Are you well equipped to fight cancer and other diseases?

YOUR IMMUNE SYSTEM

**IMMUNE SYSTEM**: The immune system is a natural defense system (made up of tissues, cells, organs and molecules) within an organism that protects it against disease.

Your immune system works much the same way an army would, protecting you from foreign invaders trying to kill or damage your cells or organs. Your natural defense system fights pathogens such as bacteria, viruses and cancer cells to keep you healthy. Sometimes, these pathogens are small (e.g. a virus) and only require a few fighting cells (or soldiers) to kill them. Other times, pathogens are big (such as a tumour) and an entire squadron of soldiers is needed to kill them. When you have a strong immune system, or personal army, you are more likely to be well protected against infections, cancer and other diseases.

**PATHOGEN**: A pathogen is anything that causes a disease.

YOUR PERSONAL ARMY

Your personal army is made up of two types of soldiers: the soldiers of the *innate immune system* and those of the *adaptive immune system*. The soldiers in the innate system are your first line of defense and hold down the fort until the soldiers in the adaptive system are trained and ready to attack invaders.

**NATURAL KILLER (NK) CELLS**

The soldiers in your innate immune system include natural killer (NK) cells, a type of white blood cell or “lymphocyte.” These cells play a key role in your immune system as they are the first line of defense against dangerous foreign cells.

**The Innate Immune System**

The soldiers in the innate immune system are always on patrol. They guard the front line and recognize and kill dangerous foreign cells on sight (this is known as “immunosurveillance”).

» Found throughout your body
» No need for previous exposure to any pathogens
» Not specific about their targets
» React quickly to invaders

**The Adaptive Immune System**

The adaptive immune system is made up of soldiers that are trained to target very specific invaders; they are your “Special Forces.” Unlike the front-line soldiers that kill all pathogens on sight, these soldiers are trained to attack only specific pathogens. They help your body to recollect attackers so that it is better prepared to fight them in the future.

» Training and initial deployment takes time
» Must learn to recognize their targets
» Once trained, will never forget a target
» React quickly ensuing exposure to invaders

**Upon arrival, two things happen:**

1. An NK cell attaches to the foreign cell, causing a chain reaction that directly kills the foreign cell (this is called cytotoxicity – “cyto” for cell and “toxicity” for killing).
2. The NK cells work together to release a protein in the blood called cytokine (“cyto” for cell and “kine” for movement). The cytokines are messengers that call upon other cells in the immune system to help the NK cells kill the foreign cells (or help prevent tumour growth).
NK CELL FUNCTION

NK cell function, also called NK cell activity, indicates how well your body can defend itself against dangerous foreign cells. NK cell activity helps your doctor assess the strength of your immune system for fighting off infections or cancer cells.

NK cell activity has been shown to be affected in a number of conditions and diseases. For example, people who are highly stressed or who are not sleeping or eating well may have lower NK cell activity. In elderly patients, low NK cell activity has been associated with an increased risk of infections and other diseases.

Determining NK cell activity is just as important as performing other blood tests, such as a complete blood count.

Measuring NK cell activity does not tell your doctor if you have a disease or an illness; it does, however, help him or her decide what other types of tests you may need to have done.

NK CELL ACTIVITY AND CANCER

In the past few decades, many studies have demonstrated that NK cell activity is much lower in individuals with different types of cancers.

<table>
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<th>NK cell activity has been shown to be lower in patients with the following kinds of cancer:</th>
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<td>Breast</td>
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<td>Lung</td>
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<td>Ovarian</td>
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NK cell activity tends to be lower in healthy individuals whose parents, siblings or other family members have cancer. This reality suggests that low NK cell activity is an important risk factor for the development of a variety of cancers. This theory has been confirmed in a study that followed more than 3000 people for a span of 11 years, and in which low NK cell activity was used to predict the risk of cancer.

People with a genetic predisposition to low NK cell activity may be at higher risk for developing cancer.

Nevertheless, if your doctor finds that your NK cell activity is very low, this does not mean you have cancer. Rather, it may just signal that you are at higher risk for cancer or that you have an unrecognized infection. Your doctor will discuss your test results with you and decide (based on your family history, symptoms and risk factors) whether you should be retested or have additional tests.

Speak to your doctor to learn more about NK cell activity.

MEASURING NK CELL ACTIVITY

NK cell activity is measured with a simple and affordable blood test. At the blood collection centre or medical clinic, a nurse or technician collects 1 mL of blood for the test.

