

HEALTH RESEARCH: ISSUES AND PERSPECTIVES (ABSTRACT)

Like the development of the automobile industry in Ontario, the government of Quebec defined biomedical research as one of its priorities for the socio-economical development of the province. Quebec offered particular conditions, such as tax appropriations supporting the links between the companies and the universities as well as the "15 years rule", to encourage biotechnological industries to be established in Quebec. This particular context led to a rise in the field of biomedical research in Quebec. Laval University, McGill University and University of Montreal collect nearly 72 % of the total subsidies of research granted to Quebec's researchers. In parallel, some 78 % of employment in pharmaceutical companies is concentrated in the area of Montreal and nearly 22 % in that of Quebec. In addition to the tax advantages suggested by Quebec, these companies are also attracted by an interesting critical mass of qualified researchers, which offers highly qualified workers, and opportunities to interact with the universities research centres.

1. A partnership between the universities, the government and Quebec's population

The financing of health research is thus of primary importance for Quebec. The increasing knowledge in the field of health allows to ameliorate the Quebec's population health, by improving care quality, doctors training and medical personnel formation thus consolidating the development of new ways which can lead to better pharmaceutical treatments. Biomedical research also allows an economical growth, by creating links with companies established in Quebec or by generating highly qualified labour, which attracts these companies. Finally, university health research forms the scientific up-raise of the pioneers who allowed Quebec to establish a universal reputation of its researchers.

Quebecers are very conscious of this partnership between biomedical research, the generation of high technology employment and the amelioration of their health. Many recent surveys place the refinancing of health research as a second priority (69 %), just after that of health system itself (75 %), whereas only 54 % wish a reduction in taxation and 6 % wish that the government be involved in the research intended to ameliorate arming. The message of Quebecers is clear: Quebec government should ameliorate the conditions of health research at the level of the university.

In 1998, nearly 70 % of health research in Quebec was carried out in research centres located in hospitals and this proportion should increase in the next years in order to bring closer clinical practice and research. Thus, hospitals affiliated to universities become fundamental places responsible for the education of health professionals and health researchers. However, the government has not taken into account the double mission of the hospitals affiliated to the universities. Moreover, the internal policies for recruitment and financing in both hospitals and universities are sometimes conflicting. This has a direct effect on the redistribution of the financing and, especially, on the stability of the research teams.

It is important to well understand a system to be able to find adequate solutions. Currently, the partnership between health research and Quebec population is still wavering, because of the precarious or unstable situation of the younger generation of researchers that undermines the long-term development of this partnership. Indeed, young researchers cannot lay out a career plan that is related to their competences and their potential in Quebec. When Quebec government sets new choices for technological and social development, analysis of the evolution of health research and the recommendations suggested in this memoir could help to plan the effects of the development of new research centres affiliated to the universities.

2. Problems

Young researchers, including “researchers-students” (graduate and postdoctoral training in research) and junior researchers, have the impression that recent measure for refinancing research succeeded in consolidating senior researchers. At the present time, the majority of young researchers working in universities cannot reach a permanent position and 75 % of the “researchers-students” in training live under the poverty threshold. Even though research in Quebec is relatively well developed, various generations of young researchers are in such a precarious socio-economical situation that many of them leave the university network, in spite of excellent skills they acquired. The system is more fragile than it appears at first sight. It is time that Quebec finances adequately its human resources in research, or else, Quebec’s biomedical research system would deteriorate leaving behind the efforts of the last 20 years.

Currently, young researchers, on the level of their university formation (masters, doctorate or postdoctoral) or at the beginning of their career, carry out their research under extremely precarious conditions. Indeed, the university network cannot offer them a career plan, because the number of university positions is insufficient compared to the number of researchers, even if all of them participate in the teaching duties. The instability of the health researcher’s career is worse in hospital research centres, a place where 70 % of Quebec’s health research is carried out: researchers cannot have stable positions and depend on competitions to obtain wage subsidies. However, health research has been one of Quebec’s government priorities for 20 years. If young researchers cannot have a stable career plan, then they lose hope and leave the university research network, and sometimes Quebec. The absence of recruitment is more critical for “researchers-students” returning from their postdoctoral training, obligatory training that is generally carried out outside Quebec, because it is extremely difficult to have access to scholarships and to keep them even if the young researcher has a good performance.

