

ESS-Pharmapolis

Az ESS mint Új Gyógyszerfejlesztési Technológia

Egyetem-Kormányzat-Ipar-Pénzintézetek



Neutron Sciences Program

- Benefits:
 - New biotechnology and pharmaceutical products
 - Next generation workforce for nuclear industry
 - Start-up companies
 - Commercialization through existing major companies

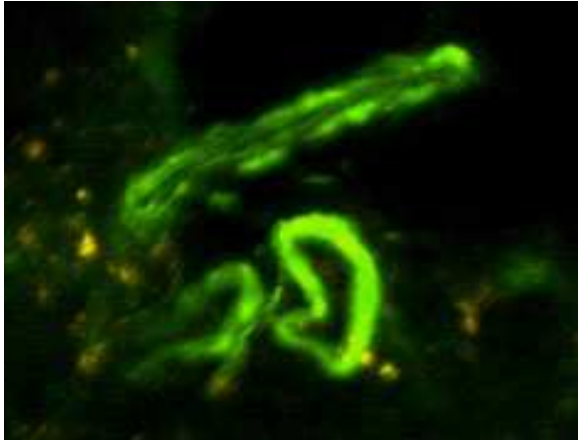
Systems Biology

- Intent:
 - Serve as a focal point for integrated life systems research in NC
 - Offer new Systems Biology teaching programs for 21st century
- Systems Biology Defined:
 - Study of all elements in a biological system and their relationships to one another.
 - Science of measuring and integrating genetic, genomic, biochemical, cellular and physiological to create a global network for **predictively modeling biological events.**

ESS in Systems Biology

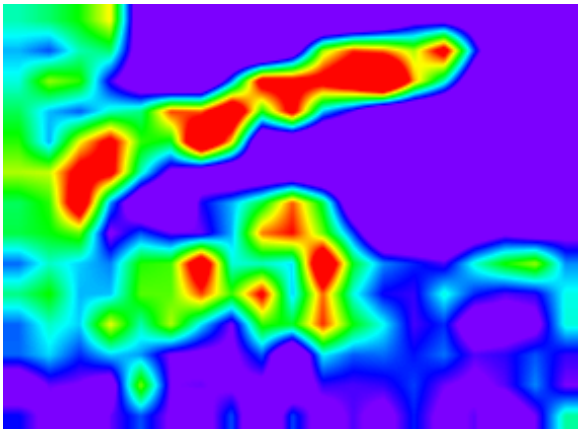
- Why Systems Biology?
 - Genetic, biochemical and metabolic disorders in humans, animals and plants result from complex molecular interactions.
 - Diseases cannot be explained by an alteration in a single gene, protein or metabolite.
 - Systems biology integrates all biological and physiological measurements in healthy vs diseased states.
 - Allows more efficient and effective design of therapeutics

Preventing Plaque Formation in Alzheimer's Disease



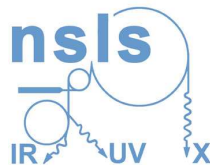
In Alzheimer's Disease (AD), the brain contains a buildup of a misfolded protein, called "plaque," that is believed to kill brain cells. It is thought that normal metal ions in the brain play a role in plaque formation. At the NSLS and APS, scientists showed that copper and zinc ions accumulate in AD, implicating that metal ions play a role in plaque formation.

These findings provide a better understanding on how AD plaques form and can be used for developing preventative drugs.



Funded by the National Institutes of Health

Eli Lilly is in the process of starting a collaboration to extend this work



WHY Are These Machines So Valuable?

Synchrotron Facilities:

- Produce ultra-high intensity light from **infra-red** to **visible light** to **ultraviolet** to **X-rays**.
- Enable us to see how nature and human-made devices work at the atomic and nanoscale, and directly observe biological and chemical processes.

Neutron Facilities:

- Penetrate deep into materials to give precise information about positions and motions of atoms in the interior of a sample, allowing a more detailed understanding of structure and properties.

Only the federal government can design, build and operate facilities large and sophisticated enough to be of continuing use to thousands of individual industry and government researchers.

Major US Centres



The Synchrotron and Neutron Users' Group (SNUG) represents:

- 5 Photon Light Sources
- 4 High-Flux Neutron Sources
- Including two under construction

Who is the user ?

