey.

This exercise is designed to test your knowledge of the pre-analytical factors that may compromise fetal fibronectin test results. It is suggested that participants refer to the fetal fibronectin kit manufacturer's instructions and their own laboratory procedures for information on test limitations.

The intended use of the fetal fibronectin assay is to detect fetal fibronectin in cervicovaginal fluid as part of an assessment of the risk for preterm delivery. A positive fetal fibronectin result is associated with an increased risk of preterm delivery. A number of pre-analytical specimen and/or patient factors may cause increased fetal fibronectin in the cervicovaginal fluid unrelated to imminent preterm delivery. The value of a given fetal fibronectin result may be significantly compromised if certain factors related to the specimen itself or to the patient's clinical status are present. The laboratory should be aware of these test limitations in order to inform clinicians about the appropriate utilization of this test.

The following are two case vignettes of obstetric patients who present as possible candidates for fetal fibronectin testing. For each case, determine whether or not there are any clinical or technical contraindications to fetal fibronectin testing.

Case 1: A 22 year old woman, with a 32 week pregnancy, arrives at the hospital with signs and symptoms of preterm labor. Speculum exam shows that the cervix has dilated to one centimeter.

Which of the following statements is correct?

010 ○ 311 Fetal fibronectin testing is inappropriate because patient presents too early in her pregnancy.

○ 312 Fetal fibronectin testing is inappropriate because patient presents too late in her pregnancy.

○ 313 Fetal fibronectin testing is contraindicated because cervix is dilated.

○ 314 There are no contraindications to fetal fibronectin testing in this patient.

Case 2: A 24 year old woman with no signs and symptoms of preterm labor presents at 20 weeks gestation for routine screening for risk of premature delivery.

Which of the following statements is correct?

020 ○ 311 Fetal fibronectin testing is inappropriate because patient presents too early in her pregnancy.

○ 312 Fetal fibronectin testing is inappropriate because patient presents too late in her pregnancy.

○ 313 Fetal fibronectin testing is contraindicated for assessment of the risk of preterm delivery in a woman who has no signs or symptoms of preterm labor.

○ 314 There are no contraindications to fetal fibronectin testing in this patient.

Educational Exercise

The intended use of the fetal fibronectin test is to assess risk of preterm delivery in women with signs and symptoms of preterm labor, who present at 24 weeks to 34 weeks and 6 days gestation (cervical dilatation less than 3 cm) or in asymptomatic women during routine obstetric visits, who are at 22 weeks to 30 weeks and 6 days gestation. Fetal fibronectin is normally elevated in cervicovaginal secretions during the first half of pregnancy. Therefore, a specimen collected during this time may show a positive result because the specimen was collected too early.

Note: There was an excellent response rate to this voluntary educational exercise by FF-A 2007 survey participants, with seventy-eight percent of the laboratories also submitting answers to the following questions.

Case 1: A 22-year-old woman, with a 32-week pregnancy, arrives at the hospital with signs and symptoms of preterm labor. Speculum exam shows that the cervix has dilated to one centimeter.

Which of the following statements is correct?

Result	Participants (887) No.	%
A. Fetal fibronectin testing is inappropriate because patient presents too early in her pregnancy.	2	0.2
B. Fetal fibronectin testing is inappropriate because patient presents too late in her pregnancy.	12	1.4
C. Fetal Fibronectin testing is contraindicated because cervix is dilated.	47	5.3
D. There are no contraindications to fetal fibronectin testing in this patient.	826	93.1

Correct statement is D.

Ninety-three percent of the respondents chose the correct answer. There are no contraindications to fetal fibronectin testing because the patient is at an appropriate gestational age and cervical dilatation was less than three centimeters.

Case 2: A 24-year-old woman with no signs and symptoms of preterm labor presents at 20 weeks gestation for routine screening for risk of premature delivery.

