ASSESSMENT OF RESEARCH QUALITY

DENTAL RESEARCH IN THE NETHERLANDS 2001-2006

NOVEMBER 2007
I  INTRODUCTION

Scope and context of this review

This report presents the results of the evaluation by an international Review Committee of (i) dental research in the Netherlands in general; (ii) the evaluation of 19 individual research programs at ACTA (the merger of the dental faculties of the University of Amsterdam and the VU University Amsterdam), the University of Groningen and the Radboud University of Nijmegen; and (iii) the evaluation of the PhD program at ACTA.

The evaluation was carried out October-November 2007 in accordance with the Standard Evaluation Protocol 2003-2009 for public research organizations (SEP) as published by the Association of Universities in the Netherlands (VSNU), the Netherlands Organization for Scientific Research (NWO), and the Royal Netherlands Academy of Arts and Sciences (KNAW) in January 2003. Following the guidelines of the Standard Evaluation Protocol, § 3.2, a Discipline Protocol for dental research was produced (see Appendix 1).

In this document, the international Review Committee reports its findings. For brief curricula vitae of the Committee members, see Appendix 2.

Materials provided to the Committee beforehand

Two self-evaluation reports (covering 2001-2003 and 2004-2006, respectively) had been prepared by the participating institutes and sent to the members of the Committee prior to the site visit of the Committee. These self-evaluation reports comprised information pertaining to various aspects of dental research in the Netherlands; detailed documentation regarding the 19 individual research programs; as well as descriptions of the PhD training at ACTA. The Committee received, in addition to the self-evaluation, a number of other documents aimed at giving an insight into Dutch dental research.

The informative self-evaluation reports served as the main source of written information for the Committee. Information available in the self-evaluation is not repeated in this report.

Procedures followed by the Committee

Prior to the site visit, the members of the Committee had four weeks to study the self-evaluation and the other documents in order to enable a preliminary review of dental research in the Netherlands in general, as well as of the individual research programs and the PhD program at ACTA. All Committee members pre-assessed dentistry in the Netherlands in general and the PhD program at ACTA. The individual research programs were pre-assessed as well with one Committee member acting as a principal reviewer.

The site visit itself commenced with the formal installation of the Committee by the Dean of ACTA on behalf of the participating universities. During the following three days of the site visit, the committee interviewed the board of the Interuniversitaire
Onderzoekschool Tandheelkunde (IOT), the directors of the individual research programs together with a number of senior researchers, as well as post-docs and PhD students at the participating universities (see Appendix 3 for the program of the site-visit).

The site visit was concluded with a short oral presentation by the chairman of some preliminary impressions of the Committee to the dental academic community.

The final conclusions and scores for dental research in the Netherlands in general, for each individual research program, and for the PhD training at ACTA were established in discussions within the Committee.

Finally, the Committee wants to take the opportunity to extend its sincere appreciation to all individuals who participated in the thorough preparations for this evaluation exercise. Specifically, the contributions by the Committee’s secretary Mr. N.R.J. (Klaas) Deen to the whole assessment procedure – before, during and after – as well as the assistance by the Committee’s liaison officer with the IOT, Dr. Martijn van Steenbergen, deserve to be highlighted.

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Upon filing the assessment by the Committee, the IOT asked for and was provided with the opportunity to point out factual errors in the report. Based on the IOT feedback, a few inaccuracies were corrected, and some re-wordings were made for clarification. None of these amendments have changed the evaluations made.

At the same time, however, suggestions were made by the IOT to make changes to the evaluation of specific programs with a view to obtain more favorable assessments. The Committee finds these suggestions unprecedented. The Committee’s viewpoint is that following such suggestions would undermine the purpose of organizing a research assessment by an independent international committee and jeopardize the integrity of the Committee members. Compliance with the suggestions to rewrite certain parts of the report would compromise its value as an independent opinion. The Committee therefore only made amendments to the effect of increasing clarity and removing phrasings that might distract from the intended meaning.

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The assessment report as it now appears is endorsed unanimously by the Committee. The Committee hopes that its report will contribute to further heighten the level of dental research in the Netherlands.
II General Assessment of Dental Research in the Netherlands

The Committee has come to the general conclusion that, in an international perspective, Dutch dental research generally maintains a high level. As a whole, it is among the leading in the world. It has breadth and covers most of the essential areas of dentistry, it is solid, and it has a constant high quality. Publication activity is typically high, and publications are accepted in the relevant international journals. Research projects have, by and large, both a good scientific and societal relevance. As a rule, the researchers have a network of national and international collaborations, and the research facilities are good, both for laboratory-centered and and patient-oriented research.

The Committee considers the total research spectrum in Dutch dental research as commendable – comprising several groups with a cellular and molecular orientation, at the one end, through materials science and clinical studies, to behavioral science and epidemiology, at the other. In contrast to dental research in many other countries, Dutch dental research is characterized by a healthy blend of researchers with different academic backgrounds who participate in both basic and clinical research programs. This mix of researchers lends itself to providing ample opportunities for novel research strategies and methodologies and prevents academic isolationism as well. In several fields, the research activities at the different dental schools supplement each other in a beneficial way.

A general impression is that basic research findings – whether in the molecular or in the behavioral sciences – are consistently considered in a ‘translational perspective’, i.e. aimed at being put to use for the benefit of patients and populations. Although publications in the international scientific literature is the hard currency of research, the Committee has also noted with approval the publication activity (usually in Dutch) aimed at the dental profession by the research groups assessed.

The Committee would also like to point to the in-built schism in focusing primarily on journal impact factors (IF:s) as a key measure of dental research quality. IF:s are calculated for a journal, not a specific article or researcher. There is also a clear risk that the focus on high IF:s translates into a focus on publications in more biomedically oriented journals that usually have higher 2-year IF:s than do dental research journals in general, thus risking to turn the research focus away in certain areas from issues that have special relevance to dentistry/oral health. In other words, focus on high impact factors may partly tend to undermine the concept of Dental Research.

The Committee has considered the longitudinal development of Dutch dental research based on a comparison with earlier assessments. The quality and output has remained high during the latest period, although the dental research in the Netherlands has, by and large, continued along the same lines as earlier. With a couple of notable exceptions, essentially the identical type of research has been performed the last decade. Given the over-all strength of Dutch dental research, the number of groups performing truly cutting-edge research might have been expected to be higher, and there is no research line that stands out as highly unique in an international perspective. The Committee wonders whether this is a result of the high focus on the bibliometric indicators as measures of research output, causing researchers to orientate towards mainstream ideas rather than attempting to go for more ‘risky’ novel lines of thinking.
In this context, the Committee is aware that most of the research is carried out by PhD students, who are faced with tight deadlines and demands in terms of the number of scientific publications needed to be allowed a PhD thesis defense. These constraints obviously work against the idea of embarking on novel research lines, the results of which may not lead to the desired number of publications within the time limits with the necessary degree of certainty.

The Committee has thus, to some length, discussed the question of innovativeness in Dutch dental research. It was considered that there needs to be room for scientific renewal in terms of novel research questions that can be approached. The present situation is still, to a large extent, a result of the drastic organizational changes and cut-backs affecting dental schools in the Netherlands some 20 years ago, implying that there have been limited degrees of freedom for reorientations. The shift of generations, which has now commenced, should be taken as an opportunity to discuss possible directional changes in Dutch dental research. A crucial question for the future would thus be to ensure the existence of mechanisms for detection and implementation of novel lines of research. However, the Committee also recognizes that “what you measure is what you get”, which suggests that indicators of novelty be incorporated in assessment criteria to an even higher degree.

