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CLINICAL RESEARCH

Safeguarding continuing cardiovascular research excellence and quality publications in France: A working document from the French Society of Cardiology☆

Préserver l'excellence de la recherche cardiovasculaire française et de ses publications — un document de travail de la Société française de cardiologie

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Abbreviations: CCF, College of Cardiologists in Training; GRRC, Groupe de Réflexion sur la Recherche Cardiovasculaire; FSC, French Society of Cardiology.

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KEYWORDS
Cardiovascular research;
Excellence;
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Summary
Background. — France has a long history of successful cardiovascular research and scientific innovations, but its continued success cannot be taken for granted.
Aims. — To identify current obstacles to cardiovascular research in France and to crystallize the analysis into recommendations for maintained and enhanced research excellence in the future.
Methods. — The French Society of Cardiology set up seven Working Groups, each comprising four to eight cardiologists, covering a spectrum of research institutes, hospitals, specialties, ages and research experience. The Working Groups met regularly in person or by conference call to analyse experiences, refine situation assessments and formulate recommendations for improvements. Results and suggestions were presented to a Core Team, which worked to synthesize, prioritize and organize the findings into a consolidated situation assessment and generate a set of action-orientated recommendations.
Results. — Four key areas of action were identified: stronger focus on the generation of high-quality data; facilitation of future cardiovascular research; greater promotion and support for research among young cardiologists; and increased focus and support for communications. Most recommendations targeted structural shortcomings and may be implemented at low additional financial cost.
Conclusions. — It is possible to maintain, and even increase, the quality of cardiovascular research in France and to boost the conversion of successful projects into high-impact publications, without major increases in funding. Intense collaboration between specialties and organizations is necessary to achieve sustainable results.

MOTS CLÉS
Recherche cardiovasculaire ;
Excellence ;
France ;
Recherche clinique et fondamentale

Résumé
Objectifs. — Identifier les obstacles actuels à la recherche cardiovasculaire en France et cristalliser l'analyse en recommandations pour maintenir et améliorer l'excellence de la recherche dans l'avenir.
Méthodes. — La Société française de cardiologie a mis en place sept groupes de travail, chacun composé de quatre à huit cardiologues, couvrant un spectre d'instituts de recherche, d'hôpitaux, de spécialités, d'âges et d'expériences de recherche. Les groupes de travail se sont réunis régulièrement en personne ou par téléconférence pour réaliser l'état des lieux, affiner les évaluations de situation et formuler des recommandations. Les résultats et les suggestions ont été présentés à l'ensemble des membres de ces groupes qui s'est employé à synthétiser, hiérarchiser et organiser les conclusions en une évaluation consolidée de la situation et à formuler un ensemble de recommandations axées sur l'action.
Résultats. — Quatre domaines d'action clés ont été identifiés : mettre davantage l'accent sur la production de données de haute qualité ; faciliter la recherche cardiovasculaire future ; accroître la promotion et le soutien de la recherche chez les jeunes cardiologues ; et mettre davantage l'accent sur la communication et la soutenir. La plupart des recommandations visaient des lacunes structurelles et pouvaient être mises en œuvre à faible coût financier supplémentaire.
Conclusions. — Il est possible de maintenir, voire d'améliorer, la qualité de la recherche cardiovasculaire en France et de dynamiser la conversion de projets réussis en publications à fort impact, sans une augmentation trop importante du financement. Une collaboration intense entre les spécialités et les organisations est nécessaire pour obtenir des résultats durables.

Background

France has a long history of successful cardiovascular research. Some transformational therapies, such as cardiac resynchronization therapy and transaortic valve implantation, were first developed by French researchers [1,2]. Grounded in an excellent education system and enjoying access and exchanges with researchers from the international community, French cardiovascular research has reliably scored highly in international comparisons.

Continued success cannot be taken for granted, however. In a companion article to this document [3], Bouleti et al.

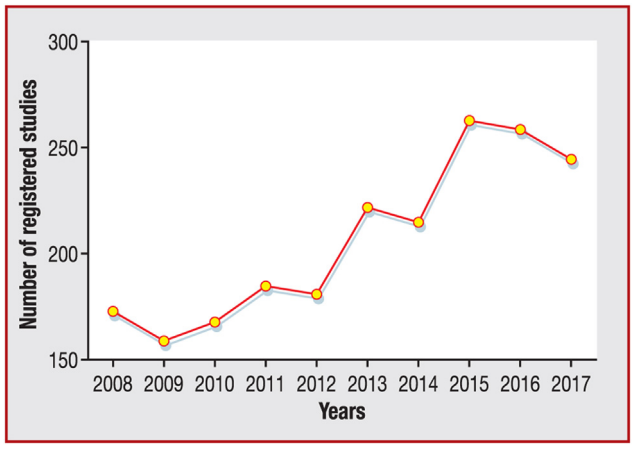

Figure 1. Number of cardiovascular studies registered on clinicaltrials.gov by French research teams in the years 2008 to 2017.