The future of biomedical research and its health system is seriously threatened, so Quebec’s society must take necessary means to support the discoveries and innovations in the various fields of health. It must control the outcome of its research investments and provide good living conditions to all its citizens. On one hand, in the future organization of health care system, in both aspects of organisation and financing hospital research centres, it is important to take into account human resources involved in research or else it would be detrimental for Quebec’s future. On the other hand, in the financing of university research, it should take into account the role that the Faculty of Medicine and the hospital research centres play in students’ formation and knowledge production.

3. Health Research at the university level

The word “health research” gathers all the fields of research that deal with human health. Research health teams are multidisciplinary and combine specialized experts in complementary fields such as biochemists, microbiologists, physiologists, chemists, physicists, psychologists, doctors, ethicists, sociologists, statisticians, physiotherapists or occupational therapists (naming only some of these fields). All these people participate actively in research projects, which aim at improving quality of life of the citizens and increasing human health knowledge. Together, they develop new therapies, new pharmaceutical compounds, new medical approaches which will help clinical doctors to treat and cure sick people as well as old aged people.

- *The interaction between clinical doctors and health researchers is crucial for the fast and adequate transfer of new discoveries towards the patient, it is recommended to support the exchanges and links between medical and scientific formations allowing a mutual comprehension of the different realities.*

Research is a paramount mission of Quebec universities, which, in exchange of governmental financing, guarantees the development, and the transfer of knowledge towards the citizens to improve their living conditions. The university thus contributes to the socio-economical development of the area, which has accommodated it by creating an excellent network of young dynamic and innovating

researchers. While many Western countries invested an enormous quantity of human as well as financial resources in university research, research in Quebec underwent many budget cuts in the last decade. To try to reduce the growing gap between research financing in Quebec and that of the competitor countries, provincial and federal governments reintroduced funds in research grant programs. In spite of this help, Canada remains in withdrawal compared to its American neighbour who invests four times more money per capita in university health research than the Canadian government. It seems that the funds recently injected in the last months mainly benefited senior researchers and that the precarious situation of young researchers and "researchers-students" remained as it is. Nearly 500 positions should be created to stabilize young researchers working in health research in hospital research centres.

- *In addition to an increase in the direct financing of research projects, Quebec government must consolidate the primordial place of health research by stabilizing and reinforcing its base: the scientific up-raise.*

One of the great difficulties in which hospital research centres live in is that they do not know the sum of money coming from the various ministries which are intended to them to finance their research. The universities as well as the hospitals receive the budget, but the research centres cannot guarantee stability of its teams of researchers or professors. A better dialogue between the ministry for Health and of Social services (MSSS), the ministry for Research, Science and Technology (MRST) as well as the ministry of Quebec Education (MEQ) on one hand and the universities and their affiliated hospitals on the other hand is an essential element to ameliorate the quality of health research.

- *It is necessary to clarify the financing of research, the training support and recruitment of supporting personnel within hospital research centres so that the sums released for university activities can be used for the finalities that have them conscript the various implied ministries (MRST, MSSS and MEQ).*
- *In the same way, it is important to encourage the dialogue between ministerial, university and hospital partners concerning research financing and support to human resources of hospital research centres.*

Since 69 % of the population wish that the government reinvest in and consolidate biomedical research, it is important to work out solutions to ensure the well being of the citizens and the future generations. Lastly, in a view to create specific health funds, it is important to verify that the budget granted to health research is not reduced because of the establishment of this innovating measure.

- *It is recommended that Quebec's government doubles the budget of the FRSQ in the coming two or three years.*

4. Socio-economical conditions of young researchers in training

To consolidate health research in Quebec, a detailed attention must be paid to the tutoring that receive young researchers. Since the medical field is evolving and the concepts and advanced technologies are difficult to control, university training of the researchers often continues until 35 years of age and sometimes even more. The "researchers-students" who undertake higher studies are integrated into research teams where they develop skills and scientific competences necessary to their future career. The "researchers-students" must interact with other researchers, conduct research tasks, take part in many congresses, act like any member of the scientific community and dissociate themselves hoping to find a university position. They must diversify their training to be able to adapt to new research teams and to join various networks.