The Synchrotron and Neutron Users' Group (SNUG) represents over 9,000 faculty, student, industrial and government scientists. Their research is *critical* to every sector of the economy:

- **Materials Chemistry and Nanotechnology**
- **Electronic Materials and Devices**
- **Energy Production, Storage and Conversion**
- **National Security**
- **New Medicines and Disease Treatments**
- **Environmental Sciences**
- **Human and Molecular Biology**

Approximately 600 scientists from over 160 companies representing technology, manufacturing, energy, chemical, and bio-pharmaceutical industries use the synchrotron and neutron facilities.

| | | | | | | |
|-----------------------------|---|---------------------|----------------------------------|--------------------|---------------------------|--------------------------------|
| E.I. duPont de Nemours & Co | Exxon Research & Engineering Co. | Applied Materials | Advanced Micro Devices | SFA, Inc. | Spectragen, Inc. | Ford Motor |
| ExxonMobil Research | Shering-Plough Research Institute | Berlex Biosciences | Gladstone Laboratory | Corning, Inc | Rigaku Corporation | Aerospace Corp. |
| Dow Chemical Company | Fred Hutchison Cancer Research Ctr. | Wyeth Research | STI Optronics, Inc | BASF | Althexis | Hinds Instruments, Inc. |
| Lucent Technologies | Novartis Inst. for Functional Genomics | Cytokinetics Inc. | Northrop Grumman ATDC | Orthologics | Bruker Optics Inc | Air Products Chemical Inc. |
| IBM Research Division | Whitehead Inst. for Functional Genomics | EUV Technology | Scientific Manu. Techno. Inc | Alpha Braze, Inc. | Panametrics, Inc | Rohn & Hass Co. |
| Bristol-Myers Squibb | McPherson Industries Division of S.I.C. | The EXFAS Co. | Edge Analytical, Inc. | Anticancer, Inc. | Photons Unlimited | St. Jude Children's Res. Hosp. |
| Pfizer Global R&D | Containerless Research, Inc. | Indoff/K&M | Digital Semiconductor | Aventis Gencell | Varian Vacuum Products | Molecular Structure Corp. |
| SmithKline Beecham | Structural GenomiX, Inc. | Komag Co. | National Semiconductor | Chevron | BioSpace Int'l. Inc | Texas Instruments |
| Bruker AXS Inc. | Agouron Pharmaceutical, Inc. | Photon Imaging Inc. | Ovonic Synthetic Materials Co. | Conductus Inc. | Millennium Chemicals Inc | Physical Sciences, Inc. |
| UOP | Chevron Research & Tech | Canmet | New Century Pharmaceuticals | Crystal Logic Inc. | Dow Corning Corp. | Boeing Co. |
| Merck & Co., Inc. | 3-Dimensional Pharmaceuticals | AMGEN | Area Detector Systems Corp. | Exelixis | Memc Electronic Materials | Balazs |
| Abbott Laboratories | Boehringer Ingelheim Pharm. | Chiron Corp. | Axson Technologies, Inc | Genomics Institute | Aventis Pharma | Xencor, Inc. |
| PPG Industries, Inc | International Fuel Cells | Tularik Inc. | Corvas International | GETOM Corp. | Bell Laboratories | Innovene |
| Eli Lilly & Co. | BP-Amoco Corporation | Aracor | Genecor International | Lumileds Lighting | NEC Research Institute | INOES Technologies |
| Pharmacia & Upjohn, Inc. | Cummins Engine Company | Genetics Institute | Hughes Space & Comm. | Pyro Fusion | Osram Sylvania, Inc. | GE Global Research |
| Glaxo research Institute | Dana Farber Cancer Institute | Burnham Institute | Walschon Fire Protection | Xradia | Princeton Gamma-Tech | Palo Alto Research Corp. |
| Biogen Inc. | Kinetix Pharmaceuticals | Intel Corporation | William Hassenzahl Consulting | Veeco-Ion Tech | Wyerth-Ayerst Research | Infineon Technologies |
| Bechtel Nevada | Lockheed Research Lab. | Hoffmann-LaRoche | Dupont-Merck Pharmaceuticals | Pratt & Whitney | Advanced Fuel Research | Evergreen Solar |
| Monsanto/Searle | Creatv MicroTech, Inc. | IBM Corp. | The Molecular Biology Consortium | Spectra-Tech Inc | Akzo Nobel Chemicals | Schott Solar |
| Emerald BioStructures, Inc | Montell Polyolefins USA | Motorola | Daimler Chrysler AG | MVA, Inc. | General Electric | BP Solar |
| Adelphi Technology, Inc. | Vertex Pharmaceuticals | Genentech | Radiation Monitoring Devices | Landauer Inc. | Pall Corp | MER Corporation |
| Proctor & Gamble | MediChem Research, Inc. | Hewlett Packard | BASF Bio-Research Corporation | Neocera Inc. | Bicron NE | Micell Technologies |
| Roche Biosciences | Parker Hughes Institute | Eastman Kodak Co. | Kraft Foods Technology Center | SAIC Corp. | Eveready Battery Co. | Micron Technologies |

