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## Concepts, Aims and Drawbacks in Interdisciplinary Dentistry: Results of an International Questionnaire

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### **Authors' contributions**

*This work was carried out in collaboration between all authors. This paper resulted from an international collaboration. All authors contributed equally to this study. Author GS designed the study, wrote the protocol and performed the statistical analysis. Authors AM, IM and KB established and disseminated the Russian version of the questionnaire. Author FS was responsible for data management. All authors read and approved the final manuscript.*

**Case Study**

**Received 7<sup>th</sup> December 2012**  
**Accepted 19<sup>th</sup> January 2013**  
**Published 3<sup>rd</sup> May 2013**

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### **ABSTRACT**

**Aims:** This article describes the results of a survey among dentists and dental technician regarding interdisciplinary teamwork. Interdisciplinary dental collaborations seem to be based on different conceptions with the consequence of various strengths but also weaknesses within teams.

**Study Design:** International questionnaire (Germane, English, Russian).

**Place and Duration of Study:** 250 questionnaires were handed out in paper form and 100 access codes for the Web-based version were sent. The survey was conducted between February and May 2011.

**Methodology:** Dentists as well as dental technicians were permitted to participate in the survey. Candidates were recruited at postgraduate educational events. Previous participants of similar educational events were sent an access code via e-mail.

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**Results:** 132 questionnaires were evaluated (response rate of 37.7%). Of the surveyed persons, 60 were women (47%) and 72 were men (53%). The mean age of the respondents was 40.3 years +/-11.51 years. Associations with other specialties (n=84, 63.6%), solutions for unresolved problems (n=83, 62.9%), and expansion of one's own specialty (n=65, 49.2%) were the most frequently cited reasons to favor the use of interdisciplinary task groups. Difficult or ambiguous communication (n=73, 55.3%), conflicts within the team (n=70, 53.0%), and scheduling difficulties (n=63, 47.7%) were the most frequently cited reasons for not pursuing interdisciplinary cooperation, followed by rising costs and the expense of resources (n=62, 47.0%), the need to modify one's own concept (n=58, 43.2%), and the absence of a balance between workload and financial remuneration (n=52, 38.6%).

**Conclusion:** Interdisciplinarity should not be regarded as the opposite of technological specialization. On the contrary, advancing technological developments in IDD will probably enforce a certain degree of specialization. Therefore, in the future it will become necessary not to lose contact with other specialties, keep open communication lines by means of a common language and common concepts, and also maintain communication with other medical specialties.

*Keywords: Interdisciplinarity; interdisciplinary dentistry; teamwork; dental education.*

## 1. INTRODUCTION

Interdisciplinarity (ID) may be described as the mutual permeation of various specialties accompanied by expansion of the scope of each [1]. ID is by no means a new concept in research, training or application. Nevertheless, a uniform approach and a widely applicable definition do not exist [2]. ID is marked by the application of perspectives, concepts and methods that go beyond the limits of individual specialties [1]. ID may either be interpreted in a very narrow sense as the actual fusion of specialties, or in a wider sense as a multidisciplinary phenomenon in which independent specialties work jointly to resolve a problem, each from its own conceptual viewpoint [1].

ID is demanded to an increasing extent in medicine and dental medicine, and has also been established in training and advanced training courses. This may be attributed to various reasons:

1. **ID teams:** Advancing specialization and the division of previously uniform specialties into several independent sub-specialties require more effort when specialists work with each other. It necessitates a greater degree of competence in terms of the ability to work in a team, leadership, and communication.
2. **Specialists:** Rapid developments of specific concepts concerning basic principles, diagnostic procedures, therapy planning, and therapy within these sub-specialties go hand in hand with the evolution of a specific vocabulary based on new, self-contained, and possibly independent definitions.
3. **Institutions:** Increasingly complex treatment models call for more extensive interdisciplinary knowledge and the establishment of facilities that fulfill this requirement.
4. **Patients:** The expectations of patients who are better informed about diverse treatment methods because of new media, and also increasingly demand these in a very self-confident manner - even if it involves changing the physician in charge of their treatment and, finally,

5. **Training and postgraduate training institutions:** Those in training demand, to an increasing extent, that they should be prepared for these requirements in the course of their education. This enforces the adaptation of existing training models without neglecting the actual purpose of one's development within a specialty.

A glimpse of the current published literature reveals that ID has been established as a fixed element in dental vocabulary. However, a point of criticism worthy of mention in this context is that especially interdisciplinary publications are to be found in rather poorly ranked or unranked journals. It is extremely difficult for young scientists to publish interdisciplinary articles in journals of high repute. This is because the narrow and specialized orientation of the journal is considered unsuitable for publication of an interdisciplinary article - despite the high quality of research underlying the submitted article [1], [3].