In this context, the committee would suggest the IOT to take on a strategic discussion on the concept of ‘dental research’, i.e. a discussion about the various aspects of this research field and its delineation, including a clarification of problems within odontology that await their solutions. While it is obvious that dental research should contribute to the general biomedical knowledge basis – and this is clearly being done in the Netherlands – there may be inherent risks with this as well. Although it is important to ensure that dental research is indeed competitive, too much focus on bibliometric arithmetic as ‘success indicator’ may cause losing track of what dental research is at all about.

The Committee further suggests that there is need for national research funding agencies to be educated about dental research, its character and prerequisites. When competing for funds with the medical researchers, who represent diseases with high mortality and morbidity, and the basic biologists with their armamentarium of molecular techniques, it is important to be able to stress the relevance of the dental proposals.

A worrying factor for dental research in the Netherlands is the development in government funding, implying a redistribution of resources from the universities to the NWO. Even though it is principally sound that allocation of research funds should be based on competition, it is obvious, as was also noted by the previous evaluation Committee, that a firm basis of ‘first source’ money of some volume is a *sine qua non*. A critical scientific mass is a necessity for being able to compete for ‘high-quality’ external funds. A certain basic resource supply is also a prophylactic means against the research becoming too opportunistic, which in the case of dental research may lead the research into a few, by now, all too well-worn paths.

In this context, the Committee has to point to the strikingly odd funding situation for dental research in terms of ‘first source’ money at the University of Groningen. The Committee has, for obvious reasons, had no possibilities in looking further into this, but it is clear that such an untenable situation deserves further analysis.
Given the increasing need to attract external funds, the Committee advises investigating the possibility of a shared dental core facility that could aid in identification of possible sources of funds, grant writing, application procedures, grant administration, reporting etc. This would seem particularly pertinent for the purpose of being able to compete for major grants from the EU, NIH etc. It might be that the (secretariat of the) IOT could play a role in this.

To keep dental research in the Netherlands healthy and to replenish the odontological faculties, it is essential to attract young researchers, both with a dentistry and a non-dentistry background. PhD training seems in general to be quite efficient, having been coordinated by the IOT in the past. At present, PhD training is organized locally, by the medical faculties in Groningen and Nijmegen, respectively, and at ACTA. The general wish of the Dutch universities to emphasize their own respective profiles is a stated fact, and there is no reason why research training should not be able to have the same high quality regardless of location. The apparent very high number of PhD students per senior research staff at places is striking, however, and needs to be considered.

The formal position of IOT has thus changed fundamentally, in that the IOT is not anymore a formally recognized national research school and has no responsibilities for the coordination of PhD training programs. However, the Committee was pleased to hear that the IOT Board will continue its role of stimulating dental research in the Netherlands in different ways. The Committee thus wants to explicitly emphasize that the IOT is a valuable asset for Dutch dental research, even though its precise role has changed and may not be entirely defined yet. An organization like the IOT would be looked upon with envy in many countries, so the Committee advises the Dutch dental research community to make ample use of this vehicle. A major role of the IOT for the future should be to bring together dental researchers in the Netherlands for mutual exposure, as well as to nurture the ‘dental dimension’ in the local PhD programs.

A sufficient influx of scientifically competent and active dentists into the academic system is essential for the future of Dutch dental research and education. In this context, the Committee has some worries about the mechanisms for producing truly excellent researchers with a dentistry background and to make them remain and thrive in the academic system after the PhD exam. An academic career does not seem to be sufficiently attractive in competitive terms compared to working clinically as a dentist.

The Committee also wants to express its astonishment about the exceedingly low number of PhDs who make a post-doctoral sojourn abroad. Going on a post-doc for a year or more in another research environment is an important part in shaping a young researcher, and a steady stream of returning post-docs is an efficient way of oxygenating a research organization, bringing in new techniques, attitudes and research inclinations. There seems to be no efficacious program aimed at stimulating such post-doctoral excursions, neither at the respective universities, nor at the national level. A well-designed program to this effect should be able to overcome putative practical obstacles and should attract young aspiring dental researchers.

Finally, during the site visit the Committee asked for and was provided with itemized information on what had been done in response to the recommendations made by the previous IOT Review Committee, six years ago. The Committee noted with acclaim that those recommendations had been taken seriously and had had an obvious impact, in that essentially all recommendations had resulted in valuable changes and amendments.
III ASSESSMENTS OF THE RESEARCH PROGRAMS

Before moving over to the evaluation of the individual programs, the Committee would like to make a few general statements in this regard:

The Committee wants to emphasize that it has made its evaluation of the 19 programs with a focus on their stated research mission and comprehensiveness as programs, their scientific novelty and output, international standing, leadership and future. A major reason for this is that the organization of research into focused programs, each with a scientific critical mass, as has been done since quite some time, could be considered as a fundamental strength in Dutch dental research.

The discipline protocol defines a research program as “a coherent set of research activities having a common mission and being the work of a group of people who ideally work together on a daily basis”. Not all of the nineteen research programs fit with this definition. As a matter of fact, several programs appear rather to represent the research performed within a specific academic department. This was especially evident in a few instances where the ‘research program umbrella’ encompassed a number of quite diverse research themes.

Besides compromising the idea underpinning a focused research program, this caused some problems in cases where the ‘sub-lines’ differed considerably in quality and output. For that reason, the Committee has made, when necessary, a distinction in scoring between the different sub-lines in a research program or otherwise described what has been scored and why.

There is also a need to make a comment about the scoring system as defined in the Standard Evaluation Protocol (SEP) and utilized in this assessment exercise:

5 – Excellent: Work that is at the forefront internationally, and which most likely will have an important and substantial impact in the field. Institute is considered an international leader.
4 – Very good: Work that is internationally competitive and is expected to make a significant contribution; nationally speaking at the forefront of the field. Institute is considered international player, national leader.
3 – Good: Work that is competitive at the national level and will probably make a valuable contribution in the international field. Institute is considered internationally visible and a national player.
2 – Satisfactory: Work that is solid but not exciting, will add to our understanding and is in principle worthy of support. It is considered of less priority than work in the above categories. Institute is nationally visible.
1 – Unsatisfactory: Work that is neither solid nor exciting, flawed in the scientific and or technical approach, repetitions of other work, etc. Work not worthy of pursuing.

The Committee adhered strictly to the definition of the scores as shown above and used the whole scale. The main reason was to avoid the noticeably inflated scoring which is often inherent in this type of peer review exercises, and to maintain a useful tool for the adequate expression of the variation observed between programs. The values given henceforth in this assessment should be viewed with this in mind. While the Committee abstained from the expected use of only the higher scores of the scale, it can nevertheless be noted that the median score for each of the four assessment parameters was 4 for the research programs.
The Committee has evaluated the years 2001 – 2006, perhaps paying somewhat more attention to the later half of this period, whereas post-2006 activities in principle have not been evaluated. Concerning the parameter “relevance” (of a research program), however, the past, the present and the future have been taken into consideration, whereas “vitality and feasibility” of a program have been taken to refer to the present and the foreseeable future.

Assessment of the Dental Research Programs of ACTA

As for dental research at ACTA, the Committee has made a few general observations:

The merger of the dental faculties of the University of Amsterdam and the VU University Amsterdam into one single organization in the shape of ACTA is two decades old and seems to be quite well-settled by now. It remains fairly, if not totally, unique that two universities share a faculty like this, and nothing similar exists in dentistry at other places as far as the Committee is aware. This dual academic parenthood seems to provide considerable synergistic effects and a better access to and utilization of core facilities. The ACTA construction has thus proven very successful, and there is every reason to believe that it will continue to yield fruitful research in the future as well.

