

WOMEN IN SCIENCE

A Publication for Seattle AWIS Members • Summer 2010

IMMUNITY





Summer 2010

WOMEN IN SCIENCE

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Do you have a story you'd like to share? If so, we'd like to hear from you. Email newsletter@seattleawis.org

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President's Letter

By Amie Siegesmund

Summer's Greetings!

As we (finally) enjoy warm summer days in the Puget Sound, I invite you to enjoy this edition of our newsletter, focused on immunity. Inside, you'll find captivating articles focused on both the positive role of the immune system (immunotherapies, protection against infection) and the negative results of an immune response gone wrong (allergies, autoimmune disease, and immunodeficiency).

Ashley Atwood summarizes exciting immunity research from around the world, including the discovery of natural antibodies that are effective against 90% of HIV strains. In addition, learn about a new protocol for peanut desensitization—good news for those affected with a peanut allergy. New links between narcolepsy and autoimmunity and the intake of fruits and vegetables and childhood asthma are also revealed.

New drugs for multiple sclerosis (MS), lupus, and rheumatoid arthritis are highlighted in Cathy Manner's update on the biotechnology and pharmaceutical industries. In addition, we learn about promising immunotherapies for grass pollen allergies and melanoma.

We're all aware of the high prevalence of MS here in the Pacific Northwest. Aarthi Vallur's feature article discusses treatment options, current research, and resources for information and support.

Learn about treatments for autoimmune diseases from Anette Hommelgaard. Anette tells us about current immunosuppressive therapies and provides a timeline of U.S. Food and Drug Administration approvals for biologics aimed at treating rheumatoid arthritis.

In our Spotlight on Seattle-Puget Sound Biotech, learn about immunotherapies and autoimmune disease treatments developed by Amgen, Dendreon, and Novo Nordisk, which are all based or have major operations in our region.

As I close this letter, I find myself thinking back on my year as President. I am so proud to have been part of the AWIS board for the past several years. I leave the board to become a member of the National AWIS Chapters Committee and hope to serve as an effective liaison between chapters and National, effecting change for chapters throughout the country. I thank you for your continued support of our chapter and look forward to seeing you at programs in the fall!

Amie

Seattle AWIS Programs Update

By Jennifer McCullar and Paramita Mookherjee

June wrapped up our program year for Seattle AWIS. We marked the end of this season with a social at Paddy Coyne's in South Lake Union. *It was terrific having an opportunity to meet new members and enjoy the company of friends!*

In May, Amgen hosted a networking social for Seattle AWIS. (For more information about Amgen, see the article on page 9). The program consisted of a diverse panel of Amgen employees. The panelists were asked to share their backgrounds and recommendations regarding their personal successes with the Seattle AWIS membership.

Here is what they had to say:

Kathleen Fowler: Associate General Counsel: patent strategy, patent litigation, and anything else that touches upon intellectual property

- **Education**
 - B.S., Biology (Cornell)
 - Ph.D., Molecular Biology (UC Berkeley)
 - J.D., Law (UC Hastings)
- **Experience/background**
 - Postdoc, Stanford University (before law school)
 - Private practice with a law firm in Palo Alto
- **How/why did you go into a career in science?**
 - Advanced Placement (AP) Biology
- **What brought you to Amgen?**
 - Relocated to Seattle to work as in-house counsel at Immunex (Amgen acquired Immunex in 2002)
- **Recommendations**
 - Keep a strong support network outside of work (family/friends and former colleagues)
 - *Frightening challenges are really opportunities to grow and learn*

Dace Krasts: Scientist focusing on chromatography techniques in an Analytical Sciences service oriented group