report on an analysis of publications, citation scores and initiations of new clinical studies in cardiovascular medicine. Their findings indicate a trend towards shrinking numbers of international publications by French researchers. In the years 2009 to 2018, ever fewer abstracts were submitted to, as well as accepted by, the international European Society of Cardiology congress. French research teams continue to publish in high-impact journals, but the trend 2005 to 2015 is stable or weakening. Considering the steady overall increase in publications as science continues to globalize, stable numbers may indicate a relative decline.

The trend towards comparably fewer publications is in contrast to an increased number of cardiovascular studies registered on the international registry, clinicaltrials.gov (Fig. 1). French researchers have registered more studies than any other country except for the US and Germany over the past 10 years. What is striking is the seemingly low rate at which research endeavours are turned into quality — or indeed any — publications.

Currently, cardiovascular research papers written by French investigators are the fifth most cited among European countries, and eighth globally. Yet only half of approved research projects result in peer-reviewed publications, indicating that a large amount of data from research projects are not put to productive work [3]. Counts of publications, impact factors and trials registrations are no more than proxies for research quality and are open to interpretation. Nevertheless, the observed trends send a signal about the long-term development of French cardiovascular research. Reversing the negative trend at an early stage requires the identification of areas where support and structural improvement would have the greatest impact.

To more closely assess the situation and to identify targeted actions to improve the quality of French cardiovascular research, publication scores and return on investment in the future, the French Society of Cardiology (FSC) set up a number of working groups with the brief to identify current strengths and future potential for improvements. The present document represents the core findings and ensuing recommendations. It is intended to serve as a guidance for constructive collaborative actions directed at ensuring France's continuing position among the highest echelons of cardiovascular research and communication.

