PHLburg Technologies, Inc.

1275 Drummers Lane
Suite 101
Wayne, PA 19087

Telephone: 610-688-6800
Fax: 610-975-5800
Website: phlburg.com

September, 2009

IN THIS ISSUE:

MESSAGE FROM NEIL B. GODICK

More on Russian demographics. According to the most recent UN National Human Development Report on Russia, males born in Russia in 2006 can only expect to live to 60 years; women born that same year can expect to live to 73 years. By comparison, the average Western European man can expect to live to 77, about 17 years longer than his Russian counterpart. The average Western European woman can expect to live to 82, about nine years longer than the average Russian woman.

Some researchers have blamed the crumbling of the Soviet health care system, increased smoking, changes in diet or a loss of jobs that raised stress levels for the mysterious rise in deaths. Many others pin the blame squarely on increased drinking.

As Russia's population continues to decline over the coming decades:

- At first this will threaten some regions.
- Then depopulation will envelope the country as a whole.

This trend has been in place since the late 1980s. Presently, even with immigration, the Russian Federation population is declining by almost a million people a year.

Its consequences are both more immediate and more widespread than many are willing to recognize. In her *The Social Consequences of the Depopulation of Russia* Olga Lebed of Moscow State University describes depopulations' consequences on Russia's society. In this article Professor Lebed lists what she says are the ten most important consequences of this depopulation trend.

We do not intend for these reports to solve any need our readers may have. We do intend to keep everyone current on technology developments in Russia. If you would like any additional information on any of the developments reported – send us a note.

Health Care - Burn care

A scientist group at the **Institute of Cytology** of the Russian Academy of Sciences headed by Dr. Yulia Shved has developed and patented a new material that replaces live skin to treat skin burns.

The human body's skin consists of several layers. One of the skin's

layers regenerates new skin cells. A patient's recovery is dangerous when this layer is damaged. If the injury is extensive, these burns require speedy skin replacement. Traditionally, a burn injury is dressed by placing an artificial film, an analogy to human epidermis. This is grown in ordinary collagen, a protein that exists in many animal tissues. The currently used films are very delicate and thin. As a result, the procedure for covering the wound with the currently used films is a tedious job.

Cytologists at the institute in St. Petersburg have developed an extraordinary film based on biologically compatible polymer, polylactide. The film is flexible, and its thickness is 20 micron. As the film is strong and does not break it is easy to apply. Its size varies from that of a box of matches to a sheet of paper. The film adheres softly to the wound without any pain and remains on the wound until healing is complete. There is no need for dressing the wound daily. The film does not grow turbid. This makes it possible to monitor growth and cell reproduction using a microscope. Another advantage for this film: the film dissolves in the wound without leaving toxic waste. The matrix on which the cells are grown will disappear and the cells continue to heal the wound. Another important property - the film is porous. This porosity helps the skin to breath and allows nourishing liquids to enter the body. All this sharply speeds up the wound's healing.

The film has been tested using laboratory animals. It has proved to be successful. The film will undergo clinical tests shortly.

Lymphoblastic leucosis treatment

Russian oncologists have developed a new method for treating infants with leukemia. Doctors at the **Centre for Infant Cancer and Hematology** in Yekaterinburg learned to cure lymphoblastic leucosis. This rare disease was considered incurable in the past. Now, children who suffer from leukemia have an opportunity to recover.

Larisa Fechina, Centre head, said medical specialists used the inexpensive and popular medicine, Provitamin-A or trans-retinoic acid for attacking the infants' cancer cells. Previously, this medicine was used to treat elders with cancer. This treatment has proved to be a successful scheme that combines traditional chemotherapy and All Trans-Retinoic Acid, ATRA.

The new method has cured 40 infant-patients. Other Russian cities, including St. Petersburg, Rostov-on-Don, and Arkhangelsk, successfully use this method to treat this leukemia. Clinics in Belarus also treat cancer patients using this method. Some German doctors are sending children with this diagnosis to Russia for treatment. Russia has honored the Centre's scientists by awarding them the prestigious Priznanie Prize.

Eye cancer treatment

Scientists from the **Department for Fundamental Medicine of Moscow State University** have developed and patented a method to remove cancer tumors from eyes. The method has been used in several Moscow clinics. Presently, photodynamic therapy plays a key role in treating cancers and this paves the way for destroying cancer cells selectively without damaging healthy ones. The cancer is destroyed where the laser is directed. After treatment the reproduction of normal cells starts filling the damaged area.

Photodynamic therapy is simple and harmless. It helps avoid unfavorable impact on the patient's immune system and chemotherapy's side effects.