- **Education**
 - B.S., Food Science; B.S., Food Technology (University of Hawaii at Manoa)
- **Experience/background**
 - Quality control (QC) analyst in food processing industry
 - Veterinary technician
 - Lab animal technologist
- **How/why did you go into a career in science?**
 - My inquisitive mind and love of benchwork
- **What brought you to Amgen?**
 - Brought to Immunex by company's corporate environment, growth potential, size, location, and people (Amgen acquired Immunex in 2002)
- **Recommendations**
 - *AWIS (inspiring resources available); scientific education outreach*
 - *Womenomics* by Claire Shipman and Katty Kay, their resulting community
- **Unusual detours**
 - Fashion modeling: increased my self-confidence, reminded me of my love for benchwork, emphasized the value of quality coworkers and teamwork
 - Visiting skilled nursing sites as a Reiki practitioner or partner in an animal-assisted therapy team
 - Accepting "volunteer opportunities" outside of my comfort zone

Seattle AWIS Programs Update

Joanne Reeder: *Purification process development*

- **Education**
 - B.S., Chemical Engineering (University of Washington [UW])
- **Experience/background**
 - Started as a work-study student in molecular biology at Immunex my junior year in college
 - Joined Purification Development upon graduation
- **How/why did you go into a career in science?**
 - Always been interested in math and science
- **What brought you to Amgen?**
 - Wanted to work in biotech with an engineering degree
- **Recommendations**
 - Find people whose skills you admire and learn from them
 - People will be very willing to help you grow...if you ask them!
 - There are many opportunities to be had during periods of rapid growth, downsizing, and reorganization
 - Careers are not linear
 - Your strengths and interests don't have to be the same
 - *Use your strengths but follow your interests*

Kathy Rohrbach: *Senior Associate Scientist in Pathology*

- **Education**
 - A.A. (Shoreline Community College, Seattle)
 - Histotechnician, HT(ASCP) certification
- **Experience/background**
 - Clinical histology/immunohistochemistry laboratory - 22 years
 - Research histology/immunohistochemistry - 13 years
- **How/why did you go into a career in science?**
 - Always loved science; UW scholarship in nutrition opened other doors
- **What brought you to Amgen?**
 - Lifelong desire to work in research directed me to a position at Immunex in 1997 (Amgen acquired Immunex in 2002)
- **Recommended networks**
 - Mentors; networking with professional societies, such as National Society for Histotechnology, American Society of Clinical Pathology
- **Unusual detours**
 - Worked at UW Primate Center part-time when children were younger

Seattle AWIS Programs Update

Jiu-Li Song: *Good Laboratory Practice (GLP) Lab Manager: provides test article characterization and stability support for toxicology studies*

- **Education**
 - B.S., Biosciences and Biotechnology (Tsinghua University, 1992)
 - Ph.D., Biochemistry and Molecular Biology (Chinese Academy of Sciences, 1997)
- **Experience/background**
 - Postdoc, University of Texas (UT) Southwestern Medical Center, Dallas
 - Research Instructor, UT Southwestern Medical Center
 - Scientist, MDS Pharma, Bothell
- **How/why did you go into a career in science?**
 - Fascinated about genetics in high school
- **What brought you to Amgen?**
 - My husband's job relocation to Seattle
- **Recommendation**
 - *Take every chance to get to know people and let people know you*
 - It is a small world! You never know what it will lead you to.

Margaret Weidner: *Pharmacology Studies in Oncology Department*

- **Education**
 - Chemical Technology; B.S., Chemistry; M.S., Chemistry; Ph.D., Chemistry (Shoreline Community College, Seattle University, Johns Hopkins University)
- **Experience/background**
 - National Oceanic and Atmospheric Administration (NOAA) work-study
 - Postdoc, Department of Chemistry, UW
 - Research Scientist, ICOS Corporation -1998
- **How/why did you go into a career in science?**
 - Best subject during study at community college
- **What brought you to Amgen?**
 - ICOS Corporation bought by Eli Lilly (2006); joined Amgen as a Senior Associate Scientist
- **Recommendations**
 - *Treat every interaction as an opportunity to expand your network and as a way to promote yourself and your skill set (practice, practice, practice)*
 - A good mentor can take you far
- **Interesting/non-traditional anecdote related to career path**
 - Six years away from career path to raise my children
 - Pay close attention to personal happiness and satisfaction; science can be exhausting!