A remaining organizational drawback is the localization of research activities at two main campuses. However, the new ACTA building, which will be completed in the near future, will relieve this problem, and the fact that essentially all ACTA research will then take place under one and the same roof will constitute a major improvement. In addition to providing the prerequisites for sharing equipment, for methodological exchange and the like, it will also improve the opportunities for the institution of novel research programs and an increased flexibility in rearranging and amalgamating old ones.

Some of the twelve research programs of ACTA are rather small. The Committee advises ACTA to seek more focus and mass, not least given the expected reduction of future governmental funding. The allocation of ‘first source’ money – in principle – also needs to be made in relation to research output. The retirement of some of the prominent researchers within a few years and the move to the new building in 2010 makes an excellent opportunity for rethinking the research structure within ACTA. Certainly, the Committee recommends that opportunity to be taken to discuss and possibly implement directional changes and additions.

As pointed out for Dutch dental research in general, there is a need for scientific renewal in terms of novel research lines at ACTA as well, and a need to strengthen existing ones by broadening them into cross-departmental ‘real’ research programs.

Finally, in contrast to what was the case in Groningen and Nijmegen, the Committee did not meet a single female program director at ACTA. Given the size of ACTA compared to Groningen and Nijmegen, and the recruitment base in the form of female PhD students, the Committee finds this observation worrying. The Committee recommends that an evaluation is made of the hurdles experienced by women as far as recruitment into senior scientific positions is concerned. The Committee thus hopes that ACTA will have female program directors at the next evaluation.
Oral function and oral rehabilitation: functional anatomy
Program leader: Prof. Dr. W.A. Weijs

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It was noted that Prof. Dr. T.M.G.J. van Eijden, leader for this program during the six-year period being assessed, had passed away in early 2007.

The quality of this research program, which deals with the general question of how jaw muscles, jaws and the jaw joints affect the development, maintenance and degradation of form and function of the masticatory system, has been very good. The approach and ideas are original, and the present program director seems to have a clear vision of the relevant research topics within the field.

The quality of the scientific publications of the group is very good, with some articles in the top journals in the field. The productivity is good as well, although the number of publications directed towards the dental profession has been rather low.

As diseases of the musculoskeletal system are a major health problem, the program is certainly of relevance, but the program also gives insights into the fundamentals of the masticatory system. The committee is optimistic for this program – which is the only one not located within ACTA itself but at the AMC (Academic Medical Center of the University of Amsterdam) – provided that the group strengthens its contacts with other research groups within ACTA. The committee was convinced by the program director as to how this strengthening could occur. The research collaboration within the MOVE initiative also seems to be of value for this program. The program, however, needs to improve its external funding.

Oral function and oral rehabilitation
Program leader: Prof. Dr.ir. M. Naeije

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This research program is quite diverse, in that it reportedly comprises two major research themes - oral kinesiology, on the one hand, and prosthetic dentistry and the quite recently added theme of oral implantology on the other. While the coupling between these parts may be theoretically justified, it was not clear to the Committee how this was substantiated, neither at present, nor for the future.

Taken as a whole, the output for the program must be judged as unsatisfactory. While the oral kinesiology sub-line has produced high-quality publications during the 6-year period, the prosthetic dentistry/implantology theme has had a low scientific productivity (the implantology theme having been introduced only recently, though). The over-all scores for the program are rather low because of this. As the assessment pertains to the whole 6-year period, the quality score was determined by the oral
kinesiology theme. There seems, however, to have been a trend for declining productivity of this sub-line over the last few years.

The continued scientific activity within this program, when the present program leader retires, seems to be assured as far as the ‘oral kinesiology’ theme is concerned. A pertinent question is, of course, the ability for scientific renewal in the area. The Committee is, on the other hand, very pessimistic about the prosthodontics/implantology theme, having difficulties in seeing anything of real scientific vitality and originality. The Committee understands the educational as well as economical interest for ACTA in having an implantology ‘presence’, but its role in this or other research programs needs to be considered. The amalgamation of oral kinesiology and prosthodontics/implantology in one program does not seem to be a fruitful idea in this case. Therefore, the program has received two separate scores for ‘vitality and feasibility’, with the lower score reflecting on the anticipated ‘vitality and feasibility’ of the implantology theme.

Diseases of the dental tissues and their prevention
Program leader: Prof. Dr. J.M. ten Cate

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This program, which focuses on the pathogenesis, etiology and prevention of diseases of the dental hard tissues and the pulp and factors related to successful treatment of diseased tissues, appears quite diverse. One thus gets the impression that the program title is an ‘umbrella’ covering the research lines of the three educational disciplines covered by the department, namely cariology, endodontics, and pedodontics, rather than a research program in the true sense of the concept (see introductory remarks).

The program consists of three sub-lines; biofilm research with a clear inclination towards basic biologic/molecular aspects of early microbial ecology and interaction; clinical endodontics focused to issues in root canal preparation and root canal treatment outcomes; and pedodontics focused to minimally invasive clinical techniques and patient-related aspects of dental treatment. Although some aspects of the endodontics research – root canal infection – are described as part of the main biofilm research sub-line, it is also clear that the remainder of the endodontics sub-line and the pedodontics sub-line stand out as quite separate and patient-near clinical research lines. The Committee doubts whether this will continue to make sense from a research program point of view, particularly as the main sub-line methodologically drifts in the direction of increasing use of molecular and genetic techniques, i.e. increasingly away from the research activities in the two other sub-lines.

This diversity made the Committee’s assessment of the program somewhat difficult, and it was felt necessary to comment the three lines separately, owing to line-specific differences observed. In the scoring for this research program, the first set of scores thus reflects the biofilm theme, while the second set of scores refers to the other two sub-lines.
The program has recently undergone a change such that the focus in the past on the physico–chemical aspects of the caries process has been toned down in favor of a new line of research dedicated to biofilm research. However, it was also clear from the interviews that the former research line remains a major activity, bringing in substantial funds from industry, and for this reason this sub-line will obviously continue to have a place in the program. It is also the former main sub-line of research that has continued to generate most of the scientific output during the review period. The new biofilm sub-line is thus not overwhelmingly manifested in the publications.

As far as the endodontics and pedodontics themes are concerned, these two sub-lines are clearly secondary relative to the main sub-line(s) in terms of publications. This is not a critique of their productivity, as the Committee has not seen it as its task to perform an analysis based on the fte equivalents allocated to each sub-line. However, considering the total program the over-all productivity in relation to the number of research staff is quite disappointing, as the program scores rather low in the ‘per fte’ indicators.

The Committee evaluates the vitality and relevance of the biofilm work quite highly. With the present broad molecular approach there should be a bright future for it, provided there is indeed a focus on this theme, and the long-term succession of the leadership is assured. As far as the two research program sub-lines endodontontology and pedodontics are concerned, the committee suggests that the latter may thematically integrate much better with the “Dental care and dental care systems: quality and efficiency” program, and that the endodontontology theme be more wholeheartedly anchored within the biofilm theme.

It was noted that quite a number of ‘indicators of esteem’ have been bestowed on the program director from the scientific community, including a prestigious KNAW professorship.

**Dental restorations**
Program leader: Prof. Dr. A.J. Feilzer

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The quality of this research program, which focuses on the study of dental materials, instrumentation, methods and techniques used for the restoration of teeth, is very good. It should also be noted that the group’s work is of some strategic importance, being essentially the only group in the Netherlands which makes this type of dental materials research.

The coherence of this multi-disciplinary program is very good, and the program director is dynamic and internationally well-known. During the assessment period there has been a change in program leaders and a partial shift in research direction, which now includes biocompatibility and negative (adverse) effects as a major theme. This, then, encompasses a widening of the studies in the direction of biomedicine, e.g. immunology. Close collaboration with medical immunology and toxicology research.
by this group is expected to be seen in the near future, which is considered a strength for the program.