Which of the following statements is correct:

Result	Participants (886) No.	%
A. Fetal fibronectin testing is inappropriate because patient presents too early in her pregnancy.	675	76.2
B. Fetal fibronectin testing is inappropriate because patient presents too late in her pregnancy.	1	0.1
C. Fetal fibronectin testing is contraindicated for assessment of the risk of preterm delivery in a woman who has no signs or symptoms of preterm labor.	181	20.4
D. There are no contraindications to fetal fibronectin testing in this patient.	29	3.3

Correct statement is A.

Seventy-six percent of the respondents chose the best response which is that testing is inappropriate because patient presents too early in pregnancy. Another twenty percent of the respondents chose answer C which states that testing is contraindicated because the woman has no signs or symptoms of preterm labor. This is not the best answer because one of the indicated uses of this test is for assessment of the risk for preterm delivery in asymptomatic women who are at 22 weeks to 30 weeks and 6 days gestation. The primary reason fetal fibronectin testing is not appropriate for this patient is because she presents too early during her pregnancy (20 weeks gestation).

References

Product information for Rapid fFN Cassette Kit (REF 01200)
Adeza Biomedical Corporation.
1240 Elko Drive
Sunnyvale, CA 94089-2212
January 2004

Web site: www.adeza.com

Glynnis B. Ingall, MD, PhD
Special Chemistry Resource Committee

FF-B
(FF)
2007

Advancing Excellence

Results must be received at the CAP no later than midnight, Central Time by the due date below:

Educational Exercise: Fetal Fibronectin Case Studies

Note: Fetal fibronectin cases are educational exercises. Participation is optional and responses to the questions below will not be graded and will not appear in the individual participant evaluations. The answers and a brief discussion will appear in the Participant Summary Report (PSR) for this survey.

This exercise is designed to test your knowledge of the pre-analytical factors that may compromise fetal fibronectin test results. It is suggested that participants refer to the fetal fibronectin kit manufacturer's instructions and their own laboratory procedures for information on test limitations.

The intended use of the fetal fibronectin assay is to detect fetal fibronectin in cervicovaginal fluid as part of an assessment of the risk for preterm delivery. A positive fetal fibronectin result is associated with an increased risk of preterm delivery. A number of pre-analytical specimen and/or patient factors may cause increased fetal fibronectin in the cervicovaginal fluid unrelated to imminent preterm delivery. The value of a given fetal fibronectin result may be significantly compromised if certain factors related to the specimen itself or to the patient's clinical status are present. The laboratory should be aware of these test limitations in order to inform clinicians about the appropriate utilization of this test.

The following are two case vignettes of obstetric patients who present as possible candidates for fetal fibronectin testing. For each case, determine whether or not there are any clinical or technical contraindications to fetal fibronectin testing.

Case One:
A 27-year-old woman presents at 32 weeks gestation with signs and symptoms of preterm labor. A specimen was collected for fetal fibronectin testing to assess for risk of preterm delivery. Because the hospital pneumatic tube system was down, delivery of the specimen to the lab was delayed. It was determined that the specimen had sat at room temperature for 6 hours prior to testing.

Which of the following statements is correct?

010 ○ 312 Fetal fibronectin testing is inappropriate because patient presents too late in her pregnancy

○ 315 Fetal fibronectin testing should not be performed because the specimen needs to be tested within one hour of collection

○ 313 Fetal fibronectin testing is contraindicated because specimen needs to be refrigerated if testing cannot be performed within 2 hours of collection

○ 314 There are no contraindications to fetal fibronectin testing

Case Two:
A 40-year-old woman presents at 25 weeks gestation with signs and symptoms of preterm labor. After evaluation of the cervix by digital examination, a specimen of cervicovaginal fluid was collected for fetal fibronectin testing.

Which of the following statements is correct?

