Presidential address

Research in Cardio-thoracic Surgery
A European challenge

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Received 29 September 1997; accepted 3 November 1997

Some 10 years ago I had the pleasure of welcoming you as the local organizer of the first meeting of the EACTS at the Vienna Hofburg. Since then the development of our association has proven to be a unique success story. We started off with less than 500 participants but over the years the number of participants climbed to 800, then to 1000 and finally to over 1700 at our annual meetings.

Together with our journal and the close cooperation with our American sister societies, the STS and the AATS, the EACTS is the most powerful organization in cardio-thoracic surgery in Europe today. Considering all these facts, I am very honoured and privileged that you elected me President. May I thank the nominating committee for proposing me and the members of the association for electing me into this position.

Article III of the EACTS reads: "To promote for the public benefit research into thoracic physiology, pathology and therapy and to correlate and disseminate the useful results thereof". This gives me the right or rather I feel obliged to discuss the present situation of cardio-thoracic surgery research in Europe.

Europe was the economic, intellectual and cultural centre of the world for 2000 years. The situation in the last 100 years has, however, changed dramatically to Europe's disadvantage.

Just as economic leadership crossed to the New World around the close of the last century, so too leadership in science was lost from the 30s and 40s up to this century. Gradually research and development have become, to an ever increasing extent, a domain of the New World, as you can see from the relation of the Nobel Prize winners between Europe and the United States before and after the Second World War (Fig. 1).

Only in the cultural sphere has Europe been able to maintain its pioneering role and even then only as far as traditional culture is concerned. The leadership in the new media of radio, film, television and entertainment went similarly to the United States.

In the last 30 years Europe's situation has continued to worsen dramatically, even if at first only in the economic field, since East Asia, lead by Japan and now followed by the so-called Tiger-states, threaten to overtake Europe in economic power. In the past, Europe was also handicapped by the consequences of two world wars and the following division into two economic and social systems. All this has thrown Europe

Nobel Prize Winners
in Physiology or Medicine

![Nobel Prize Winners Chart]

Fig. 1. Nobel Prize winners in physiology or medicine in the United State/Canada and Europe (1901–1945 versus 1946–1996).
into a crisis where it has been pushed into a defensive position.

Gross national product in most European countries is growing far more slowly than in North America and East Asia. Unemployment is rocketing and social disorder and trade union struggles show that there is just not enough to go around.

What has all this got to do with research in cardio-thoracic surgery? Firstly, it is important to note that the development of heart and lung surgery does reflect the development sketched above. At the turn of the century most of the new developments in thoracic surgery still came from Europe; and I refer here, as an example, to the wonderful book by E. Jeger of Hamburg, ‘Cardiovascular Surgery’, published in 1913, [1]. It presents a lot of cardiac operations which were later introduced into clinical practice. However, we are forced to concede that the actual development of cardio-thoracic surgery, once again as a result of the Second World War, has taken place almost exclusively in the United States.

This does not only influence the further development of our profession in research and practice, it has also had enormous economic consequences.

Looking at the instrument table of an operation theatre for heart or thoracic operation you will see that almost every single expensive instrument has not been manufactured in Europe but rather in most cases was imported from the United States and sometimes from East Asia. This means that the European surgeons only contribute partially to real net output in the economy, namely from our own work and that most of the equipment is a burden for the European economy and thus like so many other things has contributed to pushing Europe’s economy onto the defensive. Additionally, in many European countries and I refer, in what follows, above all to developments in the European Union, investment in research and development has never been popular (Fig. 2) and in most of these countries for the last 30 years more has been developed in social security, pension schemes, etc., than in strategies for the future.

It is a fact in most countries that the welfare state is no longer financially viable but at the same time due to the deficit in research and development, insufficient resources are being used productively to break out of the crisis.

This scenario, which I have presented is true for all areas of research and development in Europe and naturally also touches our profession. A walk around the exhibition at this congress will show you just how right I am with my analysis: most exhibitors are not European producers but rather European distributors, for mostly American firms. This means that value has not actually been created in Europe.