The new method has been used to treat 19 patients. The patients' cancer grew on the retina's periphery. With this technology doctors could preserve the patient's eyesight. The photodynamic therapy could be used for patients of any age and even when they suffer from other diseases. The treatment is less expensive and more effective than traditional treatment.

Genetic testing

The Molecular Genetics Laboratory at the Sechenov Medical Academy in Moscow specializes in developing new kinds of biomarkers and tests. The character estimation of genetic alternation serves as the predictor for forecasting a cancer's growth speed. Compared to today's methods this method advances detection by 2 to 3 years.

Studying molecular and biological preconditions for cancer's onset is an urgent issue for both medical treatment and government's responsibility to its population. Cancer is now linked with unfavorable ecology and lifestyle and especially genetic predisposition. There is evidence that damaged DNA plays a key role in developing cancer. A principal factor is heredity forms:

- a large number of chromosome alternations being present,
- mutated genes, and
- several carcinogenic viruses capable of fitting into the DNA molecule and interacting with genes.

Some time ago, Russia started developing methods for cancer diagnosis using genetic tumor markers. The markers were used taking into consideration the accumulated knowledge of appearing neoplasms in the late 20th century.

Genes are sometimes damaged by inherited genetic mutation or during the patient's life. These genes are in damaged organs and in the blood plasma, phlegm and saliva. Consequently, it is possible to locate them without harming the body. The identification is capable in the illness' earliest stage. Tests carried out at the Sechenov Medical Academy help identify the cancer risk almost at inception.

Russian scientists have great hopes in the microchip "Dozorny". Dozorny was developed by experts at the Sechenov Medical Academy in a program to reveal pathologies at their earliest stage. A special glass plate or a specific platform is used. When specially processed DNA fragments are applied on it the platform identifies the pathology and emits light signals. There are several promising multi-purpose tumor markers among approximately 100 genes that may trigger cancer after suffering damage. They were used in developing a universal microchip. It carries 8 genes, "a group of guards" that establishes the appearance of illnesses in the prostate, lungs, lacteal gland, intestines and other organs. The DNA tests help understand the anti-cancer drugs' effect and simultaneously forecast side effects.

The Sechenov Medical Academy in Moscow molecular laboratory studies the genetic background of hereditary illnesses and develops effective methods for diagnosis and treatment.

Materials Science – extinguishing an oil fire

45 seconds is the time required to put out a fire at an oil facility using new technology developed by Russian scientists. The technology operates in an automatic mode. This new system is more efficient and has a lower cost than traditional methods for combating oil storage fires.

If an oil or gasoline fire is not eliminated within the first few minutes, an explosion is inevitable. The traditional extinguishing system using foam has a complicated design and, as a rule, fails if there is an explosion. The new technology is simple and reliable; its functionality is not impaired even by an explosion. The technology's principal novelty is its double-wall 50 m^3 vessel containing carbonic acid at 10 atm.

The developers claim that no prior system managed to retain gas in such great volume and at extreme temperatures. Carbonic acid develops a high pressure and can break a vessel. This problem was solved by protecting the contents from the environment with a thermal insulation system. Once ignition is measured by sensing transducers, the installation's control system is activated. The valves open and carbonic acid from the vessel, via pipelines, come to ring installations placed along the perimeter and is ejected onto the flame.

As carbon dioxide reaches the flames, it displaces the oxygen that is supporting the combustion. It takes just 45 seconds from the moment the system is activated to fully suppress the flame. A single container with carbonic acid is enough to provide safety for a whole oil storage facility with tens of tanks, each of them containing up to 100 thousand cubic meters of oil.

For the end user, a standard installation costs approximately US$300,000. According to the developers this is ten times less expensive than a frothing agent installation. In addition, the system

does not require special maintenance. Petroleum products sprayed with carbonic acid do not deteriorate — they can be used immediately after the fire is extinguished.

Nanotechnologies for developing new light sources

A research team headed by Prof. Alexander Obraztsov has developed and tested a new light source. Five laboratory prototype varieties, including flat displays, digital indicators, lighting diode, and triode lamps are completed.

The cathode-luminescent lamps, whose prototypes were developed at the laboratory, could also be used as ordinary white light lamps. The same technology could be used to develop multicolored light sources for signal lamps and for architectural illumination.

The scientists stated that the cathode-luminescent lamps are a good alternative to illumination lights currently used for liquid crystal screens. These «nano»-lamps are low-cost. Using this technology the end products' cost for monitors and displays is significantly reduced. In the course of their work with the Russian Federal Agency for Science and Innovations, the research team developed experimental nanocarbon autocathodes samples. The samples have been successfully tested.

The scientists working on the project developed several new scientific methods and experimental installations, for manufacturing the pilot samples. They developed equipment for plasma-chemical precipitation and production methods for autocathodes in nanocarbon film form applied onto conducting substrates.