- *It is thus recommended that the researcher-student's evaluation and training criteria are flexible, but equivalent, wherever he does his training (university, hospital or private company).*

Like the researchers and the research assistants, the “researchers-students” participate to the research, generate results, innovate and publish in scientific newspapers, but do not receive adequate recognition, neither on behalf of the scientific circle, nor on behalf of the society in which they live, because they are still in formation and that they will receive a diploma for their efforts. Working conditions are extremely difficult for the “researchers-students”. They work in a keen manner (from 60 to 80 hours / week) on research projects (often proposed by their laboratory director), obtain their doctorate in four or five years, and then must leave the country to carry out one or more postdoctoral training for two to five years and return finally to Quebec to start their career in research at 32 or 35 years of age.

During all these years of “devotion” to university research, whereas their work contributed to the international recognition of Quebec universities, “researchers-students” (graduate and postdoctoral training in research), become young researchers, but do not have any wage stability: they live due to research scholarships obtained by way of competition (from 500 to 19 000 \$ / year); they do not profit from social protection (granted to all Quebec citizens like employment insurance, parental insurance) although they pay taxes like any citizen.

- *As more than 75 % of the “researchers-students” live under the poverty line (although they contribute clearly, by their work, to the amelioration of the living conditions of Quebecers), it is necessary to adjust their financing to the current reality of health research training. It is a priority to maintain and guarantee Quebec’s health research at a worldwide calibre. In addition scholarships obtained by the program of government loans and scholarships as well as from the subsidies of the research directors should not be taxable any more, their number and their amount should be increased and a financing system better adapted to the reality of the “researchers-students” should be created.*

A way of recognizing the research carried out by the “researchers-students” and ameliorating their socio-economical conditions would be to modify Quebec’s legislation to recognize their double reality: at the same time students in formation and young professionals of research. Thus “researchers-students” could subscribe to an insurance group (improving their health conditions) and benefit from the parental insurance program. On the other hand, they could have an adequate wage scale compared to their age and their skills. These measures would reduce the financial precariousness of the “researchers-students”; improve their quality of life, and quality of their work since all their energy would be directed towards their research and its diffusion.

- *Quebec’s legislation should recognize the “researchers-students” double reality student/professional as Quebec already recognizes it for resident medical doctors, so that the “researchers-students” can benefit from the social protection granted to Quebec’s population.*

Finally, the number of “researchers-students” from foreign origins studying in our universities is growing. In Quebec, nearly 22,5 % of the “researchers-students” is from foreign origins. These young researchers take part in worldwide radiation of Quebec universities. However, significant professional as well as social difficulties emerge in spite of many offices implanted by the universities to help foreign students. The rules granting the health insurance card must allow equality between all the “researchers-students”, whatever their nationality, since they all contribute to the socio-economical development of Quebec and to the amelioration of Quebec’s public health.

- *The economical conditions and the minimal social protections offered to the “researchers-students” must be the same for all, whatever their nationality*

5. Coordination between postdoctoral training and research career

In many research fields, when a university recruits a researcher, he quickly disposes permanence within the teaching staff. This permanence does not guarantee his research funds, but, at least, a stable remuneration. In return, he is devoted to his research and to teaching and training graduate "researchers-students". However, because of the development of a large number of health researchers, there are more researchers than available university positions. This situation is even more critical within hospital research centres.

In fact, for 20 years, Quebec government has chosen to encourage health research in order to attract biopharmaceutical companies and to improve Quebec's health care system. Consequently, Quebec has developed a critical mass of health researchers who are able to take up these challenges. Whereas health research has made great strides, the number of professor positions (and thus permanent positions) dropped following budgets cuts of Quebec universities during the last decade. Thus, there are, currently, more recruited researchers than academic positions in the faculties of health sciences and their affiliated hospital research centres.

Two types of problems emerge. The first one relates to the starting of the researcher's career. For recall, after obtaining their doctorate degree, young researchers must carry out a postdoctoral training, generally outside Quebec. However, these young researchers should return to Quebec with their newly acquired knowledge, often find themselves alone, and realize that the effective programs for integration within the existing university research teams are extremely rare, even non-existent. Indeed, there are local or national programs to help the starting of the research's career. However, collected information tends to show that, on seven postdoctoral trainees who leave Quebec, only one can return and can be integrated in Quebec's research teams.

The second type of problem relates to the instability of the young researchers, which appears more frequent in hospital research centres. Indeed, young researchers do not have a career plan since they must take part in national competitions to obtain scholarships. They are thus dependent on funding agencies, such as *Fonds de la recherche en santé du Québec* (FRSQ), or private foundations, hoping to receive a scholarship for periods of one to four years maximum. Peers judge the competitions, and "researchers-students" can all gain for few years or lose all. This situation is very problematic and more detrimental for young people since an excellent researcher's career is seldom realizable jointly with a serene family life.