### EXPENSES FOR RESEARCH IN EUROPE

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<tr>
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<th>% Gross National Product</th>
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<tr>
<td>EU</td>
<td>1.9</td>
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<tr>
<td>Sweden</td>
<td>3.28</td>
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<tr>
<td>France</td>
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<tr>
<td>Finland</td>
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<td>Denmark</td>
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<tr>
<td>(Norway</td>
<td>1.74)</td>
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<tr>
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<tr>
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<tr>
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Fig. 2. Expenses for research in the European Union (percentage of gross national product).

In order to break out of this situation we need a new European effort in research, not least in our own profession. In what follows I should like to outline how these new efforts are to be understood and what measures we ought to take collectively to design a new model of European cardio-thoracic surgery, which is efficient, economically feasible and appropriate for patients.

I should like to address three questions concerning research in cardio-thoracic surgery:

1. What do we understand by research in cardio-thoracic surgery?
2. How can such research be integrated into daily practice?
3. How can research be organized in a unified Europe viewing global aspects?

1. **What do we understand by research in cardio-thoracic surgery?**

In my opinion, research in cardio-thoracic surgery should at least be applied research, concentrating directly upon the problems of our profession. It should indeed avail itself of the results of basic research but I do not believe that it is the task of cardio-thoracic surgeons to carry out basic research themselves. In principle, research in our professional sphere should concentrate on the following areas.

**1.1. Clinical analysis**

The analysis of our own clinical activities and their comparison with the results of other professional
groups including quality assurance is one item of research which can be carried out everywhere, contributing considerably to an improvement in results and at the same time serving the interests of our patients to the greatest extent.

In a globalised research world, above all in the age of telecommunication, internet and other possibilities, any analysis of our data cannot simply belong to our own environment. It has to result from efforts to introduce randomized comparative studies throughout Europe to throw light on new questions and developments in our professional fields on a continuous basis.

Still to this day it is not clear, for instance, whether the application of two mammary arteries in bypass surgery is superior to the application of one alone. There has not been a long-term controlled study in Europe whether a total or a partial arterial revascularisation is more beneficial. To broach a trivial question, we know far too little about whether biological or mechanical cardiac valves are better for younger or older people, respectively, and that is just to mention a few open questions.

At every possible place at the moment lung volume reduction surgery is being carried out. But I have not yet heard that we have an appropriate multicentre study, carried out within the framework of the European Union, in order to be able to offer evidence for the rationality of this therapy.

Precisely in the area of these multicentre studies for purely surgical questions our profession is clearly falling behind compared with cardiologists, for example. For years, in cardiology, there have been numerous, almost innumerable, potential, randomized and mostly multinational studies which should answer every relevant clinical question. Now think of the surgical side, how many names of potentially, purely surgical multicentre studies occur to you? They are above all few comparative studies of bypass surgery versus angioplasty or stent intervention. But even in the case of these studies it was cardiologists and not surgeons who took the initiative.

All this taken together shows you that it would make a lot of sense for our association to set up a special committee under the leadership of David Wheatley, which would be intended as a point of contact for such projects.

I hope that the Committee for Research and Research Founding with the Office of the Director General for Health and Science of the European Union in Brussels are able, over the coming years to organise a number of controlled randomised studies to answer significant questions in our profession.

The setting up of the European database through Kenneth Taylor, the ESCUR project as well as the linking of our society by internet should ease communication and thereby create the basis for the speedy implementation of such studies.

1.2. Basic research

A further important research area in our profession concerns the application of basic research techniques to throw light upon clinical and theoretical questions in the profession. To which belong physiology and pathophysiology—particularly on a molecular basis—but above all molecular biology and genetic engineering. The findings in basic research about receptors, mediators, transmitters, etc., have already become components of applied research in cardio-thoracic surgery.

Unfortunately, I also have to point out here that in the future-oriented technologies such as genetic research, molecular biology, etc., we have in turn amassed a clear deficit against the United States. If we compare the programme of our congresses with those comparable to the American Associations we see that those reports dealing with future-oriented technologies are under-represented in our forums. Also the leading companies for genetic engineering are not located in Europe which means that we have a lot of catching up to do in this area.