North Great Plain Region



Pharmapolis

Pole Program
(cluster
initiative)
Debrecen,
October 2007

ESS-Pharmapolis Context

1) Background:

Local Production System in
the Pharmaceutical Sector

2) Plans (Strategy):

European Technology Platform
(ETP) system

3) Vision Cluster (Initiative)

Európai Technológiai Platformok (ETP) a Pharmapolis Programban

1. Innovative Medicines for Europe (full ETP)

- a) Predictive efficacy
- b) Predictive safety

2. NanoMedicine

(Drug delivery)

3. Food for Life

(Functional food)

4. Sustainable Chemistry

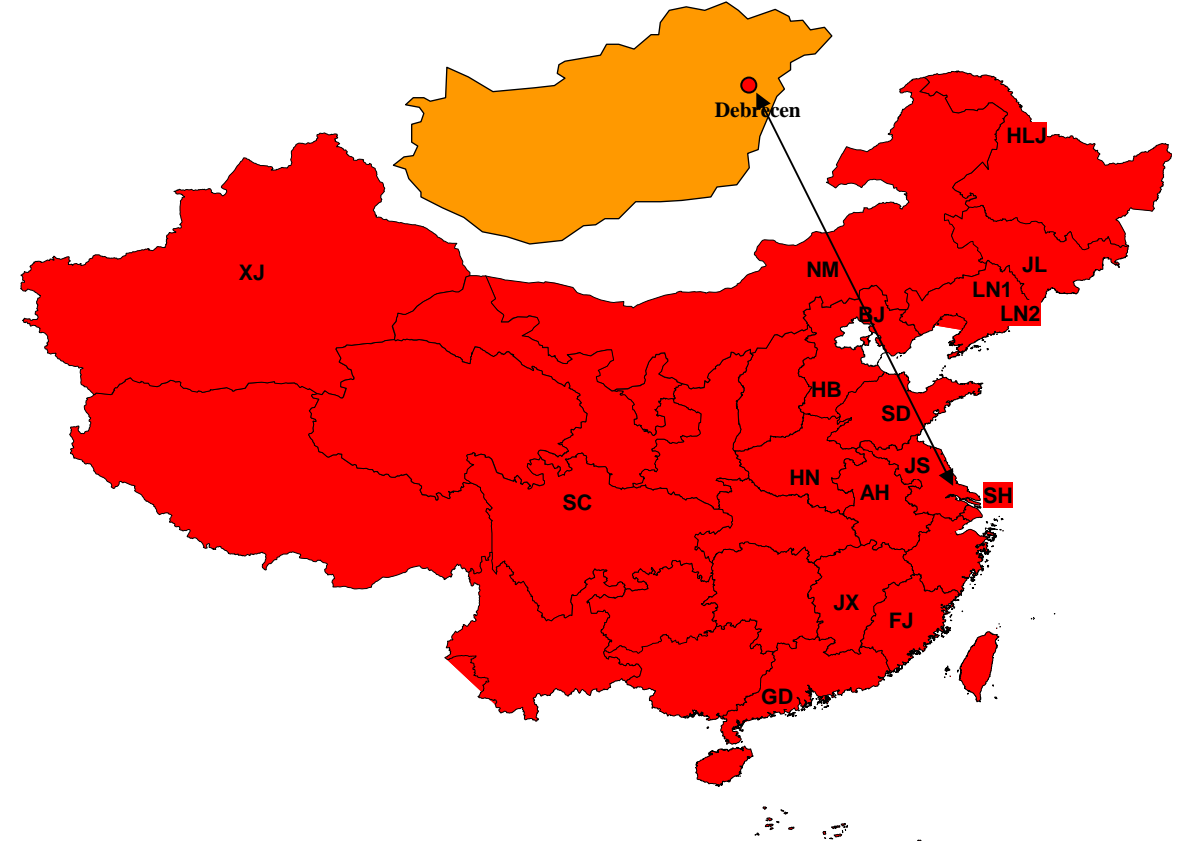