This situation is likely to last if Quebec's government does not act quickly. Many researchers working in universities research centres, especially in affiliated hospitals, will never acquire a stability or complete recognition of the services they offer to the university, even though they participate in its international reputation due to the quality of research carried out or the training of their students. This situation places young researchers in a very unstable situation, which continues during many years, sometimes during their entire career. Unfortunately, many promising and talented young researchers give up hope during these precarious years. Significant time and money investments are lost when these young graduates, disillusioned, leave the research network. They dream to find more lenient environments where they can cease to be afraid of the future and found a family.

Evolution of the Western society, and especially that of Quebec, has drawn aside women's place from the world of knowledge and decision. Still today they must double their efforts to show that their potential is at least equivalent to that of men. Young women researchers, who mainly grant as much importance to the success of their professional life than to their personal life, leave, in greater number, the extremely competitive university network that offers little socio-economical stability. However, they do not ask for a positive discrimination, they want that the criteria for evaluation of their scientific performance be identical to those of men researchers.

It is astonishing to note the dichotomy, which exists between the aspirations of a whole society, which puts on research and technologies to guarantee its survival and the precarious and stressing conditions, which are imposed on young researchers who want to become excellent innovating scientists. It is thus necessary to improve the financing system of young researchers at the time of their career between the postdoctoral training and that of junior researcher-scholar or associated professor while offering to the research centres and the universities means to recruit young researchers. This coordination will help recruiting young researchers in Quebec universities.

- *Particular solutions are proposed in order to help postdoctoral trainees to complete their formation and to be integrated in the scientific university community: by recognizing their social contribution being scientist, by improving their work conditions, their remuneration and by giving them access to the social Quebec and Canadian programs (employment insurance, parental insurance, access to the REER) and by the creation of programs that will help them coordinate between the postdoctoral training and the beginning of their research career.*

6. Financing health research at the university and hospital levels

University research plays a major role in Quebec's socio-economical quality of life. The concentration of research in Montreal attracts companies, which find a highly qualified labour. This labour was trained by universities with highly developed technology due to worldwide calibre of university research. However, Quebec universities underwent a reduction of 22 % of their financing whereas, at the same time, the school fees were frozen. To respect its electoral promise not to increase school fees in order to guarantee financial accessibility to university studies, Quebec's government must increase the financial means granted to the universities for it to keep its position at the head of the best universities of Canada, even of North America. In the same way, the research universities must be able to profit from an adequate financial support, which is important for their mission that was confided by Quebec's society.

- *To increase research funding and to assume the responsibility of the indirect expenses related to this research must become one of Quebec's priority issues.*

7. Quebec's university institutes of health research

The departmental structure of the universities and the sub-financing of research limit the development of multidisciplinary health research centres. The founding of research institutes makes it possible for Quebec to gather groups of researchers who will be able to collaborate efficiently and to integrate young researchers who are not interested in the teaching load associated with the university position. In the same way, these institutes could be a solution to the problem of integration and instability of the researchers working in hospital research centres, which participate in the training of graduate students, but cannot benefit from traditional career plan as university professors. It is necessary to give these institutes means to recruit and stabilize the research teams encouraging the development of a harmonious environment on the long run.

- *The founding of Quebec's university institutes of health research, which would be interdependent on hospital university networks.*

8. Framework agreements between industries and universities, which act like partners

In the past years, universities generated new modalities to finance health research by creating links with private companies. Hospital research centres also benefit from this new structural paradigm of research financing by the private sector. Indeed, in a chronic context of under-financing universities and hospitals, whereas increasingly sophisticated and expensive technologies are imperative to maintain a

network in health research, the hospital and university researchers turned to the private sector to create partnerships.

Nowadays, these partnerships are numerous and they accelerate the transfer of knowledge and technologies developed in universities network towards the citizens by commercialising the innovations. These partnerships had several beneficial repercussions on universities and hospitals research centres, due to an increase in the funds used to run the laboratories, purchase new equipment, increase the number of researchers per research team, etc.