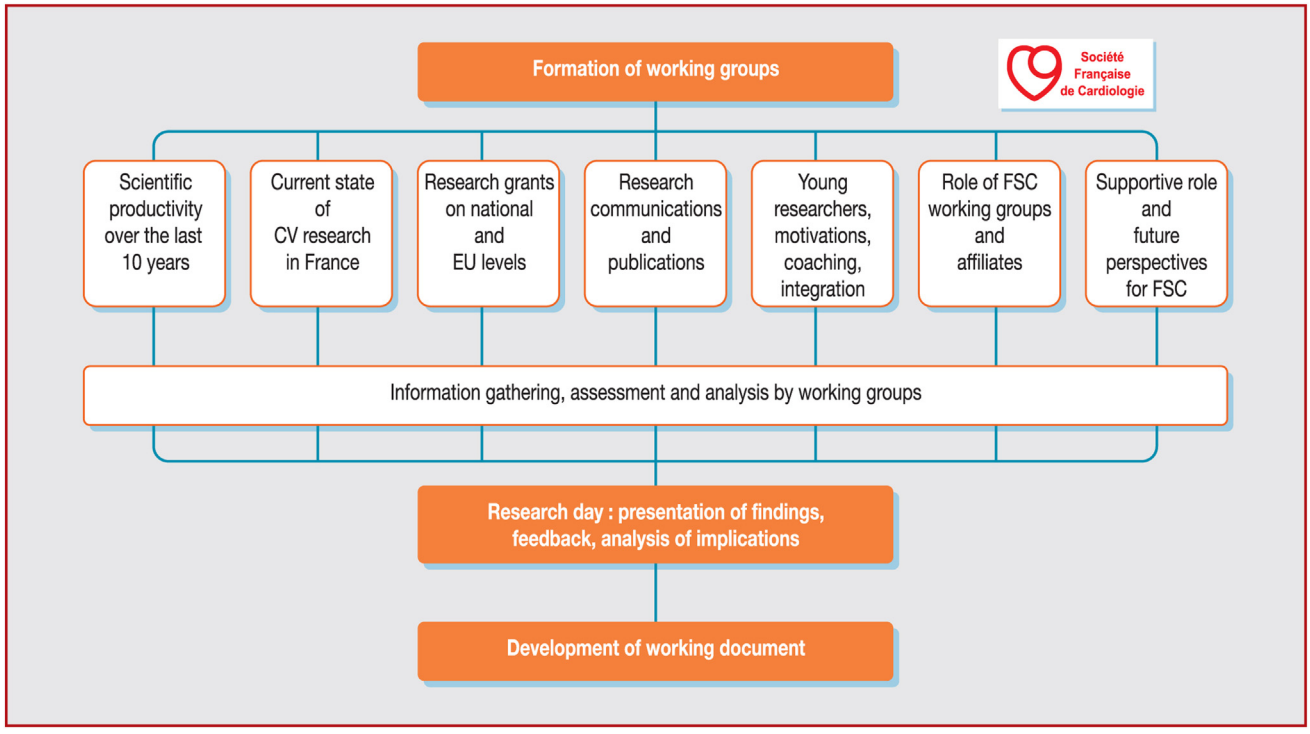

Figure 2. Assessment and evaluation process.

Methods

The FSC initiated in March 2018 a collaborate effort between nationwide members to identify and address current barriers to quality cardiovascular research and high-impact publications in France. Seven working groups were formed, under the auspices of the Society (Fig. 2). Each working group comprised four to eight academic and non-academic cardiologists covering a wide spectrum of research institutes, hospitals, specialties, ages and research experience. During a 6-month period of information gathering, the groups analysed experiences of the current situation and analysed areas of improvements. The working groups met regularly in person or by conference call to align and refine the assessments and recommendations.

After the period of information gathering, representatives from all teams gathered for a day of cross-specialty feedback, analysis and development of initial recommendations. The implications of each group's findings were debated and consensus sought as far as possible. Based on the presented analyses and suggestions, the Core Team worked to synthesize, prioritize and organize the materials into a situation assessment, and to formulate a set of action-orientated recommendations to improve the future of French cardiovascular research. The current paper presents the digested outcome of this collaborative effort.

Results

The assessment process identified four key areas that could be targeted by actions with high potential for success:

- stronger focus on the generation of high-quality data;
- facilitation of future cardiovascular research;
- greater promotion and support for research among young cardiologists;
- increased focus and support for communications.

A condensed summary of the recommendations is provided in Table 1.

Stronger focus on the generation of high-quality data

The quality of universities and research institutes in France is generally high. There is a large volume of ongoing cardiovascular research programmes, as demonstrated by the continual increase in entries on the clinicaltrials.gov registry. The challenge is how to turn these resources into quality research and high-ranking scientific publications. Deeper and more innovative analyses and a push for more manuscripts from available results would result in many more publications and a greater exposure of research. These observations suggest that the main problem is not financial but structural, although adequate financing would help address the situation. Some of these, such as the national FRANCE 2 registry, have resulted in more than 30 quality publications over the years [4–7]. Regional registries are also growing in number and are generating publications [8].

The Working Group built on the above insights to formulate the following recommendations:

- establish the role of a Central Research Referent under the aegis of the FSC with the brief to coordinate applications between different teams and mediate communication between research groups. Templates should be harmonized between different grant bodies. The services of the ''FSC research team network'' would increase the opportunities for collaboration, within and between specialties, and reduce overlap between research projects. The FSC suggests to designate a team from different cardiovascular specialties, which can be rotated regularly to ensure an appropriate workload as well as neutrality;
- France is currently lagging behind countries such as the US or northern European countries (Sweden, Denmark) on the use of Big Data for medical research [9,10]. A French ''super registry'' would allow researchers access to the national insurance registry (SNIIRAM), as well as data from national and regional databases. The super registry would need a gatekeeper to warrant appropriate use of the data as well as high-quality of conducted research. The FSC would be actively involved in this process;
- currently, research productivity at French universities is evaluated using the SIGAPS score [11], which was developed specifically for this country (for details, see Table 2). The SIGAPS score might be modified and used as a ''nudge tool'': an adapted score with greater emphasis on quality publications would stimulate researchers to search for greater excellence and less on sheer quantity.

Facilitate future cardiovascular research

French cardiovascular research is moderately well supported financially. However, at least as important as increased funding is the fact that current money is not put to the most productive use. The Working Groups identified a number of obstacles and possible improvements to increase the efficiency of setting up research projects.

A ''one-stop-shop'' research funding by different organizations should be established. Members would be, for example, the French Federation of Cardiology, the FSC and the French Heart Foundation. By harmonizing submission dossiers and increasing networking between researchers and funding bodies, this would speed up processes and avoid overlaps. The central resource should also provide information on European funding programmes and assistance with application processes. A repository of ''best practices'' could serve young researchers with models of dossiers to follow.