Even today, practicing physicians and dentists have a rather ambiguous and inconsistent concept of ID. How does one define ID? What might be the scope of ID concepts without exposing oneself to the risk of being unable to fulfill basic requirements? If one looks at interdisciplinary concepts, they are found to differ markedly from each other in terms of their very basic structure. Some approaches consider overlapping specialties as a prerequisite for ID. On the other hand, clearly defined independent specialties are considered necessary in order to practice actual and effective ID [4]. The formation of an interdisciplinary team when encountering a problem that cannot be exactly assigned to one specialty or one that addresses several specialties may well be viewed in the framework of ID concepts for the purpose of finding a solution [5]. In a newly established interdisciplinary training concept based on ID it was found that the combination of different specialties is meaningful when one wishes to learn about complex phenomena such as the utilization of online resources, or expand one's understanding and targeted application of evidence-based dentistry (Evidence based Dentistry EbD) [6].

Interdisciplinary team work is an advancement that may well be associated with difficulties due to legal regulations in various countries, such as practicing the profession of a dentist. Quite often the practice of a profession is very specifically defined with reference to individuals working in a medical office. In these premises, the patient who reports for consultation has to be treated comprehensively in terms of dentistry. The term "comprehensively" is to be viewed here from the perspective of dentistry as a whole and not from the viewpoint of a specific sub-specialty. Many remuneration systems of social insurance institutions are based on this concept. Team work between specialists is not hindered by this fact, but is rendered difficult because working in joint medical offices may not always be in keeping with this principle. Communication, coordination, and appointment scheduling become difficult, while greater temporal and financial burdens are imposed on the patient. Many countries offer simpler options of thinking in larger units as well as implementing interdisciplinary approaches. Expectations of ID tend to be very high although the goals may be very vaguely defined [4]. Besides, the effort involved in an ID project is frequently underestimated. Organizational and management tools are used scarcely and/or inefficiently [4]. The additional effort of every member of an interdisciplinary project is regarded as a relevant and limiting factor which needs to be overcome [7]. Interdisciplinary team work combines the strengths of two or more disciplines with the aim of identifying problem, revealing associations, working out solutions to problems, and applying these [8]. Interdisciplinarity is not a means of preventing the separation of individual disciplines. Rather, the inevitable gaps that arise between the disciplines must be bridged. However, interdisciplinarity is not the only form of cross-disciplinary team work. Not every scientist or academic has an aptitude for interdisciplinary team work. Persons who are interested in it

tend to think divergently - in contrast to the convergent mode of thought pursued by specialists. Members of interdisciplinary teams must possess differentiating, relativising and synthesising characteristics to a greater degree than others. Experts who think in disciplinary fashion tend to believe they can find the solution to a problem on the basis of their expertise and from their own viewpoint - even when working within an interdisciplinary team. The interdisciplinary scientific approach, on the other hand, would consist of providing the required contribution that one can offer as a specialist in order to resolve the problem [8]. The need for improvement and possible reorientation of interdisciplinary co-operation between the dentist and the general practitioner has been highlighted and appears to be compulsory [9]. The population is more and more interested in good oral health and adequate oral health services, although a gender difference may be observed [10].

ID has to serve, at least in part, as a communication platform between specialties within medicine. The chronic periodontal inflammation is widely accepted as a cause or a modifier in many diseases such as cardiovascular diseases (CVD), pancreatic cancer, preterm birth and diabetes [3]. Periodontitis can be defined as a localized chronic inflammatory reaction to bacteria, with the capacity to destroy connective tissue and subsequent bone. Periodontitis is a common finding affecting a huge amount of the general population. Often a consequent treatment is not provided, mainly because of the unawareness of the possible lethal consequences and the asymptomatic course of the disease. Periodontitis is not a disease of developed countries only, high prevalence and incidence rates are reported in developing countries as well. And, in addition, symptoms of chronic periodontal inflammation are not specific and are ignored by the patient. Periodontitis has been identified as being a risk factor for CVD. Although the direct causal relation is not yet identified, activation of signaling proteins leads to a cascade of reactions in the inflammatory and immune response. The wall of blood vessels has to be considered as a target for these mediators with the consequence of micro- and macro structural changes. Interdisciplinary dentistry has to take chronic periodontal diseases seriously and consequent diagnoses and treatment in close collaboration with the general medical care and management is required [3,11,12,13,14]. Periodontal inflammation raises systemic inflammatory metabolism and leads to unfavorable changes in specific tissues. The knowledge of the bilateral relationship between oral and systemic health will challenge physicians and dentists to work together closely in the future when managing patients with diabetes and periodontal disease. An interdisciplinary approach has to be established. Interdisciplinary dentistry can have a huge impact on diagnosis and control of diabetes and coronal diseases [15,16,17,18,19].

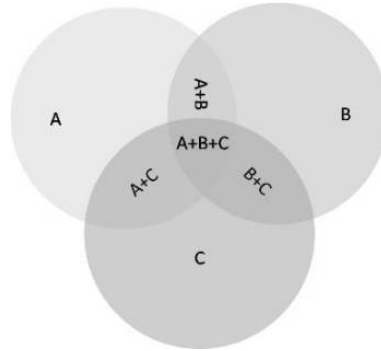
The aim of the present investigation was to clear up the various viewpoints and understandings of interdisciplinary dentistry (IDD) among dentists who perform interdisciplinary cooperative work according to their own reports. Different ID concepts are described in dentistry, which can be summarized in three main categories: first, the concept of overlapping disciplines, second, the focus on the gaps between disciplines and third, the establishing of ID Teams. One intention of this investigation was to find out, which of these concepts are favored by dentists, who are interdisciplinary oriented. Furthermore, strengths and weaknesses of IDD in a team were qualified and quantified and matched with work experience and experience in IDD. In addition, the frequency of cooperation with different disciplines and specialists has been investigated. The collaboration between close related disciplines, intermediate related disciplines and remote related disciplines has been investigated. The question as to how much of a dentist's and dental technician's daily work is taken up by IDD, and whether this share should be expanded, kept constant, or reduced in the future will be addressed.