A new study from the **University of Lausanne** provides further support for the idea that narcolepsy in humans is an autoimmune disorder. Narcolepsy is caused by a deficiency of hypocretin and a loss of hypocretin-producing neurons. The study found evidence of autoantibodies (antibodies that attack “self” instead of foreign substances) that target the protein Trib2, expressed by hypocretin-producing neurons. Trib2-specific antibody titers were highest soon after narcolepsy onset, then decreased and stabilized at levels far higher than that of control patients for up to 30 years. (*The Journal of Clinical Investigation*, March 2010)

Biologists at the **California Institute of Technology** have identified a gene that causes multipotent hematopoietic stem cells to differentiate into T cells. The gene, Bcl11b, is a repressor transcription factor that, when expressed, turns off other genes and leads to the cell becoming a T cell. Precursor T cells, which have the potential to become any of several types of immunologic cells, such as mast cells or antigen-presenting cells, move into the thymus during their development, and this organ sends signals to the cells to turn on the Bcl11b gene, blocking all other developmental paths. Among blood cells, only T cells express this gene. The Bcl11b gene was a long-sought part of the T cell development mechanism, and may help our understanding of T cell-linked diseases such as leukemia. (California Institute of Technology, July 2, 2010)

Researchers at **Ulm University** in Germany have completed an observational study that seems to reaffirm a link between increased consumption of fruits and vegetables and lower prevalence of asthma in children. Children consuming fruits and vegetables at least three times a week had lower odds of ever having asthma, while children who consumed at least three hamburgers per week showed increased odds of having asthma. Causal connections could not be established, although there is some biological plausibility for a link between a child’s higher consumption of fruits and vegetables, which contain anti-oxidants, and lower asthma incidence, since it has been shown in adults that anti-oxidants are inversely related to asthma incidence. Conversely, trans-fatty acids, frequently found in fast foods such as hamburgers, have been linked to asthma and hyperallergic sensitivity. Wesley Burks, M.D., chief of pediatric allergy and immunology at Duke University Medical Center, commented that he would not recommend a diet change based solely on this study’s observations and that further studies are needed.

<http://www.medpagetoday.com>, June 2, 2010)

Immunity Research News

A molecule that helps to bridge the two arms of the immune system, the innate and the adaptive, has been discovered by researchers at **National Jewish Health** in Denver. The molecule, known as TLR ligand, triggers B cells (considered part of the slower, more specific phase of the immune response, the adaptive) to produce highly effective IgG antibodies much earlier in the immune response. The researchers' work provides further evidence for a link between the innate and adaptive responses and also delineates a mechanism by which the bridge occurs. (*The Journal of Experimental Medicine*, July 5, 2010)

A new peanut allergy desensitization candidate has been accepted for clinical study by the U.S. Food and Drug Administration. Viaskin Peanut, from **DBV Technologies**, is applied to intact skin and delivers allergen to immune cells in the epidermis. The clinical study aims to demonstrate that the product is safe and well-tolerated in adults and children and to determine appropriate dosing. (<http://www.dbv-technologies.com/>, July 7, 2010)

U.S. government scientists have reported discovery of three antibodies, naturally produced by the body, that are effective against 90% of HIV strains. The antibodies work by binding to (and thereby blocking) the site on the virus that attaches to human CD4 cells, the virus' host cells. One important difference between these antibodies and less effective antibodies that have been identified in the past is that these antibodies bind to a virus site that rarely changes; frequent virus mutations can render existing antibodies useless when the antibodies' attachment site on the virus changes form and the antibody can no longer bind to the virus. While these antibodies are not usable as a vaccine in themselves, work has begun to create a vaccine that could teach the body to make the antibodies on its own. Dr. Gary Nabel, lead investigator, said that he is more optimistic now about an AIDS vaccine than he has been in 10 years. (*Science*, July 8, 2010)

