

## Additional Scientific & Technical Details

### Description:

A screening for evidence of cancer in the bloodstream.

This test looks for the following cancer markers:

CEA : Primarily for colorectal cancer, but higher rates will be reported in the following carcinomas:

Pancreas (65-90% of the cases with very high rates)

Lungs (52-77%)

Breast(50%)

Stomach

Thyroid (high rates)

Female genital cancers (25-40%)

CA 15-3: CA 15-3 is the breast cancer marker.

High rates can also apply to other cancers : colon, stomach, kidney, lung, ovary, uterus, pancreas, and liver.

CA 19-9 : Initially found in patients with colorectal cancer, CA 19-9 has since been observed and used with pancreas cancer (high to very high rates), stomach cancer (high rates), and bile duct cancer.

CA 125 : CA 125 is the essential ovarian cancer marker.

High rates are also found in cancer of the endometrium and Fallopian tubes. It is also frequently used in small cells lung cancer, together with NSE.

CA 72-4 : Strong new clinical evidence has recently emphasized the clinical value of the CA 72-4 serum tumor marker assay in diagnosis and monitoring of gastric cancer : CA 72-4 is THE stomach cancer tumor marker.

We use it, to be largely complete, with CEA and CA 19-9.

AFP : High rates of AFP strongly suggest presence of primitive liver cancer, or germinating cancer of the ovary or testicle.

BHCG : High rates of beta HCG can point to the presence of testicular cancer; and in varied degrees to cancer of ovary, liver, stomach, pancreas and lung.

Be aware that marijuana consumption leads to increased levels

B2M : B2M, the beta2microglobulin, is used as a tumor-marker in various illnesses of the haematopoietic system, mainly where B lymphs cells are concerned.

NSE : The main clinical interest of NSE is its marked increase in cases of small cells lung cancer.

It is also used in endocrine pancreas cancer. Also, NSE high levels are involved in neuroblastomas, a

smaller increase in medullar thyroid cancer, and a higher (but rarer) value in pheochromocytomas (showing yet malignancy).

CYFRA 21-1 : the “cytokeratin fragment” is the most stunning marker ever discovered. Among all forms of lung cancer (lung cancer presents many different forms), the Cyfra 21-1 delivers an appreciated sensitivity of 65%, and an exceptional specificity of 95%. Its value is closely tied to the stage : levels increase progressively from limited stages to disseminated ones.

Cyfra can also be used in uterine cancer, oesophagus cancer, bladder cancer.

### **Sensitivity of Test**

Sensitivity is defined as the number of patients who test positive in the presence of disease divided by the total number of patients who have disease. The sensitivity of PAULAs test is 59% when the specificity is set at 80%. For examples if there is a group of 1000 high-risk patients, about 2% or 20 will have lung cancer. Of that group, about 12 will test positive for PAULAs Test and about 200 of the patients without lung cancer will also test positive.

### **Specificity of Test**

Specificity is defined as the number of patients who test negative in the absence of disease divided by the total number of patients who do not have disease. The specificity of PAULAs Test is 80% when the sensitivity is 59%. For examples if there is a group of 1000 high-risk patients, about 98% or 980 will not have lung cancer. Of that group, about 780 will test negative for PAULAs Test and about 8 of the patients with lung cancer will also test negative.

### **Accuracy of Test**

Accuracy is proportion of true results (true positives and true negatives) in a population that has been tested. It is the sum of the true positives and true negatives divided by the sum of true positives, false positives, true negatives, and false negatives. When the sensitivity and specificity for PAULAs Test are set at 80% and 60% respectively and for a test population of 1000 high-risk patients , the accuracy is

$$12 + 784 / 12 + 8 + 784 + 196 =$$

$$796 / 1000 = 79.6\%$$

### **Positive Predictive Value**

Positive predictive value (PPV) is the power of a positive test to predict presence of disease and is the number of true positives divided by the sum of true positives plus false positives. Since lung cancer has such a low prevalence, the positive predictive value for PAULAs Test will be low. For PAULAs Test, if the specificity is set at 80% for a sensitivity of 59%, the positive predictive value is

$$12/12 + 200 = 5.7\%$$

### **Negative Predictive Value**

Negative predictive value (NPV) is the power of a negative test to predict absence of disease and is the number of true negatives divided by the sum of true negatives plus false negatives. Since lung cancer has such a low prevalence, the negative predictive value for PAULAs Test will be very high. For PAULAs Test, if the specificity is set at 80% for a sensitivity of 59%, the negative predictive value is

$$784/784 + 8 = 99\%$$

### **False Positives/False Negatives**

False positives are those patients who have a positive test in the absence of disease. When the specificity is set at 80%, the sensitivity is 59% for PAULAs Test, this means that out of 1000 high-risk patients, 20 will have lung cancer and 980 will not have lung cancer. With a specificity of 80%,  $980(0.8) = 784$  are true negatives and  $980 - 784 = 196$  are false positives.

False negatives are those patients who have a negative test in the presence of disease. When the specificity is set at 80%, the sensitivity is 59% for PAULAs Test, this means that out of 1000 high-risk patients, 980 will not have lung cancer and 20 will have lung cancer. With a sensitivity of 59%,  $20(0.59) = 12$  are true positives and  $20 - 12 = 8$  are false negatives.

### **Interference from benign and other inflammatory conditions**

The influence of these conditions on PAULAs Test have not been systematically examined. These conditions could potentially be a cause of false positives since the immune system is activated that could lead to cross reactivity to the autoantibody portion of the panel.

Menstruation

The influence of these conditions on PAULAs Test have not been f systematically examined. Since many high-risk patients with chronic lung disease and are treated with steroids that suppresses the immune system, as well as AIDS and immunosuppressive therapy for transplant patients could be potential causes of false negatives due to reduced production of cancer autoantibodies.