There is less collaboration between industry and academic researchers in France than in countries such as the US, UK or Germany. The FSC may act as mediator and explore possible funding. A portal for information exchange and exploratory discussions with commercial entities may facilitate funding for entire or parts of research projects.

The FSC should provide training in running research projects to help avoid mistakes and increase the efficiency of projects.

A searchable online registry of consulting experts should be set up for ethics committees to draw upon, which might

Table 1 Condensed summary of recommendations.

Objective	Recommendations	Expertise, competence, collaborations to be explored
Stronger focus on the generation of high-quality data	Set up a ''super PHRC'' government-funded clinical research programme Support Big Data and a super registry Modify SIGAPS core to support research quality over pure quantity	FSC/DGOS/SNDS
Facilitate future cardiovascular research	''One-stop-shop'' for research funding Improve relations between academic and commercial research Provide training in running research projects Online repository of experts as resource for ethics committees	CPP/FSC/partners from industry
Greater promotion and support for research among young cardiologists	Greater emphasis on research in the curriculum More grants and dedicated time for writing theses and papers Tie masters theses closer to research programmes Support writing of theses in formats suitable for publication Provide online training in research methods Set up professional medical writing and statistical support services Publicize ongoing research projects	FSC/CNEC
Increased focus and support for communications	Establish dedicated communications role at each college Promote and facilitate interdisciplinary communication Expand the FSC internet platform as searchable resource Elevate the status of the ACVD journal Explore modes of accessible communication with the general public	CCF/groups and affiliates/ACVD

ACVD: *Archives of Cardiovascular Diseases*; CCF: College of Cardiologists in Training; CNEC : collège national des enseignants de cardiology; CPP : comité de protection des personnes; DGOS : direction générale de l'organisation de la santé; FSC: French Society of Cardiology; SNDS : système national des données de santé.

improve the scientific quality and speed up a process that is currently slow.

Greater promotion and support for research among young cardiologists

Only a small minority of young interns and hospital physicians have published in the international literature. Current medical curricula put a low emphasis on research, and trainee cardiologists clearly need greater support:

- increase the emphasis on research in the curriculum, with increased training in statistics and research methods, as well in manuscript writing and oral research presentation in English;
- provide grants earmarked for writing masters theses and papers;
- tie the writing of master theses closer to research programmes and support writing in formats suitable for publication;
- provide training in research methods on existing educational online platforms such as *système informatisé distribué d'évaluation en santé* (SIDES);
- provide support for interns' training days to be used in research and scientific publication;
- set up professional medical writing and statistical support services for young researchers;
- set up an FSC repository of ongoing research projects and opportunities for young cardiologists to collaborate, which would help kick-start their entry into the research community.

Table 2 Calculation of SIGAPS score 1. A publication is classified into one of 6 categories, based on impact factor. Two subscores are calculated: impact factor (IF), stratified from A (highest) to NC (lowest). Points are accorded as detailed below; authorship position, classified from first or senior author (4), second (3), third, (2) or other (1). These two subscores are multiplied to generate the final SIGAPS score, which can range from 32 (first or senior author of high-impact publication) to 1 (minor coauthor of low-impact publication).

Category	C1
A	8
B	6
C	4
D	3
E	2
NC	1

Some of the services above might be explored together with existing organizations such as the College of Cardiologists in Training (CCF), a daughter organization of the FSC, which has an established presence on social media and is successful at providing networking opportunities.

Increased focus and support for communications

Large communications gaps exist, both within the research community and with the general public. Importantly, there is only a low level of communication between preclinical and clinical researchers. As a consequence, promising preclinical findings may not be developed in further clinical research. Moreover, public awareness and acceptance of medical research is lower in France than in many other countries, which reduces support for public — private partnership funding and may be demotivating for young researchers. Currently, the *groupe de réflexion sur la recherche cardiovasculaire* (GRRC) is furthering closer communication between young preclinical researchers and clinical cardiologists. An intensified collaboration, or merger between GRRC and FSC, is planned, which would generate further synergies, but more work will be needed.

As with the other recommendations, improvements suggested by the Working Groups are largely structural and not necessarily dependent on increased funding:

- promote and facilitate interdisciplinary communication and networking between basic and applied research;
- establish a dedicated communications role at each college, affiliate and working group at the FSC. These individuals should meet annually to assess the situation and work out future strategy;
- expand the FSC internet platform as a searchable resource for information on communication contacts, sources of funding and grants;
- elevate the status of *Archives of Cardiovascular Diseases* by encouraging submission of publicly supported research (perhaps as a condition for grant approvals) as well as citations of papers published in the journal and thus contributing to the overall recognition of the input from the French cardiology community. By continuing to raise the Impact Factor, this will increase the ability of the journal to attract even higher quality submissions;
- explore modes of accessible communication with the general public and patient associations to detoxify the reputation of public—private research collaborations.