Scientists at the **University of Rochester** have shown that Vitamin D receptors in the gut help regulate inflammation by binding to nuclear factor (NF) κ B (a link in the inflammatory signaling cascade), rendering it inoperable. Vitamin D receptors are more prevalent in the areas of the gut where *Salmonella* are found, and *Salmonella* infection was found to be more virulent and aggressive in mice lacking Vitamin D receptors. Since Vitamin D deficiency is a known factor in the pathology of colon cancer and inflammatory bowel disease, understanding the link between gut flora and Vitamin D receptors may be important in the development of disease prevention and treatment approaches. (University of Rochester Medical Center, July 8, 2010)

Biotechnology and Pharmaceutical Industry News

By Cathy Manner

Human Genome Sciences and partner **GlaxoSmithKline** have filed for approval from the U.S. Food and Drug Administration (FDA) for their new lupus drug **Benlysta**. Individuals with lupus are currently prescribed corticosteroids and other drugs to help moderate symptoms of the disease. If approved, Benlysta would be the first therapy designed specifically to treat the condition. The drug both reduced disease activity and lowered the frequency of symptom flare-ups in two large Phase III clinical trials. Benlysta is widely expected to generate blockbuster revenues once it reaches the market. (FierceBiotech, June 10, 2010)

An FDA expert advisory panel has recommended approval of **Novartis AG's Gilenia** as a first-line therapy for multiple sclerosis (MS). If approved, Gilenia would be the first oral drug for MS, which is currently treated through injectable agents that must be administered frequently. The panel unanimously determined that the drug was effective in reducing relapses of MS but, out of concern for side effects, recommended that additional post-marketing studies be done to assess efficacy at lower doses. The FDA's decision on the drug is expected by late September 2010. The agency is not required to follow its advisory panels' recommendations but usually does. (Bloomberg Businessweek, June 11, 2010)

GRAZAX®, an oral immunotherapy from **ALK-Abelló** that is approved in Europe for grass pollen allergy, shows sustained disease control years after completion of treatment, according to data presented at the 29th European Academy of Allergy and Clinical Immunology Congress. Patients with grass pollen allergies who used the tablets for three years exhibited a statistically significant reduction in symptom score, relative to placebo-treated controls, during the peak grass pollen season two years after completing treatment. Use of other medications for symptom relief also declined, although this decrease was not statistically significant. (Medscape Medical News, June 11, 2010)

Trubion Pharmaceuticals announced that its partner **Pfizer Inc.** is ending development of a rheumatoid arthritis drug, **TRU-015** (or PF-05212374), following a mid-stage clinical trial in which a combination of the drug with methotrexate did not work better than methotrexate plus placebo in treating the disease. Pfizer will continue to develop a second rheumatoid arthritis drug, **SBI-087** (or PF-05230895). (Bloomberg Businessweek, June 14, 2010)

The monoclonal antibody **ipilimumab**, both with and without a glycoprotein 100 peptide vaccine, significantly improves overall survival in patients with previously treated metastatic melanoma vs. vaccine alone, according to a study presented at the American Society of Clinical Oncology annual meeting and published in the *New England Journal of Medicine* in June. Ipilimumab, developed by **Bristol-Myers Squibb (BMS)**, stimulates the immune system to attack melanoma cells by blocking CTLA-4, a molecule on the surface of T cells that downregulates T cell activation. Adverse events can be severe or long-lasting but are mostly reversible with appropriate treatment. BMS plans to submit an application for FDA approval. In the interim, ipilimumab is expected to be available to patients at certain medical centers through a compassionate-use program. (NCI Cancer Bulletin, June 15, 2010)

The FDA has approved a more advanced HIV test that can detect the virus more accurately in the early stages of infection. The **ARCHITECT HIV Ag/Ab Combo assay**, developed by **Abbott Laboratories**, simultaneously detects both HIV p24 protein and anti-HIV antibodies. In contrast, other diagnostic tests approved in the U.S. detect only anti-HIV antibodies, which develop weeks after infection. Abbott's test is also the first to be approved by the FDA for pregnant women, which could allow them to begin treatment earlier and reduce the risk of transmitting the virus to their fetuses. The assay has been available since 2004 in Europe, where it is commonly used in countries such as the United Kingdom and France. (Reuters, June 21, 2010)