BENEFITS OF THE NK VUE DIAGNOSTIC TEST

NK Vue is the first test approved to measure NK cell activity. It is a simple and affordable blood test that requires only 1 mL of fresh blood. Once your blood sample has been properly prepared, it is sent to an approved lab, which will run the test and communicate the results to your physician, and to you if required.

Your doctor has prescribed an NK Vue diagnostic test to measure your NK cell activity and determine how well your immune system is equipped to fight cancer and other diseases.

Since NK Vue is a new test procedure, provincial healthcare programs do not yet cover it. If diagnostic tests are covered by your private insurance plan, however, then NK Vue might be covered for you.

Please check with your insurer to determine whether or not this test is covered under your private insurance plan.
NK VUE has been studied in clinical trials in Korea and Canada

NK CELL ACTIVITY AND COLORECTAL CANCER

The correlation between low NK cell activity (as measured by NK Vue) and the presence of colorectal cancer has been demonstrated in a published clinical trial. In a study of 41 patients with newly diagnosed colorectal cancer, researchers at Yonsei University College of Medicine in Korea discovered that the NK cell activity of patients in their study group was significantly lower than it was in the 41 healthy patients in the control group.¹

In Canada a study was conducted at Maisonneuve-Rosemont Hospital in Montreal, Quebec, Canada by Dr. Gilles Jobin and colleagues. 1047 successive subjects >40 years of age, who underwent colonoscopy, were recruited between October 2014 and January 2016. NK Vue a novel in vitro diagnostic device (IVDD), was used to measure NKA in these subjects. NKA was compared in subjects with cancer-negative colonoscopies to those with pathologically confirmed CRC. Briefly, in the 762 evaluable subjects, statistically significant differences were found between the NKA of patients positive for CRC (n=21), confirmed by colonoscopy and pathological verification, and that of patients negative for CRC (n=741) (CRC mean 344.2 pg/mL, CRC-negative mean 731.5 pg/mL, p=0.001; CRC median 87.0 pg/mL, CRC-negative median 294.8 pg/mL, p<0.001). At a cut-off of 200 pg/mL, sensitivity of the IVDD for the detection of CRC was 85.7%, with a specificity of 59.6%, with positive and negative predictive values of 5.7% and 99.3% respectively.²

NK CELL ACTIVITY AND PROSTATE CANCER

The correlation between low NK cell activity (as measured by NK Vue) and the presence of prostate cancer has also been demonstrated in a published clinical trial. In a study of 54 newly diagnosed, biopsy-confirmed prostate cancer patients, researchers at Yonsei University College of Medicine in Korea found that NK cell activity in these patients was significantly lower than it was in the 54 healthy individuals in the control group.³

References

TEST RESULTS

If your NK cell activity is low, your doctor may want to further investigate the reasons for this. He/she may recommend lifestyle changes such as diet, exercise, or smoking cessation to help improve your immune system.

If you are over the age of 50, your doctor will assess the possible reasons for your low NK cell activity and review your risk factors. He/she may also decide to order certain screening tests.

If you are a man:
» PSA test and/or digital rectal exam to look for prostate cancer

If you are a woman:
» Mammogram, and sometimes ultrasound, to look for breast cancer

For men and women
» Stool test and/or colonoscopy to look for colon cancer

Based on your test results, your doctor will determine whether further tests are required.

Not all patients want to follow their doctor’s advice when it comes to recommended screening tests: some patients are uncomfortable with the stool test, others are afraid of colonoscopies, while some women do not like mammograms.

It is important to keep in mind that knowing your NK cell activity helps your doctor to better understand your situation, therefore these tests are important.

It is recommended that you follow your doctor’s advice.

IMPROVING NK CELL ACTIVITY

Based on your NK cell activity results, your doctor may also recommend some lifestyle changes (i.e. weight loss, exercise, diet, smoking cessation), which could help improve your immune system and increase your ability to fight cancer and other diseases. Be sure to speak to your doctor about NK cell activity and what you can do to improve your immune system.

WHERE CAN I HAVE THIS TEST DONE?

If you have received a prescription for an NK Vue diagnostic test, please visit www.atgencanada.com, or call 1-855-561-4681, or write to info@atgenglobal.com. We will recommend a blood collection centre or a clinic able to collect your blood sample.
A DIAGNOSTIC TEST TO MEASURE NK CELL ACTIVITY