

Decoding Breast Cancer Virtual Lab Handbook



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In *precision medicine*, physicians consider an individual's specific genes, medical history, environment, and lifestyle. They use these factors – along with the specific characteristics of the patient's tumor – to balance various options for treatment and prevention of diseases, including breast cancer.

Adjuvant treatment is the administration of chemotherapy, hormonal therapy, other therapy, or a combination to prevent breast cancer from returning by eradicating microscopic cancer cells that may remain after the cancer has been removed. This state-of-the-art approach reduces the chances of over-treating or under-treating breast cancer by tailoring treatment to each patient's precise needs based on the characteristics of the tumor. In this Virtual Lab, you will learn about the tests doctors use to help them make precise recommendations around the treatment of breast cancer.

This Lab Handbook is a reference guide and a place to record your patient information, critical information about each test, your patient's test results, and your treatment recommendations. Be sure to consult the Lab Handbook as you complete the Decoding Breast Cancer Virtual Lab.



Virtual Lab Overview

Meet Your First Patient — Velma Belt

In the first half of this Virtual Lab, you will follow Velma Belt as she undergoes a series of tests to gather information about her breast cancer. You will learn about each test, including how, why, and when it is conducted, and discover how each test provides critical information to help physicians identify appropriate treatment options for each individual. As you explore each test, be sure to record important information about the test and the patient's results in this Lab Handbook.

In the second half of this Virtual Lab, you will apply your learning to two additional patients. Each patient has her own medical history. As you conduct the tests and gather information about your patients, be sure to take notes in the *Patient Record* (following the Overview). A *Testing and Treatment Options Organizer* has also been provided (following the Overview) to help you record and organize information from the Virtual Lab.

Mammogram

Mammography is a screening technique that can detect early signs of breast cancer. Review each patient's mammogram to determine if abnormalities are present. If an abnormality is present, identify its location and use a scale to get an idea of the abnormality's size as it compares to everyday objects.

Diagnosing Cancer

Not all abnormalities are cancerous. For each patient, you will conduct tests to diagnose cancer.

Biopsy

The *biopsy* is the first step in testing whether a breast abnormality shows the presence of cancer cells. The test helps the physician decide what additional tests are necessary, if any. The biopsy enables you to look at the patient's cells directly. For each patient, observe cells from a tissue sample to determine whether or not abnormal cells are present.

Surgery

Most women with breast cancer will undergo some kind of surgery to remove tissue from the area of concern. There are three main types of surgery to remove cancerous breast tissue.

- **Breast-conserving surgery: Only the part of the breast that contains cancerous tissue is removed.**
- **Mastectomy: The entire breast is removed.**

Lymph node evaluation will be done with either surgery. Surgery that conserves the breast is always the best approach unless there are factors indicating that mastectomy is required.

Pathology Report

A *pathology report* contains detailed information about the patient's diagnosis. Physicians use the information in the report to help them make decisions about the type of treatment that patients might receive. Review each patient's pathology report to gather additional important information.

Mammogram and Biopsy Quiz

Take a moment to check your understanding of the information you have learned about mammograms and biopsies.



Molecular Tissue Testing

Molecular testing is an important part of precision medicine. Molecular tests evaluate DNA, genes, or proteins in tumor tissue. Genes encode proteins and proteins dictate cell function. This lab is equipped to perform the following Molecular tests:

- **Estrogen Receptor Test**
- **HER2 FISH Test**
- **OncoType DX® Test**

Estrogen Receptor (ER) Test

The *Estrogen Receptor (ER) Test* determines if the cells from the breast tissue have protein receptors for estrogen. This test result will be reported either as positive or negative. If the test result is positive, the physician should recommend hormone blocking therapy. Decide whether or not ER testing is necessary. If so, conduct the test and record your patient's results.

HER2 FISH Test

The *HER2 FISH Test* is another test performed on all breast cancer. FISH stands for Fluorescence in Situ Hybridization. In the HER2 FISH Test, the pathologist uses breast tissue to detect the presence of extra copies of the HER2 gene. This test will be reported either as amplified or not amplified. If the HER2 FISH results come back as amplified, the physician should recommend HER2-targeted therapy. Because HER2-targeted therapy is only given along with chemotherapy, chemotherapy would also be a part of the treatment plan. Decide whether or not HER2 FISH testing is necessary. If so, conduct the test and record your patient's results.