Gilead Sciences Inc., a leading maker of HIV/AIDS treatments, announced that it will acquire **CGI Pharmaceuticals Inc.**, a privately held drug discovery company, for up to \$120 million. The deal will provide Gilead with access to CGI's library of proprietary small molecule kinase inhibitors, including a lead compound that could have applications for the treatment of rheumatoid arthritis and other inflammatory diseases. (Reuters, June 25, 2010)

Spotlight on Seattle-Puget Sound Biotech

By Cathy Manner, Jennifer McCullar, and Wei Qiao

The Seattle-Puget Sound region is a nexus of research and development focused on improving human health, with specific expertise in immunity, inflammation, and cancer. Here we highlight three biotechnology companies in this region who have developed products to either treat immune disorders or harness the power of the immune system to fight cancer.

Amgen

Amgen, founded in 1980, is the world's largest independent biotechnology company. According to the company's website, "Amgen was one of the first companies to realize the new science's promise by bringing safe and effective medicines from lab, to manufacturing plant, to patient. Amgen therapeutics have changed the practice of medicine, helping millions of people around the world in the fight against cancer, kidney disease, rheumatoid arthritis, and other serious illnesses." Headquartered in Thousand Oaks, CA, Amgen has sites in Seattle and Bothell, WA. Its Helix campus on the Elliott Bay waterfront in Seattle is the largest commercial biotech facility in the Pacific Northwest.

Amgen's first biologically derived human therapeutic was approved by the U.S. Food and Drug Administration (FDA) in 1989. The company's portfolio of marketed products now includes leading treatments for autoimmune diseases:

Enbrel® (etanercept), approved by the FDA in 1998, is a tumor necrosis factor blocker that is now one of the standard therapies for rheumatoid arthritis.

Nplate® (romiplostim), approved by the FDA in 2008, is a thrombopoietin (TPO) receptor agonist for treating immune thrombocytopenic purpura. It is given by subcutaneous injection. The major component of Nplate is an Fc-peptide fusion protein that functions via the TPO receptor to increase platelet production by activation of transcriptional pathways.

NEUPOGEN® (Filgrastim), another Amgen product, is a non-glycosylated human granulocyte colony-stimulating factor that is manufactured in bacterial production systems. It was approved by the FDA in 1991. In Phase 3 clinical trials, NEUPOGEN was shown to be a safe and effective therapy to accelerate recovery of neutrophil counts after chemotherapy. NEUPOGEN functions by binding to specific cell surface receptors to stimulate proliferation and differentiation of progenitor cells. A related product, **Neulasta® (pegfilgrastim)**, approved by the FDA in 2002, contains a polyethylene glycol (PEG) unit that increases the size of the drug and allows it to stay longer in the patient's system.

Vectibix® (panitumumab) is a fully human monoclonal antibody specific to the epidermal growth factor receptor that was approved by the FDA in 2006 for treating metastatic colorectal cancer (CRC). This agent is not recommended for treatment of CRC with KRAS mutations in codon 12 or 13.

In addition to its autoimmune disease and cancer treatment portfolio, Amgen also has developed FDA-approved therapies for anemia (**Aranesp® [darbepoetin alfa]**, **EPOGEN® [Epoetin alfa]**), secondary hyperparathyroidism in chronic kidney disease (**Sensipar® [cinacalcet]**), and osteoporosis (**Prolia™ [denosumab]**).

DENDREON - Immunotherapies for Cancer

Dendreon Corporation is a Seattle-based company focused on the discovery, development, and commercialization of novel cancer therapies. Dendreon has a manufacturing facility in New Jersey and is building facilities in Georgia and California.

In April 2010, after nearly 15 years of research and development, Dendreon became the first company to obtain FDA approval for what is known as an autologous cellular immunotherapy (see figure 1).