## **2. MATERIALS AND METHODS**

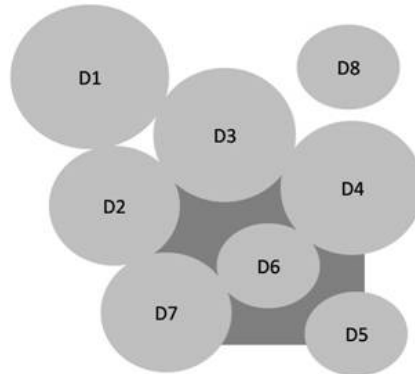
We performed an international survey. Dentists in different working environments (owners of medical offices or their partners, employed dentists, academic environment, dental industry) as well as dental technicians were permitted to participate in the survey. Potential candidates were recruited at various postgraduate educational events focusing on interdisciplinary dentistry. Previous participants of similar educational events were sent a link and an access code via e-mail, enabling them to access the questionnaire in electronic form, and were asked to participate in the survey. Both types of surveys were anonymous. The questionnaire was handed out in paper form in three languages (German, English, and Russian). An electronic Internet-based version was available only in Russian. In all, 250 questionnaires were handed out in paper form and 100 access codes for the Web-based version were sent. The survey was conducted between February and May 2011. All questionnaires were filled anonymously.

In addition to demographic data (age, gender, work place, and nationality) the following items were included in the questionnaire:

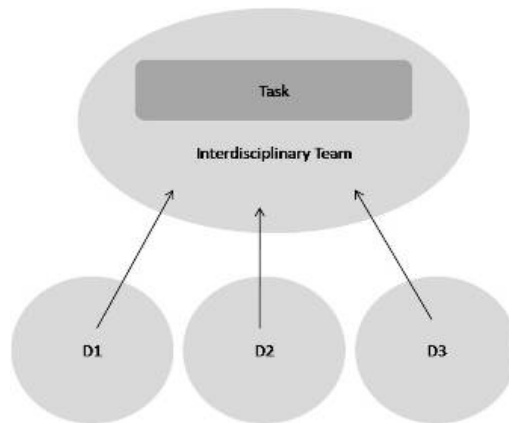
- ✓ The share of interdisciplinary work in the respondent's total work was registered on a visual analog scale (VAS) from 0 to 100. The same was done for the desired share of interdisciplinary work in relation to the respondent's overall working hours.
- ✓ Data concerning professional experience and experience of IDD in years.
- ✓ Reasons for or against IDD; respondents were permitted to mention several reasons.
- ✓ Frequency of cooperation with different specialties; the latter were categorized into closely, moderately, or distantly related specialties. Respondents could mark frequent, rare, or no cooperation.
- ✓ Basic perception or understanding of IDD was interrogated in two different ways and at different points in the questionnaire. First of all, three definitions of ID were offered. The respondents had to select the statement they could not accept at all, the statement they could accept to a large extent, and the statement they could fully accept. The following questions were asked:
  - Interdisciplinarity means cooperation between disciplines focused on a common topic and the application of methods, theories and concepts of different disciplines.
  - Interdisciplinarity exists when disciplines mix with and encounter each other, and when different perspectives, methods and academic areas intersect with each other.
  - Interdisciplinarity is collaboration between participants with different disciplinary backgrounds. Each participant contributes to the project with the point of departure in their own disciplinary expertise.
- ✓ ID was depicted in three graphic diagrams that showed different models of ID or IDD (Fig. 1a-c). The first of these were overlapping specialties that have to cooperate, or are compelled to cooperate with each other. This was followed by independent disciplines that more or less included an intermediate adisciplinary space; ID or IDD would occur when a problem arose in this adisciplinary space. Finally, the formation of an interdisciplinary team as a result of a clearly defined task and focused on an actual problem.