020 ○ 311 Fetal fibronectin testing is inappropriate because patient presents too early in pregnancy

○ 316 Fetal fibronectin testing is inappropriate because of advanced maternal age

○ 317 Fetal fibronectin testing is inappropriate because specimen was collected after digital examination of the cervix

○ 314 There are no contraindications to fetal fibronectin testing

Educational Exercise

The intended use of the fetal fibronectin assay is to detect fetal fibronectin in cervicovaginal fluid as part of an assessment of the risk for preterm delivery. A positive fetal fibronectin result is associated with an increased risk of preterm delivery. A number of pre-analytical specimen and/or patient factors may cause increased fetal fibronectin in the cervicovaginal fluid unrelated to imminent preterm delivery. The value of a given fetal fibronectin result may be significantly compromised if certain factors related to the specimen itself of to the patient's clinical status are present. The laboratory should be aware of these test limitations in order to inform clinicians about the appropriate utilization of this test.

Note: There was an excellent response rate to this voluntary educational exercise by FF-B 2007 survey participants, with eighty-one percent of the laboratories submitting answers to the following questions.

Case 1: A 27-year-old woman presents at 32 weeks gestation with signs and symptoms of preterm labor. A specimen was collected for fetal fibronectin testing to assess for risk of preterm delivery. Because the hospital pneumatic tube system was down, delivery of the specimen to the lab was delayed. It was determined that the specimen had sat at room temperature for 6 hours prior to testing.

Which of the following statements is correct?

Result	Participants (970) No.	%
A. Fetal fibronectin testing is inappropriate because patient presents too late in her pregnancy.	20	2.1
B. Fetal fibronectin testing should not be performed because the specimen needs to be tested within one hour of collection.	6	0.6
C. Fetal Fibronectin testing is contraindicated because specimen needs to be refrigerated if testing cannot be performed within 2 hours of collection.	53	5.5
D. There are no contraindications to fetal fibronectin testing.	891	91.9

Correct statement is D. About ninety-two percent of respondents chose the correct answer. There are no contraindications to fetal fibronectin testing in this case. According the test manufacturer's instructions, specimens for fetal fibronectin testing are stable for up to eight hours at room temperature. However, if specimens are not tested within eight hours, they should be refrigerated and assayed within three days of collection or frozen and tested after no longer than three months of frozen storage.

Case 2: A 40-year-old woman presents at 25 weeks gestation with signs and symptoms of preterm labor. After evaluation of the cervix by digital examination, a specimen of cervicovaginal fluid was collected for fetal fibronectin testing.

Which of the following statements is correct:

Result	Participants (972) No.	%
A. Fetal fibronectin testing is inappropriate because patient presents too early in her pregnancy.	4	0.4
B. Fetal fibronectin testing is inappropriate because of advanced maternal age.	1	0.1
C. Fetal fibronectin testing is inappropriate because specimen was collected after digital examination of cervix.	833	85.7
D. There are no contraindications to fetal fibronectin testing.	134	13.8

Correct statement is C. About eighty-six percent of the respondents chose the correct answer. A specimen for fetal fibronectin testing should be obtained prior to digital cervical examination because manipulation of the cervix prior to specimen collection may cause a false positive fetal fibronectin result.

References

Product information for Rapid fFN Cassette Kit (REF 01200)
Adeza Biomedical Corporation.
1240 Elko Drive
Sunnyvale, CA 94089-2212
January 2004

Web site: www.adeza.com

Glynnis B. Ingall, MD, PhD
Special Chemistry Resource Committee

Advancing Excellence

Results must be received at the CAP no later than midnight, central time by the due date below:

Educational Exercise – K-Kase Study

Note: K-Kases are educational exercises using CAP proficiency testing specimens to mimic real-life laboratory situations. Participation is optional and responses to the question below will not be graded. The answer and a brief discussion will appear in the Participant Summary Report (PSR) for this survey.

A 62-year-old man with a recent history of lower abdominal pain visits the emergency department. A physician diagnoses acute appendicitis and asks for a surgical consult. He is scheduled for surgery but the surgeon is concerned that the patient may need steroid coverage either during the procedure or in the post-operative period. The patient was treated several months ago for a flare-up of his chronic osteoarthritis with injection of corticosteroids into his right knee and several weeks of prednisone therapy (10 mg tapered to 5 mg per day). He has not taken any prednisone for at least six weeks.