PROVENGE® (sipuleucel-T), approved for the treatment of asymptomatic or minimally symptomatic, metastatic, hormone-refractory prostate cancer, works by stimulating a patient's own immune system to target malignant cells. To produce the active therapy, immune cells are collected from the patient, exposed to a prostate cancer-associated antigen that triggers an immune response, and then reinfused into the patient.

Within the first year of FDA approval, Dendreon anticipates being able to manufacture sufficient PROVENGE to treat approximately 2,000 patients nationwide. As manufacturing capacity increases, the therapy will become more widely available.

Dendreon has also completed two Phase 1 clinical trials of a second cellular immunotherapy. **Lapuleucel-T** targets HER2/neu (the same antigen targeted by Herceptin® [trastuzumab]) in patients with breast, ovarian, or colorectal cancer.

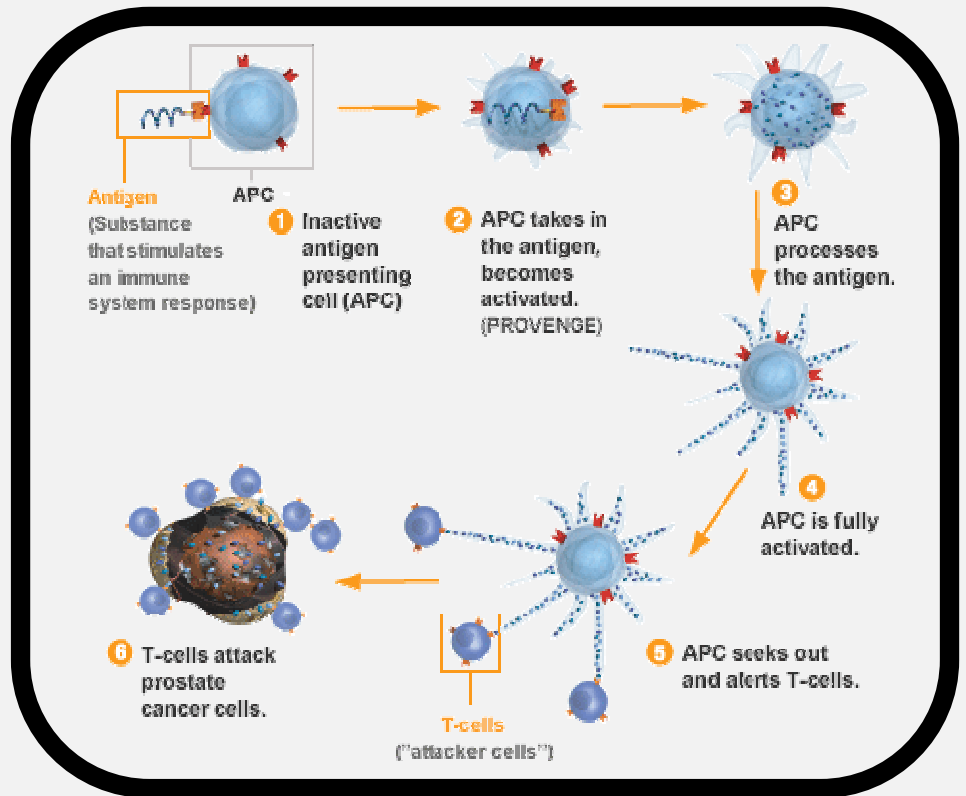


Figure 1: Active cellular immunotherapy

Spotlight on Seattle-Puget Sound Biotech

Novo Nordisk

Novo Nordisk is a healthcare company and a world leader in diabetes care. In addition, Novo Nordisk has a leading position within areas such as haemostasis management, growth hormone therapy, and hormone replacement therapy. With headquarters in Denmark, Novo Nordisk joined the Seattle biotechnology community in 2008.