Unfortunately, the negative effects or the risks associated with these partnerships are numerous. Loss of the researcher's autonomy, concentration of the efforts in innovation fields (with possibility of immediate marketing), reduction of the efforts devoted to teaching and supervision of the "researchers-students" as well as the time delay or, even prohibition of publication of certain results directed by the private sector to university members implicated in the partnerships are situations that were and will be more and more lived, proportionally to the establishment of a growing number of partnerships.

It is essential that the legislation help the hospitals, universities and companies to determine the level of responsibility and autonomy in the partnerships of research financing in the university and hospital networks. Creation of spin-off companies by professors and researchers within universities or hospitals, created internal conflicts about the rights on the intellectual property and the distribution of the patents between the universities, the researcher, the researcher-student and the private partner. In fact, the jurisdictions are not clear in many areas including intellectual property, knowledge diffusion or research financing. Quebec's government should implant framework agreements for intellectual property, under penalty if this acquired knowledge is seeing to be passing to foreign hands.

- *It is recommended to create framework agreements which will take care of the rights and the responsibilities for each one (university, researcher, researcher-student and private partner) while taking into account the divergent missions of the partners.*

In the same way, such an agreement could frame the relations between the researcher-student and his director. It will be necessary to improve the transfer of noncommercializable discoveries, which support the social development or the life quality of the citizens. It is a significant problem in the improvement of health care since a great number of clinical studies are not diffused to the medical and paramedical personnel.

- *It is recommended to ameliorate the diffusion of noncommercializable results, which could ameliorate health care, or administration of health networks.*

9. Ethics in health search

The term "bioethics" appeared in the Seventies and is a common concern to the society and health researchers. Bioethics is a new field, and a new approach and practice as well as a social cultural movement that arises from the perception of science and society responsibilities. Ethics reflects our moral and religious values, as well as our human experience and sometimes touches body integrity and a person's property.

It is necessary that Quebec's population limit utilization of health research results:

- Can we make human cloning?
- Can we use human embryo like a matrix to create replacement organs?
- Can we exploit OGMs in all impunity?
- Do we accept that an insurance company use the genetic code of a client to define his premium, like is the case in England?

- Do we accept that employers claim the medical file of their employees before recruiting them, as are 25 % of the cases in the United States ?
- Etc.

Thus, a very large opening of the mind, maturity and rigour within the scientific community must become a research premises. Ethics is passed on by sensitising the professor-researchers and the researcher-students as well as by the organisation of ethical research committees. Bioethical sensitibilization could be passed on by the creation of a law which would mark out the practice of the research carried out in Quebec.

- *It is recommended to create a bioethical law, which will be inspired from the universal ethical principles and will offer a legal and bioethical framework to the research ethical committees in order to judge the relevance of the research carried out in Quebec.*

Moreover, creation of a consulting committee in bioethics that would be inspired at the same time from the Belgian and French models, generate debates based on broad ethical problems related to health research (Belgian model) which will take into account the characteristics of the modern Quebec society, and also provide opinions to the MRST and the MSSS in order to amend or moderate the law (French model) which would rule on the bioethical practice health search in the universities and the private laboratories. Then, parliamentary committees could listen to the population and to various groups of experts so as to help the government modulate the legislation on the matter, of which the bioethical law described previously.

- *It is recommended to create a national authority, such as a consulting committee in bioethics, which would have the responsibility to plan public and experts consultations about ethical matter in research and medical practice in order to clarify the bioethical beacons that the Quebec will endow for a harmonious development of its population.*

10. Order of Quebec's health researchers

Mr. Serres militates that every researcher-student who begins his search activities in the health field, makes an oath similar to the Hippocrate's Oath, which frames the medical clinical practice and to which subscribes all young doctor. Health researcher is no more isolated in the laboratory; his discoveries modulate the environment, modify the perceptions of the living and influence the life of the citizens.

Creation of professional Order for health researchers could be an occasion to sensitise formally the responsibilities of the researchers towards themselves (problems of intellectual property, ethical issues, etc.) and towards the population, in the experimental subjects recruitment or that of commercialisation or, simply, in results diffusion.

To finish, it seems significant to release ethical committees from the socio-economical issues that are inherent in the political choices of political leaders. It is also recommended that these committees depend on apolitical organization, such as a professional Order in order to guarantee the freedom and rights of each citizen.

- *It is recommended to create a professional Order for health researcher and to give it the responsibility to define the deontological beacons for health research and for the application of research ethical rules.*