A corticotropin (ACTH) stimulation test is performed. Review the results your laboratory obtained for cortisol for the 2007 K-A specimens. Assume that specimen K-02 is the patient's baseline and that specimen K-03 was drawn 30 minutes after intravenous injection of 250 mg of synthetic ACTH. Based on the results your laboratory obtained, what would be the best interpretation?

010
- ○ 30 The patient appears to have intact adrenal function.
- ○ 31 The patient appears to have suppressed adrenal function.
- ○ 32 The patient appears to have Cushing's Syndrome.
- ○ 33 The patient appears to still be taking steroids.
- ○ 34 The patient does not appear to have acute appendicitis.

"Stress Test": K-Kase for K-A (Educational Exercise)

We provided a clinical scenario resulting in an ACTH stimulation test and asked you to assume that specimen K-02 was the patient's baseline and that specimen K-03 was the 30-minute specimen. Assay for cortisol should have produced results in the range of 25-35 µg/dL for both.

Cortisol is an important response to stress and acute adrenal insufficiency is a medical emergency. Primary hypoadrenalism (Addison's disease) is rare but therapeutic use of synthetic corticosteroids is common; sudden cessation of exogenous corticosteroids may leave the adrenals unresponsive to the stimulatory effects of ACTH for some time. Although the patient in our case had stopped therapy six weeks prior to his visit to the ED with acute appendicitis, his physician's concern regarding his adrenal status is understandable.

Many experts would probably agree that our patient has intact adrenal function because both levels are greater than the commonly accepted cut-off of 19 µg/dL even though the increase after administration of ACTH may have been less than the recommended delta of 7 µg/dL. But these criteria were developed by testing relatively healthy individuals; there is discrepancy in the literature regarding ACTH stimulation tests in critically ill patients. This probably explains the lack of consensus among participants. Of the approximately 500 responses we received, the overwhelming majority was evenly split between "intact" and "suppressed" adrenal function.

By the way, we regret a printing error which turned the injection of "250 µg of synthetic ACTH" into "250 mg". There is on-going discussion questioning the use of 250 µg as "supra-pharmacological", possibly leading to inaccurate interpretations of how well the patient will respond to stress, and suggesting the use of 1 µg instead. If our suggestion of what would have to be considered a "super-duper-pharmacological" dose of ACTH confused you, we apologize.

Jim Faix MD
Special Chemistry Resource Committee

Read more about it! Cooper MS and Stewart PM: Corticosteroid insufficiency in acutely ill patients. *New Eng J Med 348*:728-734, 2003.

NOTE: *K-Kases are educational exercises using CAP proficiency testing specimens to mimic real-life laboratory situations. Participation is optional. Responses will not be graded and will not be included in the individual laboratory Evaluation. Please contact our Customer Contact Center at 1-800-323-4040, option #1 with your comments about this exciting addition to our Survey product.*

K-B (K/KK) 2007

Advancing Excellence

Results must be received at the CAP no later than midnight, Central Time by the due date below:

Educational Exercise – K-Kase Study

Note: Participation in the K-Kase Study is optional; responses will not be graded and no evaluation will appear in your individual report. The answer and a brief discussion will appear in the Summary Report for the 2007 K-B survey.

The laboratory receives a request for interpretation of thyroid function test results.

The patient is a 68-year-old woman with risk factors for cardiovascular disease and a six-year history of angina, culminating in crescendo angina and several hospital admissions for treatment of chest pain. Cardiac catheterization reveals severe three-vessel disease and coronary artery bypass grafting is performed. Her initial post-operative course is uncomplicated but during the second post-operative week, a few days after transfer to the floor, she is noted to have increasing anxiety and tremulousness with decreased concentration and attention. Psychiatry consultation suggests the possibility of hyperthyroidism and thyrotropin (TSH) is ordered.

Review the results your laboratory obtained for TSH for specimen K-07. If the medical team calls to confirm whether the result indicates hyperthyroidism, what would be the best response?