In 2010, Novo Nordisk and the Swedish university consortium, **Combine**, announced a research collaboration in the field of autoimmune diseases. Under the agreement, Novo Nordisk will work with scientists from the six universities that make up the Combine consortium to develop a better understanding of how the immune system responds in patients with autoimmune diseases such as rheumatoid arthritis and systemic lupus erythematosus. The aim will be to develop novel therapies for the treatment of autoimmune diseases. The collaboration will also work on determining why certain patients do not respond to current treatments and how autoimmune diseases develop over time. It is hoped this can lead to the development of more targeted treatments that can be used to treat particular groups of patients. The agreement allows relevant Combine members to test Novo Nordisk preclinical development compounds in patient tissue samples. Such samples are routinely collected by Combine members from patients with autoimmune diseases. Additionally, blood samples from patients with autoimmune diseases who are being treated with conventional therapies will be analyzed for specific biomarkers to help understand why some patients respond to a particular therapy and others do not. *“This collaboration has great potential for drug development for major diseases such as rheumatoid arthritis, and as a model for collaboration between the academic community, clinical care and the pharmaceutical industry,”* said Lars Klareskog, project coordinator at Combine and principal investigator at the Karolinska Institutet.

At Novo Nordisk, sustainable development has been an integral part of their business for more than a decade. They are known for implementing sustainability into practice by employing a **Triple Bottom Line**. The foundation of the Triple Bottom Line is being *economically viable, socially responsible, and environmentally sound*. Balancing the Triple Bottom Line means the company considers each of the three elements when making business decisions and in doing so demonstrates their commitment to driving sustainable development – both locally and globally.

An example is the recent commitment Novo Nordisk has made towards gender equality. At the United Nations (UN) Global Compact Leaders Summit, Novo Nordisk vowed to support the Women’s Empowerment Principles produced by the UN Development Fund for Women (UNIFEM) and the UN Global Compact. Novo Nordisk will focus actions on progressing gender equality through a company-wide effort for more diverse senior management teams, establishing women’s networks, and continuously reporting on diversity progress. Addressing the unmet needs of women with diabetes and working to improve health conditions for women and their families worldwide is another key priority for Novo Nordisk’s actions in support of the Women’s Empowerment Principles.

Novo Nordisk has already established several programs aimed at women and children with diabetes. The initiatives aim to raise awareness of the global impact of diabetes, support community-based health and training programs, and advocate for sustainable change. The June 2010 summit marked the ten-year anniversary of the UN Global Compact. Novo Nordisk signed the UN Global Compact in January 2001.

(Source: www.novonordisk.com)

Handling the Multiple Sclerosis Burden in the Pacific Northwest

By Aarthy Vallur

Autoimmunity is a strange condition in which the body loses its otherwise well-preserved tendency to discriminate “self” from “non-self.” What this means is that the body itself becomes “non-self,” and everything is then game for the rapacious cells of the immune system. But there is method in this madness - even these rapacious cells seem to target one particular organ, and in the case of multiple sclerosis (MS), it happens to be the myelin sheath, the critical insulating layer that protects the nervous system and enables the transmission of nerve impulses.

What is really shocking is that the PACIFIC NORTHWEST is one of the regions in the world that reports the highest incidence of MS. MS affects about 400,000 Americans and 2.5 million worldwide, and a vast majority of them are women and Caucasians, although other ethnic groups have also reported MS in significantly lower numbers. The incidence of MS is more common in the cooler, temperate areas of the world. All of this rings alarm bells for the Pacific Northwest. No local risk factors have been identified, although low Vitamin D levels that result from inadequate exposure to sunlight have long been thought to be a contributing factor. Vitamin D synthesized from sunlight has been identified as a possible inhibitor of the autoimmune response. A detailed case study to determine if this hypothesis is true is currently being conducted at the Australian National University. A search for genetic predispositions has not been successful.

MS is usually associated with sudden attacks of vision loss, pain, and loss of coordination, and may become progressively degenerative, with permanent nerve damage and loss leading to psychological, sensory, and organic dysfunction. But MS patients usually have a normal lifespan and very rarely progress to constant symptoms. The real challenge is the diagnosis and treatment of childhood MS, usually in patients under 15. The goals of treatment are to manage symptoms, counsel patients on lifestyle changes, and block the autoimmune response with targeted therapy. Research has focused on exploring risk factors and discovering new and better means of early detection, treatment, and sustained relief.