The productivity of the program is very good and, in particular, the number of PhD theses produced should be mentioned. However, there is room for improvement as far as the innovative aspects of the research are concerned. It should also be possible to have even more publications in journals which reach outside the immediate biomaterials field. A factor to keep an eye on is the rather high dependence on external research money for this program, but the Committee didn’t feel that this would compromise the choice of research projects or their scientific relevance. The Committee has no doubts about the future of this vital group.

**Oral and maxillofacial disorders: diagnosis and treatment**

Program leader: Prof. Dr. I. van der Waal

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The quality of this group, which deals with the diagnosis and treatment of oral and maxillofacial diseases, in particular oral cancer and jaw deformities, is very good. The program director is an internationally respected researcher and the scientific impact of the research is excellent.

The productivity is very high, and the program is commended for having taken up pertinent problems stemming from major changes in the population. The issues dealt with by this program are very relevant for dentistry. Also questions of a fundamental basic science importance are addressed, rendering the output from the program of interest for medicine in general. It might, however, be of importance to establish more clear and focused research sub-lines, as the current scope of research is very wide.

The future of this program should be bright, provided that there is a good successor for the program director, who will retire soon. This is a matter of concern, as the Committee is not really aware of what will indeed take place in this regard, resulting in a ‘medium’ score for the last item.

**Protective functions of saliva for oral health**

Program leader: Prof. Dr. A. van Nieuw Amerongen

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The quality of this homogenous program, which covers the field of oral defense mechanisms with a particular focus on the role of salivary constituents, is excellent, and the program stands out among the 19 as one of the most original in its research. There has also been a clear development into novel research themes during the assessment
period. In general, the publications appear in high-quality international journals. The approach of the program, with a focus on basic science blending with clinical and applied research and performed by individuals with different backgrounds, is commendable. The program director is internationally prominent.

The role of salivary defense mechanisms is in many respects of decisive importance for oral health, so the choice of research area is clearly of high relevance. This applies to oral health in general but has special relevance in an ageing population. In view of current demographic trends this research is therefore highly relevant. Collaborative efforts towards clinical dentistry as well as other medical areas also speak in favor of the relevance and potential of this program.

The Committee is convinced that there exist adequate personnel prerequisites for a continued activity of this program, and ideas are clearly not lacking. The group has been successful in financing its activities in the past, but funding might be a problem in the future, as there seems to be no immediate commercial interest in this research – strangely enough. This program ought to be better supported by biomedical basic science funding agencies.

**Bioengineering of bone and periodontium**

Program leader: *Prof. Dr. V. Everts*

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The research of this program, focusing on the biology of mineralized tissues such as teeth and bone, their development, turnover and reactions in health and disease, as well as regeneration of those tissues, is of a very high quality. The research has in the past been quite heterogeneous, but it is now a good example of a comprehensive research program with mutually supportive sub-lines, and it is one of the outstanding programs among the 19.

The research group and the program director are internationally highly renowned, and several indicators of 'esteem in science' light up for the members of this program.

The group is very productive, and articles are usually published in relevant scientific journals. The issues this program deals with are very relevant for dentistry, as clinical activities mainly revolve around hard tissues. Specifically, knowledge inherent in this group about e.g. cell signaling, morphogenesis and differentiation mechanisms should be of importance for developing novel technologies for orofacial and dental regeneration, including tissue engineering. However, also questions of a fundamental basic science importance are addressed, rendering the output from the program of interest for biomedicine in general. The fact that this group participates in the MOVE initiative adds to the over-all societal significance of the research program.

The program has gone through a transitional phase the last few years, in terms of both individuals and sub-projects, which is not completely finished yet. This has obviously resulted in a focusing of the activity to fewer major research topics of a high scientific value, which the Committee considers as commendable. An added benefit of this
should be to decrease the earlier strong dependence on ‘soft’ money. The future of this active program, with its good mixture of dentists and non-dentists at different levels, is excellent, but the focus of the program should be watched so the balance is not tilted away too much from its dental/oral basis.

Microbiological aspects of oral infections
Program leader: Prof. Dr. A.J. van Winkelhoff

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This aim of this program is phrased rather broadly as an attempt to increase the knowledge of bacteria involved in pathological processes in the oral cavity, and to provide clinicians with information of relevance to the diagnosis and treatment of oral infections. From the publications for the last few years it would seem that the main own line of research of this program has been dedicated to microbial diagnostic methods and techniques and to host-microflora interactions using molecular techniques. Even so, it is also clear that a significant part of the output is made up of studies where the role and contribution of the program has chiefly been as a service function.

While this is consistent with the large service role played for dental practitioners by the Section of Oral Microbiology of the Department of Periodontology, it may also be taken to illustrate the lack of focus that emanates from the stated program aim. In this context, the Committee is somewhat surprised that the large amounts of clinical data collected as a consequence of this routine diagnostic service function do not seem to have been made use of to any major extent.

As evidenced by the citation indicators as well as the esteem and impact indicators, the quality of this program has been quite good in the past, when bacterial specificity was a main theme in the microbiology of periodontal disease. It seems, however, as if the program may have lost some of its scientific originality and focus lately. A question mark exists as to whether the group has a critical scientific mass to be a serious player in the new oral microbiology research fields. Judged as a program, the scientific productivity has been unsatisfactory, both in terms of PhD theses as in the number of truly own scientific publications. The group is quite active, however, when it comes to disseminating knowledge on oral microbiology to dental professionals.

The importance of the Section of Microbiology as a service organization for oral microbiology is obvious, but the question remains whether this could be sustained as a separate research program. The addition of Prof. Crielaard to this group in 2005 may be important for the further development of the oral microbiology research program but, given the present information, the Committee has not seen the existence of any unique, competitive research themes that would support the continued definition of this as a distinct research program.

The committee might thus suggest that the own-research parts of the program would fit better into the realms of the program on oral biofilms (to which Professor Crielaard
is also attached), and that the periodontal diagnostic service functions be maintained as a division under the auspices of the Department of Periodontology.

**Growth and growth regulation during normal and abnormal craniofacial development**

Program leader: **Prof. Dr. H. van Beek**

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The stated mission of this program is to study the aetiology of malocclusions and craniofacial abnormalities as well as orthodontic treatment methods and their quality. While this program had some productivity of a good quality in the earlier part of the assessment period, the productivity has been quite low during the later part of the review period, even in light of the few tenured staff. Furthermore, the stated research themes are not well reflected among the publications from this program. The list of key publications shows no cohesive research line, and some significant work was in fact performed within/with the aid of other ACTA research programs.

There are presently no real indications that this research program will flourish in the future. Its stated research area is not well reflected in the output, and the Committee did not get the impression, either from the self-analysis or the meeting with the program director, that there are any specific research plans. Although orthodontics, craniofacial growth and orofacial developmental defects are indeed important clinical subjects, it is not possible to have an opinion about the relevance of this program.

There are reportedly difficulties in recruiting PhD students, but it is not feasible to build a research program on clinical specialization training dentists only. A major problem for ‘vitality and feasibility’ is also that it is presumably not possible to run a competitive research program with a multitude of staff who have research fte:s of 0.05 - 0.30 (the latter being 3 individuals), and who is burdened with a heavy clinical, specialist training and teaching load.

**Biology, physiology and pathophysiology of the periodontium**

Program leader: **Prof. Dr. U. van der Velden**

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The quality of this program, which involves the susceptibility to periodontitis, the mechanisms of degradation and regeneration of the periodontium, the prevention and treatment of periodontitis and the systematic effects of periodontitis, has been very good. The originality of the approach and ideas, the publication strategy and the scientific impact of the research are nearly excellent.
However, the coherence of the program could be improved by a stronger focus. Currently, both clinical studies and fundamental research are mixed, and it is not clear whether those sub-lines are mutually supportive in a ‘translational’ manner, a problem the Committee has noticed in other programs as well. The program has a long-range high productivity with a balanced distribution over the members within the program. Much effort has also been paid to the dissemination of knowledge among the professionals working in the field of dentistry.