**Fig. 1a. Interdisciplinary teamwork based on overlapping disciplines**



**Fig. 1b. Interdisciplinary Teamwork based on differentiated disciplines with adisciplinary gaps**



**Fig. 1c. Interdisciplinary Teamwork based on an identified task and a target oriented interdisciplinary team**

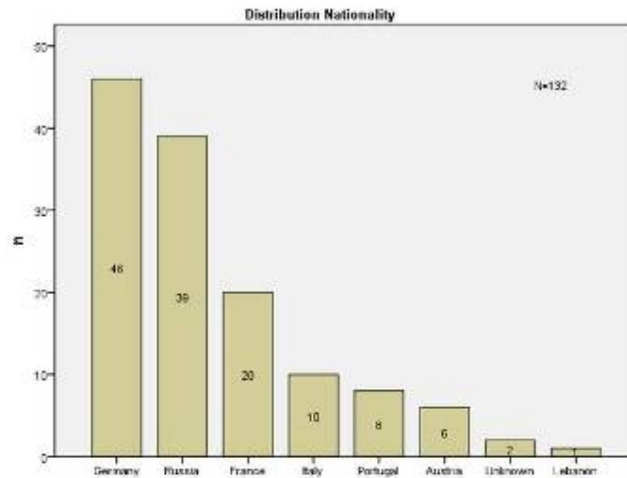
Data analysis was performed after the creation of a database in which all data were entered twice in order to identify input errors. Missing, inexact or illegible entries in the questionnaire were not taken into account. The database was created with the Microsoft® Excel® software

and was evaluated using the statistical software program SPSS® (IBM®, version V.19\_2011).

### 3. RESULTS AND DISCUSSION

#### 3.1 Demographic Data Evaluation

In all we were able to evaluate 132 questionnaires. This equals a total response rate of 37.7%. This value is quite satisfactory for a study using a questionnaire. The Internet-based survey yielded a response rate of 29% (29 of 100). As regards the survey in written form, 103 questionnaires could be evaluated, amounting to a response rate of 41% (103 of 250). Of the surveyed persons, 60 were women (47%) and 72 were men (53%). The distribution of countries is shown in Fig. 2. Initial statistical tests revealed no significant differences between the electronic survey and the paper-based survey. Likewise, no country-specific differences were found.



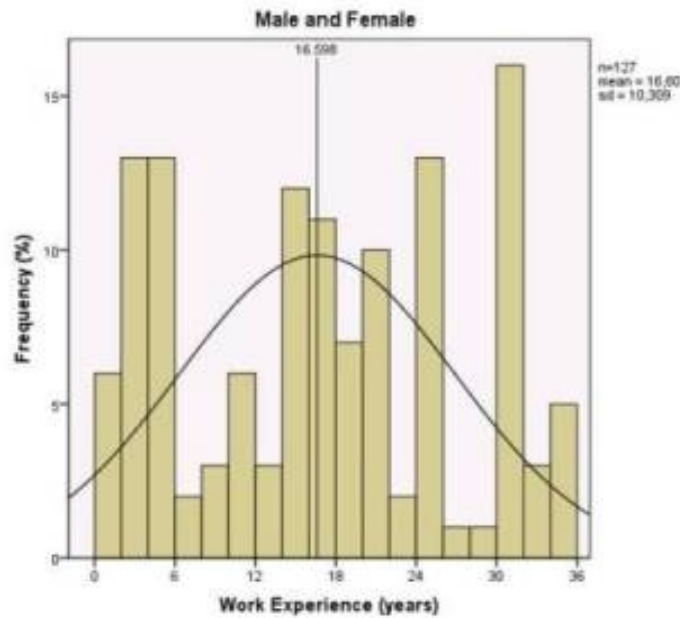
**Fig. 2. Distribution of participating nations within this opinion survey among dentists and dental technician**

The mean age of the respondents was 40.3 years (standard deviation (SD) 11.51 years, minimum 21 years, maximum 65 years, range 44 years). Eight participants (6%) did not mention their age. The mean age of female respondents was 38.3 years (SD 10.98, minimum 21 years, maximum 60 years, range 39 years); 3 persons (5%) provided no data. The mean age of male respondents was 42.2 years (SD 11.78, minimum 22 years, maximum 65 years, range 43 years); 5 persons (7.7%) provided no data. Only one respondent (0.8%) provided no data concerning the workplace. Seventy-four (56.1%) stated that they were working in a private dental clinic. Twenty-nine (22%) respondents were dental technicians working in commercial dental laboratories, 3 (2.3%) were dental technicians occupied in clinical laboratories. Twenty-one (15.9%) dentists were employed in academic dental institutions while 2 (1.5%) respondents were employed in hospitals. A further 2 (1.5%) respondents utilized the option of making a free entry and stated that they were occupied in the dental industry [1] or working as a consultant [1]. Thus the large majority of respondents

were employed in a dental clinic, a commercial dental laboratory, or an academic dental institution (cumulative 94%).

### 3.2 Professional Experience, Actual and Desired Share of IDD

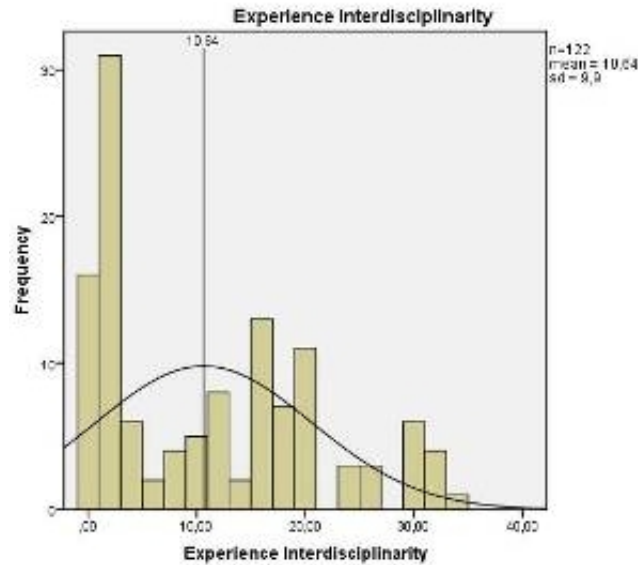
Data concerning the mean duration of the respondents' professional experience was based on the entries of 127 (96.2%) respondents while 5 (3.8%) provided no data. The mean duration of professional experience was 16.6 years (SD 10.3, minimum 1 year, maximum 35 years) (Fig. 3).



