Sustainability in Pharmacy
From the Jungle to the Patient

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Sustainability in Pharmacy… From the Jungle to the Patient

Overview-

- Amazon Story
  - GAI
  - Camu Camu
- Natural Products in the pharmaceutical industry
  - NIH Natural Products
  - FDA Natural Products
- The story of Taxol
- Reducing the footprint in Pharma
- Novartis Green/sustainability practices
Let me take you to the Rainforest

- About the Amazon Rain Forest
A story of Sustainable Enterprise

Global Awareness Institute:

- Promote hemispheric cooperation and broader understanding of sustainable development by:
  - Encourage students, institutions and the private sector to participate in joint international problem-solving ventures;
  - Establishing and maintaining land and animal preserves in fragile areas of the world;
  - Designing and supporting sustainable industries that encourage preservation of rainforests
Japanese consumer's first contact with the pleasantly flavored Amazonian fruit known as "camu camu" was in form of a refreshment drink, then in liquor, and now causes sensation as vinegar used for the refinement of salads. According to Toyohara Hidekazu, responsible for tropical foods at the Agrarian University of Tokyo, the demand for the Peruvian product on the Japanese archipelago has increased drastically and in order to provide proof for that trend, Japanese retailers say their camu camu stocks are exhausted.

http://www.livinginperu.com/blogs/business/263
IIAP UNEP and the Amazon Farmer

• Camu Camu
CAMU CAMU Project

• Sustainable Product development
  – ~100 Acre reserve First Forest outside Iquitos, Peru
  – 25 acres deforested – Plant Camu Camu

Partners- Educational and Agriculture Programs
  – UNAP- Universidad Nacional de la Amazonia Peruana
  – IIAP- Instituto de Investigaciones de la Amazonia Peruana
SEARCHING FOR CURES FROM NATURAL PRODUCTS
Searching for Cures from Natural Products

- DTP-NPB (Developmental Therapeutics Program- Natural Products Branch) of the NCI/NIH
- Since 1986 has acquired natural products from 25 countries
- By 1999, more than 50,000 specimens were collected and over 10,000 marine specimens collected
- In these undertakings, the NCI/NIH committed to the conservation of biodiversity
- The extracts from these plants screened for anti-cancer activity against NCI-60 cell lines

http://dtp.nci.nih.gov/branches/npb/repository.html
Before The NPD

• In 1955, the NCI set up the CCNSC or the Cancer Chemotherapy National Service Center

• Set up to screen products for anticancer activity. Most were synthetic.

• In 1960, commissioned botanists to collect ~1000 natural specimens/year
Some Examples of Cancer Treatments from Natural Products

Camptothecin acuminata, “happy tree” China
• Topotecan, irinotecan
Catharanthus roseus, Madagascar periwinkle
• ~70 Vinca Alkaloids extracted including Vincristine
Taxus brevifolia, Pacific Yew Tree
• Paclitaxil or Taxol®

- http://www.tirgan.com/taxol.htm
CCNSC and Taxol

• In 1962, as part of this program, Arthur Barclay collected bark from a single Taxus brevifolia.

• Active ingredient from extract identified in 1966 from fresh samples.

• More work was commissioned on taxol.
  – In 1966, 28 kg crude extract from 1,200 kg bark to give 10gm of pure material.
  – In 1977, 7000 lbs of bark requested.

  Goodman & Walsh 2001, pp. 25,28
Meeting the increasing demand for Taxol

- Preclinical anticancer activity and MOA was elucidated in late 70’s.
- Increasing interest along with difficulties in formulation caused more demand for taxol
- 12,000 additional pounds of bark commissioned to conduct ph II trials
- Activity found in Melanoma and Ovarian cancer and it was estimated that 360,000 lb of bark would be needed to treat all US patients!!

- **Goodman & Walsh 2001**, p. 120
Semisynthetic and Sustainable

- Supplies of Taxol from 1967-1993 came from bark Pacific Yew
- Harvesting the bark kills the tree
- Attempts to extract from pine needles or other cultivated taxus species difficult
- Work by Robert Holton at FSU lead to effective semi synthetic process of production using needles from European Yew
Taxol® (Paclitaxel)

- BMS granted FDA approval of Taxol® in 1992
- Peak sales of $1.6 b in 2000; now generic
- Taxol is indicated for the treatment of ovarian, breast and non-small cell lung cancer. It is also approved for the treatment of Aids-related Kaposi’s sarcoma. It is used to prevent restenosis (narrowing of coronary stents)
To Endure
COMMITMENT TO SUSTAINABILITY AT NOVARTIS
A commitment to conserve energy requires us all to do our part -- individuals, communities and businesses.

With this in mind, Novartis' Energy Team is taking a long-term approach.

The Team is working to build a culture of sustainability that will positively impact not only the company, but employees, well into the future.
Building a Culture of Sustainability

• Proudly, Novartis signed onto the Kyoto Protocol in 2005, committing to significantly reduce its site and vehicle fleet greenhouse gas emissions.
• The company also sits prominently on the Dow Jones Sustainability Index, a global index tracking the performance of sustainability-driven companies worldwide.
• Moreover, in Argentina, Novartis purchased land for reforestation of pastureland to sequester carbon, and is sponsoring a jatropha plantation and biodiesel project in Mali, West Africa.
Recently, Novartis amended its Article of Incorporation to state: *In pursuing its purpose, the Company strives to create sustainable value*

NPC has established an overall goal to reduce energy consumption by 10 percent by 2011.

As part of this effort, a cross-functional Energy Team was created by Business and Administrative Services to focus on this objective.
The Energy Team follows a three-pillar strategy focused on: Utilization/Conservation, Procurement, and Culture.

Energy Teams exist at all major sites worldwide and are comprised of representatives from Site Operations, HSE&BC, Engineering, Finance and others committed to reducing energy consumption.

Each year, representatives all the Novartis North American sites meet and exchange best practices and ideas.
Making a Difference

- The East Hanover site operates a waste-to-energy system that turns office trash into steam.
- It recently installed a steam driven turbine to generate electricity for the NRC building.
- Novartis operates a solar panel array on the roof of Building 405.
- These innovative approaches provide low-cost electrical power, and help to reduce the site’s overall carbon footprint.
Some of NPC’s efforts, such as airflow reductions in several laboratory buildings, began as far back as 2004.

The current strategy broadens the scope of the initiative to include recycling, solar power, emission reductions, waste minimization, electric consumption timing patterns, training, and more.
Novartis Energy Facts

- Each year, the East Hanover site consumes nearly 100 million kwh of electricity (equivalent to 8,500 households) and 620,000 Dth of natural gas (equivalent to 6,200 households).
- NPC is on-track to achieve a 10 percent energy consumption reduction in 2010 relative to the 2006 base year.
- In 2008, NPC realized a savings of $1 million in energy costs, which is enough to power 1,500 homes for one month.
Novartis Energy Facts

• East Hanover has reduced energy consumption every year since 2003.
• By the end of 2009, NPC’s solar array at the East Hanover site will have produced a cumulative 500,000 kwh of electricity since coming on-line in 2006.
What You Can Do

- While Novartis has committed to reduce energy consumption across the corporation, it cannot do it alone.
- It’s everyone’s responsibility to conserve energy and do their part to make our company greener and more energy efficient.
- Here are some ideas that can apply to both work and home.