1.3. Research using animal experiments

There is no doubt that animal experiments, not only to develop new technologies but also to test new equipment, constitute an absolute necessity in our profession. Even if the transfer of results in animal to human can sometimes be doubtful, we are in the position to go on record and say that most biological laws occur in the same way in animals as in humans and that therefore such a transferability does exist. There certainly have been mistakes involving inadequate animal protection in the past with the planning and implementation of animal experiments. However, regulatory authorities in Europe have reversed their position to such an extent as to make research involving experiments on animals almost impossible to carry out. The question arises whether or not we have done enough to counter all these developments and to make it clear to our fellow human beings that in their own interests and for the improvement of our results animal experiments in cardio-thoracic surgery are absolutely essential.

1.4. Applied research leading to industrial implementation

By this I understand the development of all possible types of equipment which we need to assist us in our professional duties. In my opinion it is in this sector that we in Europe commit the most sins, since it was considered as unworthy at the universities of all places to implement research on an industrial basis and thereby risk the possibility of earning money. It is also right to say though that industry has not paid the kind
of attention to our profession in Europe which would have made it straightforward for researchers to have their developments manufactured in Europe. Thus, it has come about that a whole range of developments which have originated in Europe in the last 30 years and which have shown themselves to be highly successful products in the industry have not been produced in Europe and have therefore been lost to the net real output of the gross domestic product on Europe. In this context I shall allow myself to refer to our honorary speaker A. Carpentier who counts as one of the pioneers of the bioprostheses, but whose developments found industrial transfer in California.

2. How can such research be integrated into daily practice?

All the ideas presented here show that we have to invest more in the research activities in our profession. The question then arises of how can we integrate research into the practical training of young surgeons and into the clinical activities of our established staff surgeons.

Despite various efforts and some very good results of many non-university departments, research is to be carried out, above all, at academic institutions. It seems more important than ever to create a positive climate for research at these places and to make it clear to young surgeons that academic research is just as important as clinical activity.

Moreover it has to be seen to, that both the appropriate material infrastructure for research is created, meaning laboratories, computer facilities, non-academic staff, etc., and that the idealism of young surgeons be directed towards research. It is essential that continuous guidance, supervision and control from experienced staff surgeons follow en-route. In this respect, the European system is certainly inferior to the academic American one, because the commitment to research by our established staff surgeons is by no means as strong as in the USA. Nevertheless, the most important point is that appropriate faculties and sufficient time be set aside for younger surgeons to undertake research during and immediately after their training and that it be made clear that research is just as significant and just as important as clinical work. Only in such a climate, can innovation thrive and lead to a positive influence on the future of our profession.

3. How can research be organized in a unified Europe viewing global aspects?

Naturally, the foundation of all progress will continue to be institutional research organised in each country. Country-specific funds for promoting research along with private and public foundations have the function of supporting research projects and will continue doing so in the future. However, we should make allowance for the fact that in the European Union at least, part of the research budget of the member states will be paid centrally to Brussels and in turn refunded from there through the individual biotech projects all over Europe. In this connection we must take into consideration that it is by no means possible that every single member state will get back the precise sum which has been paid into the research kitty in Brussels, rather it is more likely that individual countries will compete against one another. So it will depend on the competence and efficiency of the groups claiming these funds whether there will be a corresponding return flow of research money.

In this respect we must regrettable state that at least in recent years the share of cardio-thoracic research projects in the European Union biotech programme has been exceedingly small, since we and others obviously avail ourselves of this financing possibility far too rarely (Fig. 3). In my experience there also exists a deal of ignorance about how to set up such projects and how to obtain research funding.

In principle, it is naturally important to plan a good project and the higher the scientific content of such a project is, the greater the chance, naturally enough, of receiving research funding from Brussels. According to experience, however, this does not suffice for the allocation of this single grant. More importantly, in the selection of individual research projects, next to the criterion of absolute scientificity, there is a second selection process which takes certain regional policy and other aspects into consideration.