**Fig. 3. Work experience, male and females**

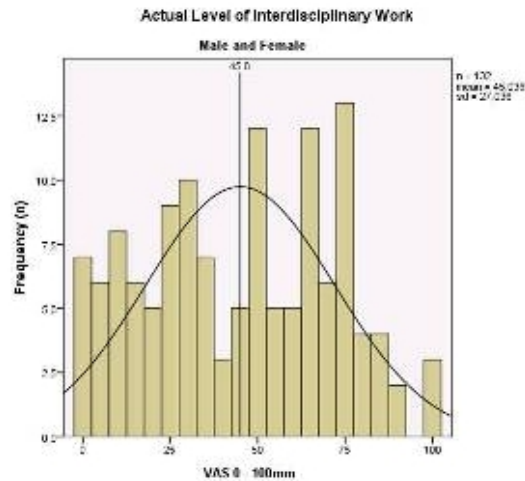
Female and male respondents differed just marginally in terms of work experience (female: 15.4 years, SD 10.1, minimum 1 year, maximum 35 years; male: 17.7 years, SD 10.5, minimum 1 year, maximum 35 years). The mean duration of having worked in interdisciplinary teams was 10.7 years (SD 9.9, minimum 0 year, maximum 34 years) (Fig. 4). In this regard, a greater difference was noted between men and women. While women reported a mean duration of 8.4 years as regards experience with ID (SD 9.1, minimum 0 year, maximum 30 years), men reported a mean duration of 12.5 years (SD 10.6, minimum 0 year, maximum 34 years). Six women (10%), and only 2 men (2.9%), provided no data in this regard.





**Fig. 4. Work experience in interdisciplinary collaboration, male and females**

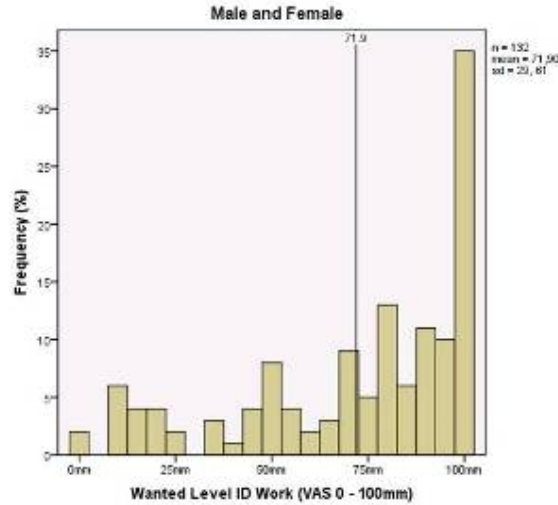
The question concerning the current share of IDD in the overall working hours was registered on a visual analog scale (VAS 0 – 100 mm); the same was done for the desired share of IDD in the overall working hours. The current share of IDD in the overall working hours was reported by all respondents. The mean value was 45% (SD 27.04, minimum 0, maximum 100) (Fig. 5) and showed marginal differences between men and women: the mean value reported by women was 41.7% (SD 27.45, minimum 0, maximum 100) while that reported by men was 47.9% (SD 26.53, minimum 100, maximum 100).



**Fig. 5. Actual level of Interdisciplinary work (VAS: Visual Analogue Scale)**

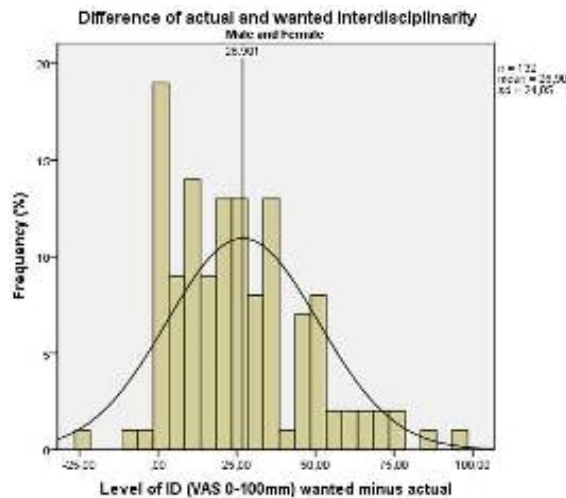
Values for the desired share of IDD in the overall working hours were markedly higher: the total mean value was 71.9% (SD 29.6, minimum 0, maximum 100); the mean value reported

by female respondents was 71.4% (SD 29.19, minimum 0, maximum 86) while that reported by men was 72.3% (SD 30.19, minimum 0, maximum 100) (Fig. 6).