The vitality of this program is sound, although there are some concerns as to the influx of new PhD students. Furthermore, there is a question as to the critical mass of researchers within this program in the coming years. Changes in the staff (Prof. Beertsen became Dean, Prof. van der Velden is close to retirement) make a proper planning for the future of the program mandatory. It is strongly advised to seek possibilities to increase the influx of PhD students for this program. The current research topics are innovative and deserve credit, but there is a need to consider the staffing of this important program for the future.

**Dental care and dental care systems: quality and efficiency**

Program leader: Prof. Dr. J. Hoogstraten

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This research program, which has a focus on the quality and efficiency of Dutch dental care and dental care systems, on the one hand, and on dental anxiety and pain, on the other, maintains a very high quality. The group is really taking advantage of the multidisciplinary background of its staff members, and it is methodologically very strong. The research group should also be commended for taking up important research issues that are neither ‘mainstream’, nor big fund attractors.

The Committee is, therefore, not particularly concerned over the observation that the indicators of esteem and citations are not among the higher at ACTA – this is the unfortunate consequence of the group’s continued focus onto a line of research that is traditionally overlooked or disregarded by dental care providers, despite its relevance to the consumers of dental services. Considering the field, the productivity is very high, and the relevance of the kind of research carried out for the general public is evident.

This is a dynamic and vital group that has strengthened itself even more with the recent appointment of a full professor focused to Quality of Life issues. The output in terms of the number of professional publications is very high. In view of the fact that the immediate users of the research carried out are largely found among dental professionals, the group should be commended for its high activity in this area. Finally, it is also obvious that this program serves a function as a resource facility for other research programs in terms of research methodology, which emphasizes the research methodological competence of the group.
Diagnostic imaging of the tissues in the maxillofacial complex
Program leader: Prof. Dr. P.F. van der Stelt

Quality 2
Productivity 2
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The research theme for this program is stated somewhat nonspecifically as “digital imaging and computer aided diagnosis” in radiology. Most of the research output, at least in recent years, seems more devoted to a variety of technological aspects of the new techniques than to the (perhaps more pertinent) questions to what extent the novel technologies lead to improved diagnosis, and management and prognosis. There is a clear lack of direction in the research that is carried out, which is also reflected in the rather unspecific mission statement.

In view of the number of routine examinations that must be accessible to the researchers owing to the diagnostic services rendered by the Radiology Department in daily routine patient management, the committee found it worrying that so little research was done on the implications of the novel technologies for diagnosis and management. This field of research could relatively easily produce significant numbers of research papers, but the program has not achieved this. The group obviously has a prominent international position in the field of digital radiology, but without sufficient papers to evaluate, the quality and relevance for dentistry of this kind of technology-driven research remain unclear. A line of thinking is one of the key prerequisites for a vital research program, and this research program seems to fall short in this respect.

It was also of concern that the research output has fluctuated greatly over the 6-year assessment period, being rather low for the past 2 years. However, during the site visit the Committee received the list of publications in 2007. This showed that the number of publications is increasing, although publications in the better journals remain rare. Considering the technology field in which this program operates, the financial feasibility of this program ought to be good. However, it is the Committee’s opinion that as the program’s well-reputed leader gets closer to retirement, it is necessary to basically reconsider this program’s future.

Assessment of the Dental Research Programs of UMCG

Before moving over to the evaluation of the individual programs at UMCG, the Committee would like to make a few general comments.

The Dental School in Groningen was restarted in the mid-1990:s, and it was seemingly resurrected without being allocated any governmental money for research purposes. The amount of ‘first source’ money for dental research thus seems below a decent threshold, and coming from that basis it is admirable what has been achieved. Whatever the reason for the present imbalance, it is clear that a historical explanation should not be allowed to perpetuate this untenable situation, and it certainly deserves further analysis.
The self-evaluation mentions that “since dental research is integrated in more broadly oriented UMCG research institutes and programs, it is not possible to assess UMCG dental research on a ‘UMCG dental institution’ level”. The Committee recognizes the potential surplus value of a close collaboration between dental, medical and biotechnical researchers as it is within the UMCG. However, the chosen organizational structure makes it difficult to evaluate the quality of the specific dental research in Groningen, something that would be of interest not only to this Committee.

The current research budget at UMCG makes it impossible to cover the whole spectrum of dental research. The Committee strongly advises more focus and mass as far as specific dental research is concerned. That should be possible without harming the education of students. The ‘research program’ concept would, in fact, be a useful vehicle to accomplish this.

Finally, the Committee was somewhat surprised by the arrangement of the site visit in Groningen. The Committee would have expected the UMCG to adhere to the general assessment format, including providing time for each program to have an individual discussion with the evaluation committee.

**Biomedical engineering**

Program leader: *Prof. Dr.ir. H.J. Busscher*

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This is a productive group with a multi-faceted but coherent research program of high quality and productivity, and clearly one of the leading programs among the 19 assessed. Even though research activities occur outside the IOT ‘dental research’ program as well, there seems to be a beneficial cross-fertilization with that research, and there is no doubt that this group is one of the internationally leading ones in the study of microbial adhesion mechanisms, biofilms and biomaterials-related infections. The program director has an internationally outstanding reputation.

The research area and its sub-themes are very central also to dentistry, and that together with its focus and high quality renders this program highly relevant. Findings are both of a basic science and applied character. Some lines of information are of importance for the development of novel treatments in clinical dentistry, and it is commendable that the program leadership emphasizes this as one of the focus areas of the program. Thus, the evaluators expect to see more research made in the field of dental biomaterials and their relation to the oral environment.

The large number of PhD students is striking in comparison to the quite low number of tenured research staff, but this might in part be an effect of how this has been reported. In any case, this obviously also results in a large number of PhD theses. A question is of course how many of these are dentists, and how many want to pursue an ensuing academic/research career, specifically in a ‘dental research’ context.

This is a highly vital program with excellent opportunities for the future, even though the tenured research staff is strikingly small. The program has had a rather large
dependence on ‘soft’ money, but the leadership seems to handle this adequately. There is also a need for the future to keep an eye open so the translational (into dentistry) value of the program is not lost. Related to this is the problem in recruiting dentists – at any level – to this research program.

**Diagnosis and prevention of dental diseases**

Program leader: *Prof. Dr. M.C.D.N.J.M. Huysmans*

As discussed below, the Committee found it inappropriate to score this exceedingly broad research program numerically.

The program has a very broad focus on “diseases of the dental hard and soft tissues including consequences and sequelae”. To this effect, the activities are organized in five focus areas, each with its own supervisor, and where the fifth focus area has yet to be started. These areas are:

1. diagnosis and prevention of hard tissue loss
2. diagnosis of periodontitis
3. clinical dental biomaterials
4. restoration of function with implants
5. clinical epidemiology and oral care research

The Committee found it difficult, if not impossible and unfair, to score this broad and disparate program as a single entity. As described, the program is staffed by a small group of researchers but encompasses a considerable portion, essentially the core, of dentistry. It is clear that this does by no means agree with what the Committee would identify as a ‘research program’. The program leader has a good international reputation.

While the Committee is convinced that the productivity for the program during the assessment period is respectable – given the other commitments of staff and the lack of time and resources – it is necessary to emphasize that as a whole, these four areas do not make a research program. Even within a given focus area, with focus area 3 as the exception, it is difficult to identify real lines of research over and beyond those stated in the keywords “hard tissue loss”, “periodontitis” and “implants”. This is underscored by the Committee’s observation of relatively few publications in which the researchers of this program appeared as first or last authors.

