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# ALLIANCES AND PARTNERSHIPS: A CHALLENGE TO BIOTECH

**CIRANO Note, prepared by Catherine Beaudry and Nathalie De Marcellis-Warin, October 2008**

National Biotechnology Week has just ended, and across Canada numerous discussions addressed the issues confronting this industry. The term biotechnology refers to "the application of science and technology to living organisms as well as parts, products and models thereof, to alter living or non-living materials for the production of knowledge, goods and services" (BIOTECanada, 2008, *Biotechnology Facts*). Annual surveys by BIOTECanada (Nanos Research) reveal that Canadians support research into biotechnology and understand its importance for the future prosperity of the nation.

In Canada, this industry accounts for more than 550 firms that cumulatively invest a total of $1.7 billion in research and development (R&D) every year. According to Investissement Québec, Quebec ranks fourth in North America in terms of the number of biotech firms. This industry mostly consists of SMEs: Nearly 75 % of these firms have fewer that 50 employees, and 85 % fewer than 150. Three to four per cent of biotechnology-related patents issued in the OECD are held in Canada. However, Canada lags far behind the United States in terms of biotechs' average revenues.

Firms can strengthen their position if they collaborate amongst themselves and with research centres in the matter of innovation. The workshop *Alliances and partnerships: a challenge for biotechs*, hosted by CIRANO last September 19, provided a forum for stakeholders to examine the necessity of collaboration between companies, the form it should assume, and the conditions for its success.

## Collaboration in numbers

The first topic on the agenda was biotech clusters in Canada and collaborative networks of inventors. Our research has revealed that, while 60 % of collaboration between researchers that leads to patents occurs within a single agglomeration, 29 % of cooperative links are international (especially with the United States), and only 11 % of collaboration at the individual level is between Canadian cities. There is a pronounced international scope to research in this domain.

With respect to biotech firms, surveys by Statistics Canada on the use and development of biotech reveal a decline in collaboration among firms (from 63 % in 1999 down to 53 % in 2005). Between 1998 and 2005, collaborating firms generated more income, spent more than twice as much on research and development, employed nearly double the staff dedicated to biotech, and obtained 3.5 times as much financing as non-collaborating firms (though this latter gap is shrinking). Furthermore, between 2003 and 2005, the percentage of new firms (less than five years old) among Canadian biotech firms fell from 49 % to 27 %. Since the proportion of firms that were spun-off or spawned remained fairly constant between 1999 and 2005, it was independent start-ups that began to eschew biotech or did not survive.

## The need for collaboration

Biotech SMEs must collaborate if they want to survive and prosper. In the biotechnology industry, these SMEs often play the role of intermediaries in tripartite arrangements, inserting themselves between upstream institutions that conduct research and large, established firms that commercialize the innovations downstream. Collaboration occurs during the phases of development featuring significant uncertainty, whether at the technological or commercial level. The failure rate may be as high as 70 % for R&D activities and between 30 and 50 % for commercialization. Thus, involving a university research centre in an R&D project may reduce the risk on the technological level by curbing the uncertainty associated with research activities. Moreover, in some areas (such as health) R&D is a very expensive activity, so that to conduct it, or even to survive, innovating firms require access to capital injections. According to the 2007 study *Canadian Life Sciences Industry Forecast*, conducted by PricewaterhouseCoopers in collaboration with BIOTECanada, Canadian firms increasingly expect to receive financing from strategic partnerships rather than from venture capitalists—characterized by growing reluctance to invest in this industry. Furthermore, large corporations are continually on the lookout for new research ideas to generate new products, since the intellectual property protection on most pharmaceuticals is expiring.

## Making collaboration work

With large corporations on the lookout for new products, and small biotechs and research centres seeking funding, strategic partnerships come into their own. The round table at our workshop allowed some factors that contribute to the success of these collaborations to be identified (for example, the types of partners, the reasons for the collaboration and its timing). To illustrate, in partnerships with universities, the participation of students allows specialized workers to be trained who will maintain collaborative links with the laboratories in which they studied, thus facilitating the firm-university relationship. Business leaders favour longer internships, since training within the industry requires a minimum of three months. From the perspective of alliances between firms, though partnerships between large firms take longer to establish, they are nonetheless more sustainable. The key to success is that both parties be committed and that everyone benefit, along with a certain balance of power within the partnership. In addition, it is vital that there be good chemistry between the teams!

In a context of globalization, and given that most large pharmaceutical corporations are not Canadian, there are grounds for concern regarding the value drain that could result from these strategic partnerships. For this reason, it is essential to encourage collaboration within Canada, to attract firms, and thereby to contribute to creating value at home.