010
- ○ 35 The patient appears to have intact thyroid function.
- ○ 36 The patient appears to have hyperthyroidism.
- ○ 37 The patient appears to have hypothyroidism.
- ○ 38 The patient should have free T4 testing performed.
- ○ 39 The patient's TSH should be re-tested after discharge from hospital.

"Post-Op Course": K-Kase for K-B (Educational Exercise)
In the K-B mailing, we presented the following scenario and question related to specimen K-07:

The patient is a 68 year-old woman with risk factors for cardiovascular disease and a six-year history of angina, culminating in crescendo angina and several hospital admissions for treatment of chest pain. Cardiac catheterization reveals severe three vessel disease and coronary artery bypass grafting is performed. Her initial post-operative course is uncomplicated but during the second post-operative week, a few days after transfer to the floor, she is noted to have increasing anxiety and tremulousness with decreased concentration and attention. Psychiatry consultation suggests the possibility of hyperthyroidism and thyrotropin (TSH) is ordered. If the medical team calls to confirm whether the TSH result indicates hyperthyroidism, what would be the best response?

A. The patient appears to have intact thyroid function.
B. The patient appears to have hyperthyroidism.
C. The patient appears to have hypothyroidism.
D. The patient should have free T4 testing performed.
E. The patient's TSH should be re-tested after discharge from hospital.

Over 2000 laboratories reported TSH results for K-07 and the all-method mean was 0.07 mIU/L (or μIU/ml). This should be well below the lower limit for euthyroidism but does that mean that the patient is hyperthyroid?

The reciprocal relationship between TSH and free thyroxine (T4) is well-known and TSH is a more sensitive indicator of a thyroid disorder, especially early in disease progression. Even with normal levels of free T4, persistently elevated TSH probably indicates early hypothyroidism and persistently suppressed TSH probably indicates early hyperthyroidism. Most of these cases of subclinical or mild thyroid disease are identified in the out-patient setting, however. Although TSH continues to be a sensitive test for thyroid dysfunction, the specificity of an abnormal TSH result is reduced in hospitalized patients. This may be due to the use of drugs that affect thyroid function (or TSH release) as well as a syndrome called "non-thyroidal illness" in which severe systemic disorders alter the normal regulation of thyroid hormone production. TSH may be low early in this syndrome and may be transiently elevated as the syndrome resolves and the patient recovers. Some studies on the prevalence of thyroid disease in hospitalized patients have shown that almost 85% of such patients with abnormal thyroid function tests are, in fact, euthyroid.

Approximately 1300 laboratories responded to this educational exercise and the results were very diverse. A few thought that the correct response should be either that the patient had intact thyroid function (1.8%) or hypothyroidism (6.4%). Twenty-four point two percent believed that the patient could be characterized as hyperthyroid. A bare majority (50.8%) wanted to assay free T4 before making a decision and 16.8% of respondents chose to recommend re-testing after the patient had fully recovered.

This clinical scenario is a real one and the patient was, in fact, hyperthyroid; but there is no unequivocally "right" answer to our question. There is a sense in the literature that non-thyroidal illness does not suppress TSH to the near undetectable levels seen in hyperthyroidism, but not all laboratories can confidently report results in this range with good precision. Many experts would probably agree that free T4 testing should be done to confirm this diagnosis, but there is controversy regarding the performance of free T4 immunoassays in non-thyroidal illness. Perhaps monitoring the patient closely, but deferring

a definitive diagnostic work-up for thyroid disease until the acute systemic illness has resolved, is a reasonable approach.

Jim Faix MD
Special Chemistry Resource Committee

Read more about it! Attia J, Margetts P, Guyatt G: Diagnosis of thyroid disease in hospitalized patients: a systematic review. *Arch Intern Med 159*:658-665, 1999.

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Advancing Excellence

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Educational Exercise – K-Kase Study

Note: Participation in the K-Kase question is optional; responses will not be graded and no evaluation will appear in your individual report. The answer and a brief discussion will appear in the Summary Report for the 2007 K-C Survey.

The laboratory receives a request for interpretation of prostate-specific antigen (PSA) results.