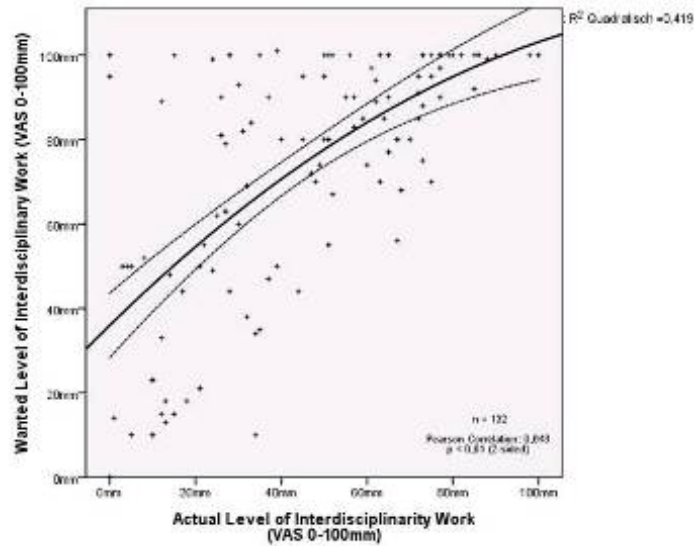


**Fig. 6. Wanted level of Interdisciplinary work (VAS: Visual Analogue Scale)**

The primary notable feature is that female respondents reported 100% as the maximum share of ID in the overall working hours, but their desired maximum share of ID in their overall working hours was just 86%. This is rather surprising, and was indirectly confirmed in other evaluations as well. The difference between the actual and the desired share of IDD in the number of daily working hours is shown in Fig. 7a: minimal differences were noted between men and women. A positive correlation was established between these two parameters (Fig. 7b). Just a small number wished to achieve a reduction in the share of IDD.

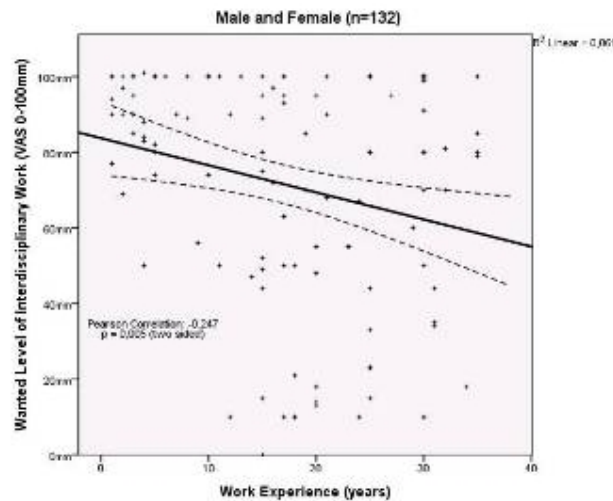


**Fig. 7a. The differences between actual and wanted Interdisciplinarity. Only a few participants want to reduce the level of actual interdisciplinary work (VAS: Visual Analogue Scale)**

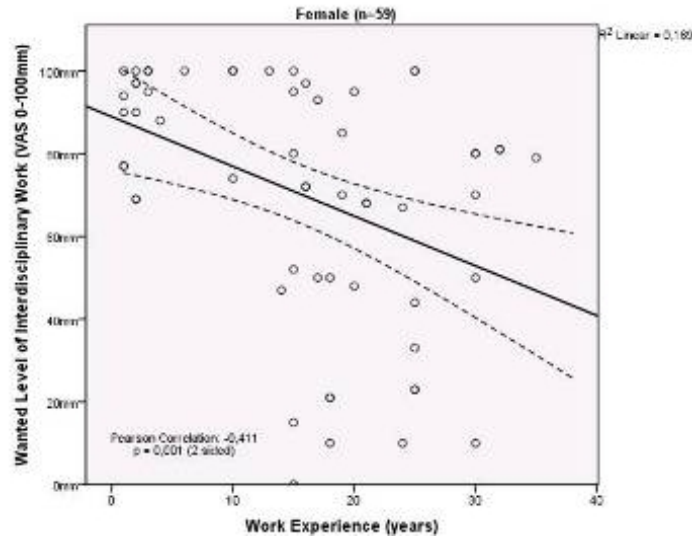


**Fig. 7b. A positive correlation exists between actual and wanted level of Interdisciplinary work (VAS: Visual Analogue Scale)**

Correlating work experience (in years) with the desired share of IDD (VAS in mm) in working hours, one surprisingly finds a negative and statistically significant correlation (Fig. 8a). This association is especially marked among female respondents (Fig. 8b). However, a limitation of the present study was that it was not designed to answer this question. Whether this was an actual effect or whether it had occurred due to the small number of surveyed persons cannot be stated with certainty; the same applies to the reason for this observation. The evaluation of work experience as opposed to the desired share of IDD revealed no country-specific differences.