This said, however, there is no question about the quality and productivity of the ‘clinical dental (bio)materials’ theme (focus area 3). The leader of this research theme is internationally well-known with a high productivity and a good track record, and the work as such has a clear scientific and societal importance. The Committee advises the UMCG to seriously consider the possibilities to provide the primary investigator for this theme with better structural support. Developing the dental materials sub-line further would also be strategically relevant in a national Dutch perspective.

No 2nd source research funding has reportedly been acquired by this program. Furthermore, the activity of the program in terms of PhD theses has not been high – 3 theses in the period 2001–2006 – but might be expected to increase as indicated by the apparent increase in the number of PhD students between the first and the second half of the evaluation period.
In general, it is thus the Committee’s conviction that this research program must be fundamentally reconsidered. It is neither fair, nor relevant to assign an overall score to the program as stated, and the Committee has thus refrained from doing that but with the additional remark that the Committee acknowledges the hard work that these researchers are doing under the given constraints. The dental materials theme has both vitality and, if provided with adequate resources, can also be expected to produce good research in the future.

**Oral and maxillofacial surgery**
Program leader: *Prof. Dr. L.G.M. de Bont*

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The stated research mission of this program is a focus on ‘clinical problems in selected patient cohorts via bi-directional translational research using *in vitro* and *in vivo* (experimental) models’. This aim is further materialized though seven focus areas, five of which belong to the oral and maxillofacial surgery area (bioreabsorbable materials and implants; preprosthetic and reconstructive surgery; diagnosis of pre-malignant disorders; *Sjögren* syndrome; and – still under creation – head-and-neck-related quality of life) and two belonging to the subdivision orthodontics (basic mechanisms; and quality control).

During the 2001-2003 period, the orthodontic themes were non-existent, and it is only at the end of the second 3-year assessment period that any orthodontic research is visible. None of it, however, made it to the ‘key publications’ in the Self-analysis for 2004-2006, and there seems not to have been any specific interactions with other focus areas – as expected within a research program. The research in orthodontics is scarcely mentioned in that report, over and beyond tables describing staff and funding, and it is clear that plans had been made for orthodontics becoming an independent department regarding patient care as well as research. However, this division had not yet materialized by the end of 2006, which is presumably why orthodontics was reported as being part of the UMCG-OMFS program. Due to this abstruse situation, the Committee decided not to include the subdivision of orthodontics in this evaluation.

The research in oral and maxillofacial surgery has a very broad scope, from ‘-omics’ diagnostics in *Sjögren* syndrome over reconstructive materials and surgery to epidemiology and quality of life aspects. From the perspective of a ‘research program’ it would clearly be relevant to consider to focus the scope. It is thus not really clear why the fifth focus area, dedicated to epidemiological and psychometric research, should be created within the framework of the oral and maxillofacial surgery program. This suggest that the OMFS program is largely an ‘umbrella’ covering whatever the activities are within a specific clinical department, and although quality is high it gives a shattered impression.

An alternative to focusing the scope is therefore to abandon the departmental umbrella, and let some of the focus areas grow into real research programs. Some justification for the latter may be found in the fact that the input of resources into the program is comparatively quite high, amounting to an average of 8 fte:s. If
orthodontics had indeed been part of the UMCG-OMFS program, the research would have been considerably diluted, implying lower scores for some of the parameters.

In any case, the research activity of the OMFS program has been high, including a remarkable number of dissertations, and the program is obviously capable in bringing in grants both from industry and from national and international research funding agencies. A substantial number of the scientific publications is based on clinical trials. In an international perspective this research design is greatly under-used in the field of oral and maxillofacial surgery, and the high number of randomized clinical trials actually carried out should thus be credited to the quality of the present program. The relevance and vitality of this research program are considered as very good, but the questions of its contents and focus of research remain to be addressed.
IV ASSESSMENT OF THE ORGANIZATION AND PRACTICE OF PhD TRAINING AND SUPERVISION AT ACTA

Over-all, the Review Committee was impressed by the organization and practice of PhD training and supervision at ACTA. It is a well organized program, it has an efficacious throughput with a remarkable dissertation rate (>90%) within reasonable time limits, and it is quite voluminous.

The Committee had the opportunity to interview a group of PhD students as well as several post-docs. The general impression of these discussions was that supervision and quality assurance within the PhD training program are well taken care of. The PhD students were very positive about the atmosphere within ACTA and the support they receive.

One proposition made by the PhD students was a formalization of the supervision by introducing an obligatory meeting between the PhD student and the supervisor and the responsible professor every six months. The Committee supports this idea. Another suggestion, also made at the interview, was for ACTA to appoint an independent mediator to whom PhD students can turn in the event of problems with the supervisor. Interestingly enough, the Committee was later informed that ACTA had indeed already appointed such a person (from the Department of Human Resources Management). This is commendable.

ACTA offers four compulsory courses for all PhD students, together amounting to 15-23 days of study depending on the student’s background. The PhD students seemed satisfied with this (limited) number of courses, and were fairly sure that they would be able to find additional, relevant courses outside ACTA by themselves. The Committee has confidence in the inventiveness of PhD students, but was nevertheless pleased to hear that ACTA has recently decided to play a more active role in informing PhD students about courses that might be of interest and of specific relevance for their own research. This would also ensure that all students receive a proper formal education.

The Committee understands that the ACTA research school intends to institute a more regular collaboration around PhD courses with other research schools, and this seems to be a fruitful idea. It would be important then, that ACTA can offer something appealing in return. To some extent PhD students participate in courses that are primarily aimed for clinical specialty training programs. In those cases, it is important to ensure that the course is really appropriate as part of a scientific training.

The ability to report own results to others is an important feature of research training, and this seems to be very well taken care of. There are intra-mural meetings for research students at regular intervals; students attend and present at the annual Lunteren meetings; and ACTA has a well-thought-through policy for supporting PhD student attendance at one or more international scientific congresses.

Although the PhD training program at ACTA is organizationally well delineated and structured, the Committee got the impression that there is a reasonable flexibility in the system as well. The rather strict format determining how many articles a PhD thesis should be based on seems to be under scrutiny. This is certainly appropriate in view of how modern research has influenced scientific publishing, and it is important to teach young scientists early on the virtues of quality and conclusiveness vs. quantity in scientific publication.
The influx of students to PhD training comprises essentially a 1:1 mixture of individuals with a dental and a non-dental background. This is a basically sound proportion, not least in perspective of the wide spectrum of what is ‘dental research’. At the same time, this proportion may be construed as a sign that it is difficult to recruit dentists to a scientific/academic career. The ACTA leadership is clearly aware of the problem in recruiting dentists to a research career, but it nevertheless deserves to be mentioned. On the other hand, the fact that many non-dentists are attracted to a PhD training at ACTA speaks in favor of ACTA in a broader sense.

A fair number of PhD students leave Academia and take up clinical appointments as dentists or start working in industry after the completion of their PhD thesis. This is both expected and desired. However, the Committee is not sure to what extent the well-oiled ACTA ‘PhD-machinery’ really produces researchers who can replenish the present academic staff, and who can be truly independently innovative in formulating novel lines of research and scientific approaches for the future.