Handling the Multiple Sclerosis Burden in the Pacific Northwest

Stem cells to replace lost neurons are a hot topic of research in several top laboratories. But the chronic nature of the disease has made researchers and doctors focus on mechanisms of managing symptoms more successfully. *And this is where the Pacific Northwest community has taken the lead.* Major research centers such as the Oregon Health & Science University in Portland have developed successful clinical trials for a family of new drugs to treat MS, while major hospitals around the region have established specialized MS education and treatment centers. On the commercial side, Amgen, the largest biotech company in the Seattle area, has focused on the development of treatment options for MS.

Community resources such as the Facebook page Pacific NW Multiple Sclerosis Awareness, started by Joy Wilkerson of Tacoma, and the Pacific Northwest Multiple Sclerosis Registry and Network (<http://www.pacificnwms.org>), maintained by the Providence Medical Center, OR, are crucial sources of information.

Please check out the Pacific Northwest MS Quilt Project (<http://www.multiplesclerosisquiltproject.com/>) to contribute a square, raise awareness about the research, and contribute to more research. This is the current challenge in global MS management and especially in our beloved Pacific Northwest, where more people are diagnosed each day with MS than anywhere else.

*Aarthy Vallur is a Senior Fellow
at the University of Washington.*

Autoimmune diseases are disorders in which the body's immune system reacts against some of its own cells or tissues through production of antibodies. This can have various consequences depending on the target cell or tissue, including destruction of a particular type of cell, excessive stimulation of organ growth, or interference with normal organ function. Examples of organ-specific autoimmune diseases are insulin-dependent type I diabetes (affects the pancreas), Graves' disease (affects the thyroid gland), and chronic hepatitis (affects the liver). Autoimmune diseases can also be non-organ specific and have effects throughout the body. Examples include rheumatoid arthritis (RA), multiple sclerosis, and lupus.

Most autoimmune diseases are chronic, but many can be managed to some extent. The goal of treatment is to control the autoimmune process and reduce symptoms. Specific therapies vary by disease and type of symptom. Immunosuppressive medicines that control or reduce the immune response include corticosteroids and non-steroidal anti-inflammatory drugs (NSAIDs). One of the best known examples of organ-specific treatment is injectable insulin to control blood sugar in diabetics. In addition, treatment with biologics is also an option. The biologic rituximab (MabThera) targets the B cells that are significant components in the immune reaction. Other biologics such as adalimumab (Humira), etanercept (Enbrel), and infliximab (Remicade) block tumor necrosis factor (TNF) alpha, a protein produced by immune cells to induce inflammation. Abatacept (Orencia), another biologic, inhibits the costimulation of T cells.

Examples of Drugs Approved for Treating RA:

1998: Enbrel receives U.S. Food and Drug Administration (FDA) approval for patients with moderate to severe RA who have had an insufficient or inadequate response to one or more disease-modifying antirheumatic drugs (DMARDs). Enbrel, which is administered via subcutaneous injection, was one of the first biologics to be approved for RA and can be given in combination with methotrexate.

1999: Remicade is approved by the FDA in combination with methotrexate in patients with inadequate response to methotrexate. Remicade is a monoclonal antibody given intravenously.

2002: FDA approves **Humira**, a monoclonal antibody, for adults with moderate to severe RA who have had an insufficient or inadequate response to one or more DMARDs. Humira is given as a subcutaneous injection. It can be used either as monotherapy or in combination with methotrexate.

2005: Initial FDA approval of **Orencia** in people with adult RA. Orencia can be used as monotherapy or in combination with DMARDs other than TNF antagonists.

2006: FDA approval of **MabThera** in combination with methotrexate for patients with moderate to severe RA that is refractory to one or more anti-TNF alpha therapies.



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