No single organization can implement these recommendations on its own. The FSC calls for the involvement of a number of affiliate organizations to draw on their variety of expertise and competence, in particular the solid foundation established by the GRRC. Suggestions are provided in Table 1.

Discussion

Research is the engine driving progress in medicine. High-quality research has a knock-on effect on the quality of current and future therapies, which translates into improved quality of life for patients. Interaction between successful researchers transfers knowledge and experience between specialties as well as generations. This in turn feeds back into stronger research in a positive circuit. Conversely, decline can accelerate in a negative feedback loop.

Despite a favourable environment, France performance in health research is at risk of lagging behind European countries with similar gross national product. The current paper makes a number of action-orientated recommendations to support continuing cardiovascular research excellence in France. It represents a collaborative effort of cardiologists from all areas of the country. Most of the recommendations target structural barriers common to many research organizations. In addition to structural barriers, we found that improved networking and higher educational training may significantly improve French cardiovascular research efficiency and visibility.

Two objectives drove the effort: to maintain and elevate the quality of cardiovascular research in France, and to boost the conversion of successful projects into high-impact publications. While some of our suggestions, notably those aimed at improving communications between research teams, will have effects on both outcomes, others will address one or the other problem.

The recommendations range from short-term solutions to changes that will bear fruit only over several years. The fact that half of currently approved research projects result in no peer-reviewed publication tells us that a huge amount of data are currently gathering dust in French research institutes due to lack of time and motivation for researchers to write up their results. Even when discounting failed projects, to identify unpublished results and provide researchers support with medical writing would produce a rapid short-term boost to the country's publication record. But current research funding makes no provision for medical writing assistance or training. An online service function within the FSC organization could help address the problem by, for example, providing rapid evaluation of research results, advice, support and perhaps contacts to other researchers willing to help with evaluation and manuscript writing in exchange for coauthorship, as appropriate. This would act as a stimulus to all involved. At the other end, it may take time and organizational effort

to establish a ''super registry''. But once up and running, such data sources would generate quality analyses and high-impact publications over the decades to come.

Most of the suggestions are structural rather than calls for increased funding. Intensified interdisciplinary communication, deeper involvement and coaching of young cardiologists, stronger focus on theses written in a publication-ready format; these are changes that need no additional personnel. Whether a dedicated communications role can be established at each college within current budgets is an open question. Some services will need initial resources, for example, the ''one-stop-shop'' for research funding, the online repository of experts to assist ethics committees or the expanded FSC internet platform as a searchable resource. But once up and running, such resources may pay for themselves by reducing redundancy and improving productivity.

Some services do need serious financial consideration, especially those intended to aid cardiologists in training. Online training in research methods may be a low-budget solution but it will not come free of costs. The provision of professional medical writing and statistical support services for young researchers is associated with headcounts or service fees, whichever format of collaboration is developed. This needs no apology: French cardiology can only thrive if young cardiology researchers receive sufficient support. Moreover, these services would have an immediate positive influence on the rate of conversion of research grants into publications. As this facilitates approval of further grants, it offsets some of the costs for the services.

Compared with many other countries, collaboration between academic researchers and commercial entities is at a low level in France. This is a difficult balancing act. The current recommendations focus on public funding, but the need for better relations and greater involvement of commercial partners in future research is large. Large, randomized multicentre long-term outcome studies are often beyond the resources of public financing alone. Only a public — private working group could address the problem though, probably including representatives from the general public. This is beyond the scope of the current recommendations.

Assessments of research productivity and quality are only as good as the underlying methods. Worldwide, publication counts and citation scores are used to grade research. In France, the development of the SIGAPS score has provided a more sophisticated proxy than those used by other countries. The score offers an unrealized opportunity to influence the behaviour of researchers. Any performance measure will modify behaviours towards maximizing the score. As SIGAPS currently emphasizes publication numbers over quality, it may reward researchers who work on run-of-the-mill projects (''me-too research'') and disincentivize risk taking. A modified SIGAP score may nudge the scientific community in more positive directions.

Despite the recent trends in international publications, French cardiovascular research remains world class. Our exercise identified a number of brakes and obstacles that may be responsible for the slowdown. Targeted actions with reasonable financial expenditure may unlock the unrealized potential in the French system and clear the path to enhanced research excellence in the future.

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Disclosure of interest

The authors declare that they have no competing interest.

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