Related to this question is the exceedingly low propensity for PhD students to follow up with a post-doc abroad. This, combined with the fact that 40% make a ‘domestic’ post-doc, is somewhat disturbing, and may be taken as a risk indicator that future dental research at ACTA will proceed in the direction of the tangent. The Committee thus advises ACTA to actively promote PhD students to go abroad after finishing their PhD degree. This could be made by instituting a post-doctoral program that tends to the expatriate as well as to the repatriate phase and, perhaps, leads into some kind of ‘tenure track’ system. This could be done locally at ACTA but, as pointed out above, there is certainly a need for a proactive post-doc policy in Dutch dental research at the national level as well.
PROTOCOL EXTERNAL REVIEW COMMITTEE FOR DENTAL RESEARCH IN THE NETHERLANDS 2007

1. Introduction

In The Netherlands every 6 years the research programs of universities and academic hospitals have to be evaluated by an external review committee. For the year 2007 evaluation of dental research is scheduled. This evaluation concerns essentially all dental research in the Netherlands as performed in the Academic Centre for Dentistry Amsterdam (ACTA), the Radboud University Nijmegen Medical Centre (RUNMC), and the University Medical Center Groningen (UMCG). Almost all research is organised in the Netherlands Institute for Dental Sciences (Interuniversitaire Onderzoekschool Tandheelkunde, IOT).

This protocol describes the evaluation procedure for the external review committee. The time period that will be evaluated is 2001-2006. The procedure is based on the Standard Evaluation Protocol (SEP). The IOT board and directorate took care of the preparation and gathering of all written materials and for the organisation of the site visits. The respective University Boards (Colleges van Bestuur) have final responsibilities for the evaluation procedures.

For all research programmes the committee will evaluate the scientific quality and productivity, the relevance, and the perspectives for the future. In addition the PhD training programmes will be evaluated.

2. Delineation and required expertise of committee members

Members of the review committee should have:
- Excellent expertise in, and overview of the main fields of dentistry
- Expertise in one of the sub-disciplines of dental research
- Experience with organisation of a department and interdisciplinary research

A review committee consisting of four members, the chair included, can cover the main fields of research in a balanced way and on an excellent level of expertise. The evaluation should be performed in an international perspective. Therefore, the committee consists of international experts from outside the Netherlands. The committee members are independent, meaning that their judgement is not influenced by the institution or programme under review. The committee will be assisted by an independent secretary.

The experts who have agreed to participate in the committee are listed in Appendix A.
3. Level of aggregation

The local research programme is the level on which the assessment takes place. A research programme is defined as a coherent set of research activities having a common mission and being the work of a group of people who ideally work together on a daily basis. The programmes will all be concisely described, including the scope of the research, mission statement, leadership, and strategy and policy. The research programmes to be evaluated are listed in Appendix B.

The committee can be asked to express their views on different recognizable research lines, that may exist within programmes.

4. Specific aims and elements of the assessment

For each programme, the following items will be evaluated:

- **Scientific quality.** This reflects the scientific interest, the significance and originality of the work in an international perspective.
- **Productivity.** This reflects the scientific productivity in relation to the input. The following items will among others be included: number of publications (both in international journals and in Dutch language journals, but with an emphasis on publications in SCI or SSCI cited journals), quality of the journals as indicated by the impact factor, the number of dissertations, and input in scientific personnel.
- **Relevance.** This reflects the relevance of the research in particular for clinical dentistry. The clinical importance can be deduced from several indicators, such as professional publications, memberships of scientific societies, contributions to post-graduate teaching and invitations to speak for dental practitioners.
- **Vitality.** The vitality and feasibility of the research regards future perspectives for the programme. Important items are the quality of the planned research, new initiatives, and personnel changes.

5. Information for the committee and procedures

The assessment will be based on the following material to be delivered to the committee

- Annual reports 2001 – 2006. These reports include among others research objectives, results, input in research staff, publications, indicators of esteem, and current PhD projects.
- Self evaluation reports over 2001 – 2003, and over 2004 – 2006. A self-analysis has been written by the programme leaders and the board and director of the IOT over the years 2001-2003, including perspectives and expectations. In addition, a self-analysis will be performed over the years 2004-2006.
- Analyses of publications and citations. Citation scores of all full professors, senior lecturers and senior scientists will be provided in total and over the years 2001-2006.
It is the intention that the committee will meet with all local programme leaders, and also with other participants (e.g. PhD students and post-docs) of the research programmes. A site-visit to relevant departments or institutes is included and sufficient time will be allotted for evaluation of the facilities. In addition, discussions will be held with the director of research of the IOT and the chairman of the board of the IOT. In total, a site-visit of 4 days to the Netherlands is planned.

6. Research input of academic staff

In the self-evaluation report, the list of programme members of each programme shall include the following ranks:

- full professors
- senior lecturers (associate professors)
- lecturers and other tenured staff (assistant professors)
- non-tenured staff (post-docs and other academic personnel involved in research)
- PhD students

The list will include all members who were involved in the programme during the assessment period, and will specify the period of time during which they were involved.

7. Output categorisation

The following output categories are discerned:

- Academic publications, i.e. publications for the scientific community, most often written in English:
  - in refereed SCI or SSCI journals
  - in other refereed international journals
  - books and book chapters
- PhD theses
- Professional publications, i.e. publications for a broader professional audience such as dental practitioners; often written in Dutch
- Patents
- Grants (e.g. NWO, STW, EU, NIH, charity funds, industry)
- Indicators of esteem; these include in particular:
  - Awards
  - Memberships of editorial boards
  - Organisation of international symposia and congresses
  - Invited lectures at international symposia and congresses
  - International functions, e.g. elected memberships of scientific organisations

Popular publications and abstracts are not included. Besides the above-mentioned research output, for each programme five key publications from 2001-2006 will be indicated.
8. PhD training

A major objective of the IOT is to provide a high-quality scientific training programme for PhD students. Till 2006, the IOT was formally accredited by the Royal Netherlands Academy for Arts and Sciences (KNAW). As the Dutch universities have decided to organise the PhD training in local graduate schools, the IOT did not apply anymore for a formal re-accreditation. In the future, the IOT will remain a forum to coordinate research within the oral sciences in the Netherlands and to stimulate collaboration between the IOT research groups. Local graduate schools will be responsible for the PhD training. The dental research groups in Nijmegen are Groningen are organised in the respective medical schools in the academic hospitals. The PhD programmes in Nijmegen and Groningen will therefore not be evaluated in the present protocol.

The committee will be asked to review the organisation and practice of PhD training and supervision at ACTA. To this end, the organisation, policy and practice of training and supervision of PhD students is explained, paying attention to structure and objectives of the PhD training, supervision of candidates, allotment of responsibilities regarding PhD projects, and career perspectives.

To evaluate the PhD training programme, the following materials will be provided:

- Procedures for approval of PhD research protocols and selection of PhD students
- Program of courses
- Scientific meetings for PhD students
- Rules and regulations specific for PhD students
- Overview of current PhD students and PhD students in the previous 10 years:
  - Name and nationality
  - Title of the programme and title of the thesis
  - Scientific background of the PhD student
  - Start of the PhD appointment and date of the thesis defence

9. Responsibilities

IOT board and director:

- Preparation of the evaluation protocol
- Preparation of all written materials (annual reports and self-evaluation)
- Organisation of the site-visit

University/Academic hospital

- Approval of the protocol
- Agreement with the committee members and chairman.