In practice this means that projects in which a number of the contractors originate from the heartland’s of the European Union, but a number come nonetheless

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<th>Topics (Selection)</th>
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<td>Cancer Research</td>
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<td>Cardio-Vascular Disease</td>
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<td>Total</td>
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Fig. 3. Biomedicine and Public Health Research (projects of the Biomed Program). Third Call of the European Commission, December 1996.
from somewhat worse off peripheral areas, who will have a greater chance of acceptance and allotment of funds, than those that only consider scientific content.

Additionally, the European Association will have to engage in an increased level of lobbying in Brussels. I would like to put forward the idea of having a permanent accredited representative for exactly this function at the Office of the Director General for Health and Science in Brussels.

The advent of the internet and e-mail seems to have made it easier to conduct research and to communicate with one another even over a distance of thousands of kilometres. The European Association has taken this development into account and set up an Internet Committee under Paul Sergeants. I can only invite you to take advantage of this new facility.

All this will not however suffice and turn research in cardio-thoracic surgery into an economic factor and thereby also a means of creating jobs. In this case it seems to me to be of great importance that a change in thinking takes place, so that research, aims not only at scientific, but also at commercial results. Nevertheless, in order to be successful, the state must be prepared to improve the rules of play. As a rule European tax laws make it far more difficult than in the United States, for instance to win over risk capital for research and development. Not until an equilibrium compared with the United States has been attained here in Europe in this matter will our profession develop further in the fields of biomedical engineering and medical technology in respect of their industrial exploitation. It is additionally essential that we present the findings of our research appropriately and offer them in an adequate way to those responsible for industrial implementation.

Much has gone wrong in the past and continues to go wrong at present! Let me explain this with the help of an example.

In Vienna we began very early, even before most centres in the USA, in 1968, with research into a balloon pump, treating the first patients successfully in 1969 [2]. During this time we already had full automatic control, a safety mechanism and many other things, manifestly in advance of such equipment to appear on the market but we were not able and we also did not have the intention towards the direction of commercial exploitation and industrial cooperation. Today the market leader, a US company, employs some 2000 people.

The same happened a few years later with our pumps for circulatory support [3]. Fortunately we were more successful with the fibrin glue because we published its first successful use in cardiac-surgery in 1976 [4]. Today the annual sales rate of fibrin glue worldwide is about 100 million US dollars However, the company which was originally Austrian–Swiss is now hailed as one of the biggest American health care firms.

I believe that we shall have to make more of an effort in the future than we have done up to now to change our point of view and that we shall have to strive much more than we have done up to now to put our findings at the disposal of the community as a whole and we must above all assist in industrial realisation in the sense of wealth-creation and job-creation.

Europe has not lost yet. I believe, however, that we will have to put more effort into our future in order to push forward research in our profession. It is imperative that we look beyond our own narrow confines and disregarding the interests of the, globally speaking, small European countries plan out and venture upon a common European effort in order to rise to the challenges more than we have done up to now. For this we have to create the appropriate climate for research at all our institutions. We have to convince our politicians that next to direct research assistance the application of risk capital to, above all, industrial implementation will be made easier. Parallel to which the decision making processes in the over-bureaucratised centre of the European Union in Brussels will have to be accelerated and made more transparent. We have to assist our East European countries to achieve as fast as possible western standards. The EACTS has contributed to this issue and has provided an East European committee to support CT-surgeons from these countries.

In order to render everything more efficient the EACTS sees itself as an agency. The task of its ruling body is not only to represent the profession in an appropriate way but also to render such assistance through its committees and thus guarantee successful research for Europe and for our patients and to contribute to an expanding industry which, in turn, is essential for the maintenance of the high standard of our profession.

That I could discuss all these issues with you as your president is one of the highlights of my professional career. That I came to this position I want to thank all the people who taught, trained and helped me over the years and I thank all of you that you gave me the privilege of the floor and that you have listened to me. Thank you very much.

References