OncoType DX® Test

If a patient has an ER positive tumor, HER2 is not amplified, and no lymph nodes are involved, an *OncoType DX® Test* is needed. The OncoType DX® Test gives information about how likely it is that the tumor will spread to other parts of the body. It also helps physicians determine whether patients with early-stage invasive breast cancer will benefit from chemotherapy. This approach aims to eliminate the side-effects and costs of unnecessary treatment.

Based on the expression of 21 selected genes, a recurrence score is generated and ranges from 0-100. The higher the recurrence score, the greater the chance that the breast cancer will come back and the more likely a patient will benefit from chemotherapy.

What the Score Means

- **Lower than 18:** Low risk of recurrence with hormone therapy. The risk of side effects from chemotherapy outweighs potential benefits to the patient.
- **Between 18 and 30:** Intermediate risk of recurrence with hormone therapy. Unknown whether benefits of chemotherapy outweigh risk of side effects.
- **Greater than 30:** High risk of recurrence with hormone therapy alone. Benefits of chemotherapy outweigh risk of side effects.

Decide whether or not OncoType DX® testing is necessary. If so, conduct the test and record your patient's results.

Recommend a Treatment Plan

Once your patient has undergone all recommended tests, review the test results to determine the optimal treatment plan for your patient. If necessary, refer to your notes in the *Testing and Treatment Options Organizer* for a reminder on the appropriate treatment.

Check Your Patient's Progress

Hopefully, your patient is on the road to recovery. Once you have recommended a treatment approach, you will learn about your patient's recovery progress. If your patient has had a recurrence of breast cancer, review your *Patient Record* and consult the *Testing and Treatment Options Organizer*.

Molecular Testing Quiz

Take a moment to check your understanding of the information you have learned about molecular tissue testing.



Dr. You: Meet Your Patient — Michele Johnson

Once you've completed your work with Velma Belt, apply your learning to your next patient, Michele Johnson. Make decisions about the tests Michele will take, review her results, and make recommendations for a treatment plan.

Dr. You: Meet Your Patient — Brittany Featherston

Once you've completed your work with Michele Johnson, apply your learning to your next patient, Brittany Featherston. Make decisions about the tests Brittany will take, review her results, and make recommendations for a treatment plan.

Testing and Treatment Options Organizer

	Conduct this test when...	
ER	HR2 FISH	OncoType DX®

Treatment	Recommend this treatment option when...
Hormone blocking therapy only	
Chemotherapy followed by hormone blocking therapy	
HER2-targeted therapy and chemotherapy	
Hormone therapy and possible chemotherapy	
Hormone blocking therapy, HER2-targeted therapy, and chemotherapy	

Patient Record #1: Velma Belt

Patient Age: _____

Patient Gender: _____

Medical Record Number: 01234

Mammography Notes

Biopsy Notes

Does your evaluation of the patient's tissue sample confirm the presence of cancer? YES/NO

Pathology Report	
Surgical procedure:	
Date of procedure:	
Specimen size:	
Laterality:	
Tumor size:	
Margins:	
Number of lymph nodes evaluated:	
Number of lymph nodes with cancer:	

ER Test Notes

HER2 FISH Test Notes

OncoType DX® Test Notes

Treatment Approach Notes

Patient Progress Notes:

Patient Record #2: Michele Johnson

Patient Age: _____

Patient Gender: _____

Medical Record Number: 05684

Mammography Notes

Biopsy Notes

Does your evaluation of the patient's tissue sample confirm the presence of cancer? YES/NO

Pathology Report	
Surgical procedure:	
Date of procedure:	
Specimen size:	
Laterality:	
Tumor size:	
Margins:	
Number of lymph nodes evaluated:	
Number of lymph nodes with cancer:	

ER Test Notes

HER2 FISH Test Notes

OncoType DX® Test Notes

Treatment Approach Notes

Patient Progress Notes:

Patient Record #3: Brittany Featherston

Patient Age: _____

Patient Gender: _____

Medical Record Number: 04523

Mammography Notes

Biopsy Notes

Does your evaluation of the patient's tissue sample confirm the presence of cancer? YES/NO

Pathology Report	
Surgical procedure:	
Date of procedure:	
Specimen size:	
Laterality:	
Tumor size:	
Margins:	
Number of lymph nodes evaluated:	
Number of lymph nodes with cancer:	

ER Test Notes

HER2 FISH Test Notes

OncoType DX® Test Notes

Treatment Approach Notes

Patient Progress Notes: