The University-Industry Interface at Stanford

by Katharine Ku, Director

The university-industry interface is exciting and yet complex. At Stanford, we are always looking for creative ways to establish closer ties with industry for Stanford’s and industry’s mutual benefit. Stanford’s formal relationships with industry are on a continuum - beginning with corporate philanthropy, to Industrial Affiliates Programs, to sponsored research, to licensing...and more.

Each program offers its own special opportunities for a particular company and gives us flexibility in the way we interact with industry. Different industries/companies work with different sectors of the University for different reasons, all of which can be beneficial for both Stanford and the companies.

**Industrial Affiliates Programs**

Industrial Affiliate programs offer corporations a “window” into Stanford research, including facilitated access to faculty, staff and students.

**OTL: By the Numbers**

by Kirsten Leute

As many know, OTL completed one full licensing cycle of inventions disclosed in the 70’s when the Cohen-Boyer Recombinant DNA Cloning (DNA) patents expired on December 2, 1997. The royalties from the DNA patent haven’t quite followed suit yet, with 1997-98 being OTL’s all time high, but OTL expects revenue income to be significantly lower in 1998-99.

So what does the past look like? And what do we expect for our future?

The Past

Figure 1 is a graph of the income received by OTL in the past six fiscal years, as well as a forecast for the 98-99 fiscal year. Note that the non-DNA income for 97-98 was a significant increase from the past several years due to a one-time equity cash out of almost $8 M. Since OTL’s inception, the total income received by OTL is almost $410 Million, over $250 Million of which is attributable to the Cohen-Boyer technology.

The number of different technologies that are producing income in any one year is steadily increasing, from 214 in 1992-93 to 298 in 1997-98. While it is typical to have minimum payments in exclusive licenses, OTL has made a concerted effort to negotiate maintenance payments for nonexclusive licenses as well, thus contributing to the increase in the number of technologies which produce income and improving license diligence of our licensees.

Continued on page 2
University-Industry Relations at Stanford
Continued from page 1

A Sampling of Licenses Granted by OTL in the Last Quarter

<table>
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<tr>
<th>Docket(s)</th>
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<th>Uses</th>
<th>Licensees(s)</th>
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<td>593-027</td>
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<td>Gene Therapy</td>
<td>Megabios Cpl.</td>
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<td>Monoclonal Antibody</td>
<td>Sorotec</td>
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In licensing, the royalty income to the Schools is almost opposite the revenue distribution from Industry-Industrieships.

Who Belongs to What?

Each of the three programs (Industrial Affiliates programs, Industrial Contracts and OTL) works with approximately 300-400 companies at any one time. It appears, however, that individual companies are selective in their interaction with Stanford to meet their particular needs. For example, one major semiconductor company is a member of 7 Industrial Affiliate Programs. They are sponsoring 2 research programs, but OTL does not have any licenses with this company.

Another example is a major local technology company. This company is one of our biggest revenue generating licensees, under the Cohen-Boyer license and has 7 other licenses with OTL. They have funded 2 sponsored research projects but are not an Industrial Affiliate member of any program.

A final example is a major defense contractor company. We have a significant sponsored project program and a substantial licensing program with them but they are not a member of any Industrial Affiliates programs.

With regard to licensing, "big" companies do not realize the same royalty technology from universities. OTL's traditionally active area is in life sciences and biotechnology because industry requires proprietary protection for pharmaceutical and product development cycles. Another active area for OTL is the "start-up" arena; start-ups generally do not have the time or money to fund an expensive technology (license.) For most companies, the license represents a product-driven business decision, and an investment in a particular product rather than a research decision. In 1996-97, OTL's statistics show:

- 715 active licenses
- 400 companies
- $51.8M of which the Schools' shares were:
  - SOM: $6.8M
  - SOE: $0.8M
  - DOR: $0.2M
  - HBS: $0.02M
  - Earth Sciences: $0.02M

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For more information, please contact Jill Brigham at jill@otlmail.stanford.edu or (650) 725-9112.
Allergy shots can be painful, time consuming and expensive. With the help of a potent immune system adjuvant (a drug effectiveness enhancer), the efficacy of these shots may increase dramatically.

Researchers Rosemarie DeKruyff, PhD and Dale Umetsu, MD, PhD found that when *Listeria monocytogenes* is used as an adjuvant with allergy shots, the effectiveness of the allergy shots increased dramatically. In studies conducted with mice, ongoing allergic responses, that include production of high levels of IgE as well as symptoms of asthma, could be reversed dramatically with one or two injections of heat killed *Listeria* combined with the allergen. Normally, conventional allergy shot therapy requires 50-100 shots to be effective in alleviating allergic symptoms. However, when allergen immunotherapy is effective, it is a satisfying method to treat allergic disease and asthma since it can result potentially, by converting detrimental allergic immune responses into protective immune responses, into “cure” of the disease. In contrast, most medications used today for these chronic diseases require chronic administration of the medication to control symptoms. The use of heat killed *Listeria* as an adjuvant to boost allergy shot therapy could revolutionize immunotherapy and make it a first line therapy for allergy and asthma.

According to Dr. Umetsu, *Listeria monocytogenes* is a relatively common organism that doesn’t cause significant infections, except in pregnant women. In any case, since the *Listeria monocytogenes* is killed prior to mixing with the allergen, there is no risk of infection with *Listeria*.

Drs. Umetsu and DeKruyff developed the idea of using heat-killed *Listeria* as an adjuvant for allergen immunotherapy while working with Interleukin-12, a cytokine that they found partially inhibits allergic reactions. Since *Listeria* increases interleukin-12, they tried using heat killed *Listeria* to induce IL-12 and increase the potency of allergy shots. They achieved remarkable results and found that the *Listeria* was more effective than administration of recombinant IL-12 in reversing allergic responses. Drs. Umetsu and DeKruyff are also looking into using these findings as an immunotherapy for cancer.

Stanford is seeking a licensee to further develop the technology and take it to market. A patent application is pending and a publication is available. For further information, please contact Lisa Primiano at (650) 725-9120 or lisa.primiano@stanford.edu.

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