The patient is a 56-year-old African-American man with no significant health problems whose father died of metastatic prostate cancer. He has been tested for PSA several times in the recent past. The last PSA level was one year ago and was reported as slightly elevated at 4.5 ng/ml (reference range: <4.0). His physician decided to repeat the test and, this time, also ordered "free PSA."

Review the results your laboratory obtained for total PSA and either complexed or free PSA for specimen K-20. If the physician asks how to interpret these results, what would be the best response?

010
- ○ 40 The patient probably has BPH (benign prostatic hyperplasia).
- ○ 41 The patient probably has prostatic carcinoma.
- ○ 42 The patient may have cancer and needs an ultrasound study.
- ○ 43 The patient may have cancer and needs biopsy.
- ○ 44 The patient should continue to be monitored for PSA, perhaps more frequently.

"Fathers & Sons": K-Kase for K-C (Educational Exercise)
In the K-C mailing, we presented the following scenario and question related to specimen K-20:

The laboratory receives a request for interpretation of prostate-specific antigen (PSA) results.

The patient is a 56 year-old African American man with no significant health problems whose father died of metastatic prostate cancer. He has been tested for PSA several times in the recent past. The last PSA level was one year ago and was reported as slightly elevated at 4.5 ng/ml (reference range: <4.0). His physician decided to repeat the test and, this time, also ordered "free PSA".

We asked you to review the results your laboratory obtained for total PSA and either complexed or free PSA for specimen K-20 and choose the best response if the physician asked how to interpret them.

A. The patient probably has BPH (benign prostatic hyperplasia).
B. The patient probably has prostatic carcinoma.
C. The patient may have cancer and needs an ultrasound study.
D. The patient may have cancer and needs biopsy.
E. The patient should continue to be monitored for PSA, perhaps more frequently.

Over 2000 laboratories reported total PSA results for K-20, but only slightly more than 500 reported results for either free or complexed PSA. Since 583 laboratories took part in the educational exercise, it's likely that most of these were laboratories performing the additional test. It is interesting that, despite having been available for several years, relatively few labs perform either free or complexed PSA.

Most of us are familiar with the rationale behind these assays. Because active PSA is quickly bound by protease inhibitors, most of the PSA in the blood is "complexed". Some PSA appears to be already inactivated when it is released into the blood. In BPH, this "free" fraction is increased, but patients with prostatic carcinoma have primarily complexed PSA. Reporting that the % complexed PSA is elevated (either by measuring it directly or, inversely, by measuring the % free PSA) can help physicians decide whether the risk of cancer is high enough to perform prostate biopsy, especially when the total PSA is in the "borderline" region of 4-10 ng/ml.

The patient in our case study has several risk factors for prostatic cancer: age, race and family history. So, it was certainly appropriate for his physician to test for total PSA. Because the most recent total PSA was "elevated" (>4 ng/ml), his physician repeated the test and also requested "free PSA". The results from the 583 laboratories that responded to this educational exercise were diverse, but the majority (51%) believed that the patient may have cancer and needs biopsy. It is likely, however, that most who chose this option (or the 2% who more definitively believed that the patient probably did have cancer) based their opinion on other factors than the % complexed PSA.

The overall mean for the total PSA reported for K-20 was 6.8 ng/ml; this represents a significant increase from the patients level of 4.5 ng/ml reported the year before. Although there is no consensus regarding what rate of increase represents increased risk of cancer rather than BPH, certainly a rise of more than 2 ng/ml in one year is very suspicious. In contrast, the complexed PSA was approximately 80% (i.e. the free PSA was approximately

20%). Last year, when we polled subscribers to the K survey, there was significant diversity in terms of the level of complexed (or free) PSA used to indicate increased risk of cancer (refer to the Participant Summary Report for K-C 2006). This result is probably suspicious for cancer, but not unequivocal.

A few (14%) thought that the correct response should be that the patient may have cancer and needs an ultrasound study; so-called "PSA density" may be helpful, but is probably not needed in this case. A significant number (27%) recommended continued monitoring, perhaps more frequently; this is probably too conservative, given the brisk "PSA velocity" already observed as well as the patient's other risk factors.