10. Tentative time schedule

Proposed time schedule:

- February 2007: preparation of the protocol, installation of the external committee
• May-August 2007: Preparation of all written materials (annual reports and self-evaluation)
• October 2007: delivery of written information to the committee
• 18-21 November 2007: site-visit of the committee to the Netherlands
  o Day 1: arrival in Amsterdam, introduction and committee meeting
  o Day 2: interviews with programme leaders from ACTA
  o Day 3: interviews with programme leaders at Nijmegen and Groningen
  o Day 4: interviews with PhD students and post-docs, writing of the provisional report; final interview; departure
• December 2007: Publication of the final report of the evaluation committee

This time schedule will be discussed and fine-tuned with the chairman of the committee.
MEMBERS OF THE EXTERNAL REVIEW COMMITTEE

Prof. Dr. Anders Linde (chairman)

Professor and Chairman, Department of Oral Biochemistry, the Sahlgrenska Academy at Gothenburg University, Sweden. MSc, DDS, Odont. Dr. Editor-in-chief *European Journal of Oral Sciences*. In 2000 chairman of the International Review Committee for the Netherlands Institute for Dental Sciences. *Principal research interest*: developmental biology, biology of mineralized tissues.

Assoc. Prof. Dr. Vibeke Baelum

Department of Community Oral Health and Pediatric Dentistry, the Dental College, University of Aarhus, Denmark. DDS, PhD, Dr. Odont. Associate editor *European Journal of Oral Sciences*. Member European Federation of Periodontology Periodontal Practice Committee. Board member Norwegian Research Council Programme on Clinical Research. *Principal research interest*: public health dentistry, health services research, epidemiology, diagnosis.

Prof. Dr. Marc Quirynen

Professor and Chairman, Department of Periodontology, Faculty of Medicine, Catholic University Leuven, Belgium. DDS, PhD. Associate editor *Journal of Clinical Periodontology*. Board member European Federation of Periodontology. *Principal research interest*: periodontal diseases, periodontal microbiota

Prof. Dr. Pekka K. Vallittu

Professor and Chairman, Department of Biomaterials Science, University of Turku, Finland. DDS, PhD, CDT. Specialist in Prosthodontics. Dean of the Institute of Dentistry, University of Turku. *Principal research interest*: Dental materials with special respect to non-metallic biomaterials, their adhesion resins and clinical use.
Appendix 3

PROGRAM OF THE SITE VISIT

Day 1 (Sunday 18 November)

Afternoon arrival

18.00 – 19.30 Committee meeting: procedures, tasks of the members, evaluation of written materials

20.00 - Dinner of the committee with representatives of the participating universities (prof.dr. F. Lobbezoo, prof.dr. M.C.D.N.J.M. Huysmans and prof.dr. G.J. Truin), director IOT (prof.dr. V. Everts), dean ACTA (prof.dr. W. Beertsen), and research coordinator IOT (dr. T.J.M. van Steenbergen)

Day 2 (Monday 19 November)

8.30 – 9.00 Meeting with the IOT: chairman, director and research coordinator (prof.dr. F. Lobbezoo, prof.dr. V. Everts, dr. T.J.M. van Steenbergen)

9.00 – 10.30 Interviews with programme leaders ACTA (I: clinical sciences)
9.00 – 9.25 Cariology Endodontology Pedodontology
   prof.dr. J.M. ten Cate, prof.dr. P.R. Wesselink
9.30 – 9.55 Periodontology
   prof.dr. U. van der Velden, prof.dr. B.G. Loos, dr. T.J. de Vries
10.00 – 10.25 Oral Function
   prof.dr.ir. M. Naeije, prof.dr. D. Wismeijer, prof.dr. F. Lobbezoo

10.45 – 12.45 Interviews with programme leaders ACTA (II: specialist and supportive sciences)
10.45 – 11.10 Orthodontics
   prof.dr. H. van Beek, dr. L.L.M.H. Habets
11.15 – 11.40 Social Dentistry
   prof.dr. J. Hoogstraten, prof.dr. G.H.W. Verrips, dr. R.C. Gorter
11.45 – 12.10 Oral Radiology
   prof.dr. P.F. van der Stelt
12.15 – 12.40 Dental Material Sciences
   prof.dr. A.J. Feilzer, dr. C.J. Kleverlaan

12.45 – 13.45 Lunch
13.45 – 14.15 Transfer to VUmc location

14.15 – 17.00 Interviews with programme leaders ACTA (III: VUmc and AMC locations)
   prof.dr. I. van der Waal, prof.dr. E. Bloemena
14.45 – 15.10 Functional Anatomy
15.15 – 15.40 Oral Biochemistry
   prof.dr. A. van Nieuw Amerongen, prof.dr. E.C.I. Veerman
16.00 – 16.25 Oral Cell Biology
   prof.dr. V. Everts, prof.dr. J. Klein Nulend, dr. A.L.J.J. Bronckers
16.30 – 16.55 Oral Microbiology
   prof.dr. A.J. van Winkelhoff, prof.dr. W. Crielaard
17.00 – 17.30 Site visit of the research facilities at the VUmc location
18.00 – 20.00 dinner of the committee
20.00 Transfer from Amsterdam to Groningen

Day 3 (Tuesday 20 November)

Morning programme: Groningen

8.30 – 8.45 Welcome and introduction by the dean prof.dr. S. Poppema
8.45 – 9.15 General introduction in the organisation of the research programs at the
   University Medical Center Groningen (pro-dean research prof.dr. L.F.M.H. de Leij)
9.15 – 11.45 Session with program leaders from Groningen
   Biomedical engineering
   prof.dr.ir. H.J. Busscher, drs. W. Kloppenburg
   Dental diseases
   prof.dr. M.C.D.N.J.M. Huysmans, prof.dr. F. Abbas
   Oral Surgery
   prof.dr. L.G.M. de Bont, prof.dr. A. Vissink
10.45 – 11.30 Site visit of the research facilities in Groningen
11.30 – 12.00 Interviews with PhD students and post-docs from Groningen
12.00 – 14.30 Transfer to Nijmegen (including lunch)

Afternoon programme: Nijmegen

14.45 – 15.10 Meeting with prof.dr. D. Ruiter, dean of the Medical Faculty, prof.dr. J.A.
   Jansen, chairman of the dental school, and prof.dr. G.J. Truin, member of the
   IOT board
15.15-17.10 Interviews with programme leaders
15.15-15.40 Orthodontics
   prof.dr. A.M. Kuijpers-Jagtman, prof.dr. S.J. Bergé
15.45-16.45 Dental Epidemiology and Dental restorations
   prof.dr. G.J. Truin, prof.dr. N.H.J. Creugers
17.00-17.25 Tissue engineering
   prof.dr. J.A. Jansen, dr. J.C.G. Wolke, dr. X.F. Walboomers
17.25-18.00 Interviews with PhD students and post-docs from Nijmegen
18.00- 20.30 Dinner of the committee at the Faculty club
20.30 Departure to Amsterdam
Day 4 (Wednesday 21 November)

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<tr>
<th>Time</th>
<th>Activity</th>
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<tr>
<td>9.00 – 9.40</td>
<td>Interview with post-docs ACTA</td>
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<tr>
<td>9.45 – 10.25</td>
<td>Interview with PhD students ACTA</td>
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<tr>
<td>10.30 – 11.00</td>
<td>Site visit of the research facilities at the ACTA main location</td>
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<td>11.00 – 11.45</td>
<td>Interview about the research policy and PhD program at ACTA</td>
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<td>(prof.dr. W. Beertsen, prof.dr. V. Everts, dr. T.J.M. van Steenbergen)</td>
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<td>11.45 – 12.30</td>
<td>Committee meeting and writing of the draft report</td>
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<td>12.30 – 13.30</td>
<td>Lunch</td>
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<tr>
<td>13.30 – 16.00</td>
<td>Committee meeting and writing of the draft report</td>
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<td>16.00 – 16.15</td>
<td>Presentation of preliminary findings by the chairman of the committee</td>
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<td>16.15 – 17.00</td>
<td>Informal meeting (with drinks and snacks) for all participants of the</td>
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<td>site visits, (senior) scientists, and the committee</td>
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<tr>
<td>17.00</td>
<td>Departure</td>
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