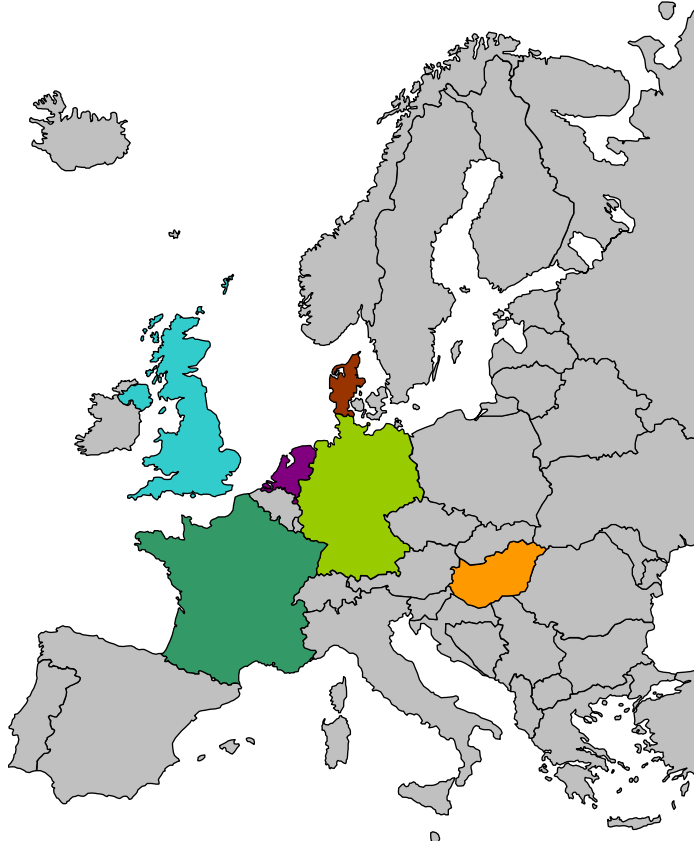
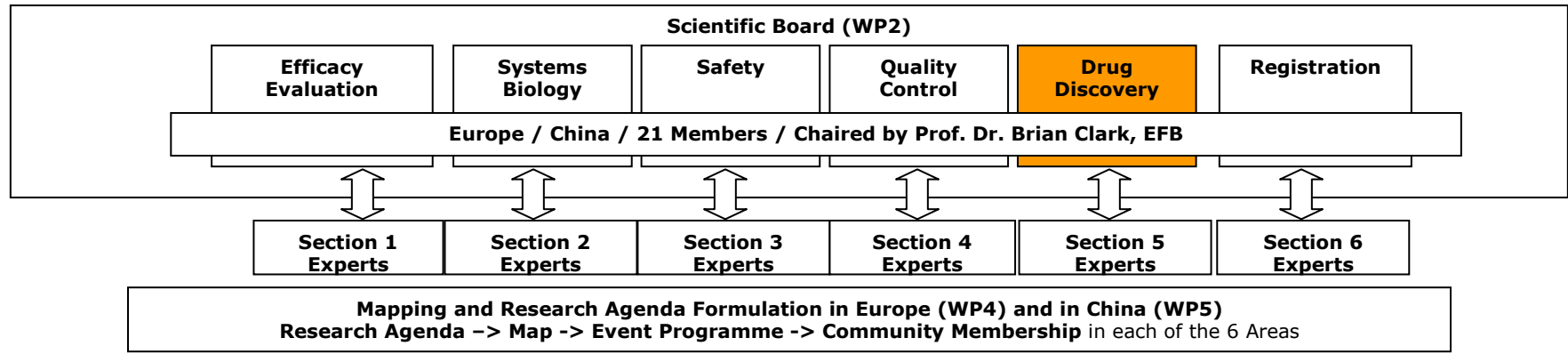
(Pharma topics only)

4+ Co-operation with other poles & clusters

These are the challenging issues where Europe's future growth, competitiveness and sustainable development depend on major pharmaceutical and food research and technological advances.

(Source: http://cordis.europa.eu/fp7/cooperation/home_en.html#2)

Modern Biology-based evaluation on the Efficacy, Safety and Quality of Traditional Chinese Medicine



Current state: Company / University/Local government/Banking Institution/VC quadrant regional innovation structure