**Fig. 8a. A negative correlation exists between work experience and wanted level of Interdisciplinary work**



**Fig. 8b. A negative correlation exists between work experience and wanted level of Interdisciplinary work in females**

### 3.3 Reasons in Favor of or Against an Interdisciplinary Approach

Respondents of the survey were offered 10 reasons in favor of or against IDD (Table 1). Multiple answers were permitted. Associations with other specialties (n=84, 63.6%), solutions for unresolved problems (n=83, 62.9%), and expansion of one's own specialty (n=65, 49.2%) were the most frequently cited reasons that were believed to favor the use of interdisciplinary task groups, followed by changes in one's own perspectives (n=59, 44.7%) and modification of one's own conceptual framework (n=57, 43.2%). The following were mentioned most rarely: ID is a temporary fad (n=8, 6.1%), ID serves to create a new specialty (n=10, 7.6%) or modify other specialties (n=26, 19.7%).

Difficult or ambiguous communication (n=73, 55.3%), conflicts within the team (n=70, 53.0%), and scheduling difficulties (n=63, 47.7%) were the most frequently cited reasons for not pursuing interdisciplinary cooperation, followed by rising costs and the expense of resources (n=62, 47.0%), the need to modify one's own concept (n=58, 43.2%), and the absence of a balance between workload and financial remuneration (n=52, 38.6%). The following factors were mentioned most rarely: greater personal effort (n=47, 35.6%), adherence to a treatment plan (n=39, 29.5%), and geographic problems (n=47, 35.6%). However, the numbers of answers, each given by more than one third of the responders, were remarkably high. In fact, 39 responders mentioned that patients would object to IDD (n=49, 37.1%). The data are summarized in Figs. 9a and 9b.

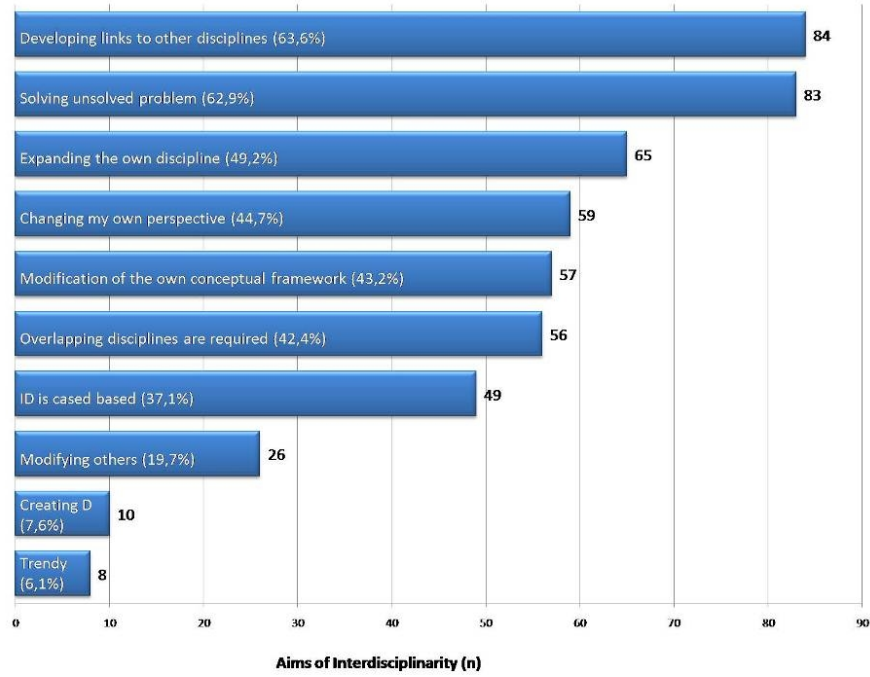


Fig. 9a. The aims of Interdisciplinarity are indicated within the bars and arranged according to the frequency of nomination (n, %)