Ironically, this patient is likely to have prostate cancer (and need biopsy) regardless of the PSA (or free PSA) results, because of his significant risk factors! The chance of finding prostate cancer on biopsy no longer appears to correlate with PSA level. Several surveys have shown that positive biopsy rates (and cure rates) are now similar when the PSA is between 2-10 ng/ml. In 2004, the National Comprehensive Cancer Network recommended a lower cut-off (2.5 ng/ml) for all patients. So, this patient (whose father had metastatic prostate cancer) is probably long overdue for his biopsy.

James D. Faix, MD
Special Chemistry Resource Committee

Read more about it! Routh JC and Leibovich BC. Adenocarcinoma of the prostate: epidemiological trends, screening, diagnosis, and surgical management of localized disease. *Mayo Clin Proc 80*:899-907, 2005.

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TM-B (TM, TMX) 2007

Advancing Excellence

Results must be received at the CAP no later than midnight, Central Time by the due date below:

TM-Case

Note: Participation in the TM-Case question is optional. Your response will not be graded and no evaluation will appear in your individual report. The correct answer and a brief discussion will appear in the Participant Summary Report (PSR) for this mailing.

The laboratory receives a request for interpretation of CA 19-9 test results.

The patient is a 56-year-old male who has been diagnosed with pancreatic cancer. The tumor is 2 cm in size and can be treated by complete resection. A baseline sample for CA 19-9 is obtained. After total pancreatectomy, the patient does well and is seen at follow-up (one month after surgery).

Assume that TM-05 is the patient's baseline and that TM-06 is the specimen drawn during the one-month, post-operative visit. Based on the results your laboratory obtained, what would be the best interpretation?

010 ○ 1062 The tumor appears to have been completely resected.

○ 1063 There appears to still be residual tumor.

○ 1064 There appears to be metastatic disease.

○ 1065 There has been no significant change in CA 19-9 level but the patient needs to be followed.

○ 1066 There appears to have been a significant change in the CA 19-9 level but the patient needs to be followed.

TM Case Study

The laboratory receives a request for interpretation of CA 19-9 test results.

The patient is a 56-year-old male who has been diagnosed with pancreatic cancer. The tumor is 2 cm in size and can be treated by complete resection. A baseline sample for CA 19-9 is obtained. After total pancreatectomy, the patient does well and is seen at follow-up (one month after surgery).

Assume that TM-05 is the patient's baseline and that TM-06 is the specimen drawn during the one-month, post-operative visit. Based on the results your laboratory obtained, what would be the best interpretation?

Interpretation	Participants (205) No.	%
There appears to have been significant change in the CA 19-9 level but the patient needs to be followed	120	58.5
There appears to still be residual tumor	42	20.5
There has been no significant change in CA 19-9 level but the patient needs to be followed	26	12.7
There appears to be metastatic disease	17	8.3

Discussion

Correct statement is "There appears to have been a significant change in the CA 19-9 level but the patient needs to be followed".

CA 19-9 is used as an aid for monitoring response to therapy in pancreatic cancer. The question dealt with determining the clinical significance of the change in levels between the pre-operatively obtained specimen TM-05 and the post-operatively obtained specimen TM-06, which showed a decline of approximately 40%. If one considers a significant change to be at least 2.5 times the analytical coefficient of variation, this difference is too large to be due to analytical and/or biological variation alone.

The second specimen was taken one month post-operatively. This time point is too early to unequivocally differentiate between complete resection, residual tumor and metastatic disease. With complete resection, one would expect a persistent decline in levels to below or close to the reference range. Residual tumor or metastatic tumor would not result in a persistent decline in levels below the reference range.

For all these reasons "There appears to have been a significant change in the CA 19-9 level but the patient needs to be followed" seems to be the most suitable answer and, in fact, was chosen by the majority of respondents (58%).

Yashpal D. Agrawal, MD, PhD
Special Chemistry Resource Committee