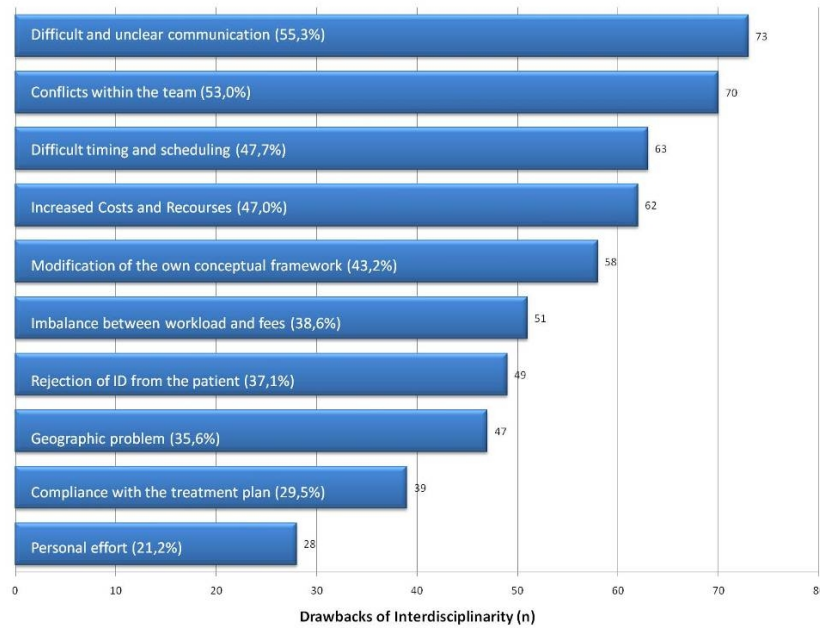
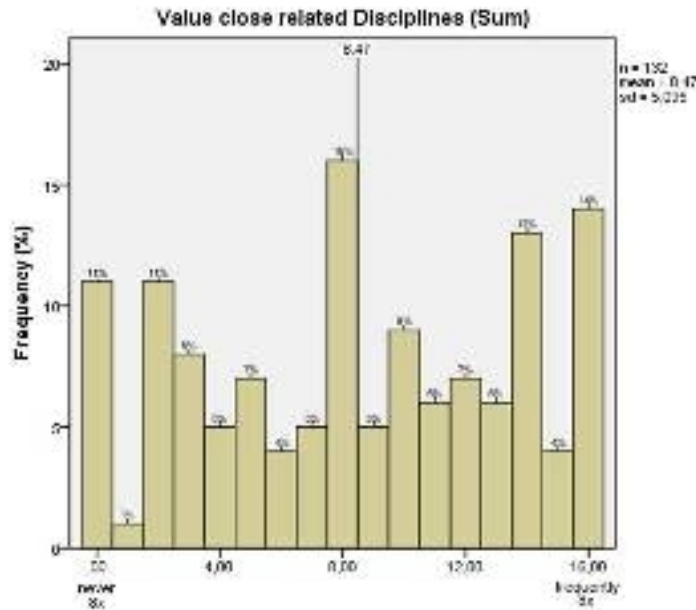


Fig. 9b. The drawbacks of Interdisciplinarity are indicated within the bars and arranged according to the frequency of nomination (n, %)

### 3.4 Cooperation between Specialties

Respondents were offered 27 specialties and 3 additional description fields to mark those specialties with which they never (0), rarely (1), or frequently (2) cooperated. The listed specialties were then divided into 3 groups. The basic association between these specialties was used as the criterion. The group of "closely related" specialties included prosthetics, restorative dentistry, orthodontics, endodontics, periodontology, oral surgery, implantology, and specialists for craniomandibular functional disorders. The "moderately closely related" group of specialties consisted of dental technicians, speech therapists, maxillofacial surgery, ENT, orthopedics, physiotherapy, aesthetic surgery and radiology. The remaining specialties were assigned to the "distantly related" group, namely internal medicine, pediatrics, obstetrics and gynecology, psychiatry, psychology, oncology, gerontology, microbiology, genetics, dermatology, and allergology.

Data concerning closely related specialties are shown in Fig. 10a. The mean value is 8.47 (SD 5.06). Notably, 11% stated that they never cooperated with any of these specialties, whereas 14% said they worked frequently with all 8 specialties of this group. The mean value for moderately related specialties was 4.58 (SD 3.32); 14% of the respondents stated that they never cooperated with any of these specialties while no respondents said they worked frequently with all of these specialties (Fig. 10b). A mean value of 3.7 (SD 4.75) was registered for distantly related specialties; 43% mentioned that they never worked with any of these specialties (Fig. 10c). Fig. 11 summarizes these associations.



**Fig. 10a.** The group of "closely related" specialties included prosthetics, restorative dentistry, orthodontics, endodontics, periodontology, oral surgery, implantology, and specialists for craniomandibular functional disorders

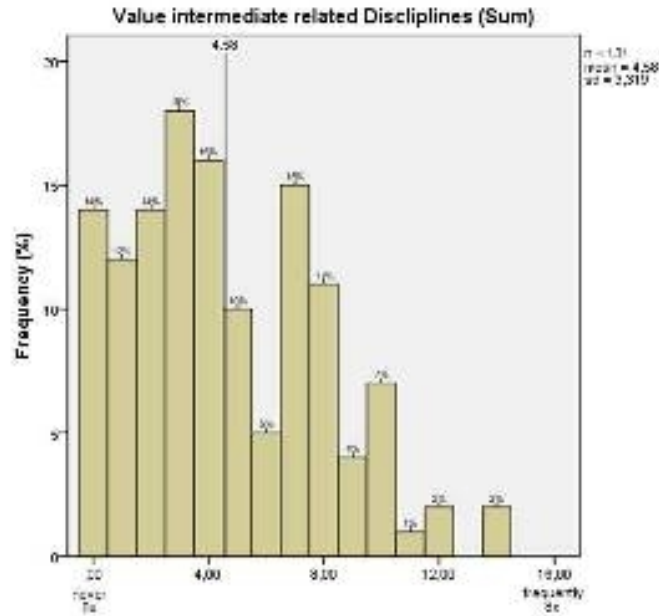


Fig. 10b. The "moderately closely related" group (intermediate related) of specialties consisted of dental technicians, speech therapists, maxillofacial surgery, ENT, orthopedics, physiotherapy, aesthetic surgery and radiology

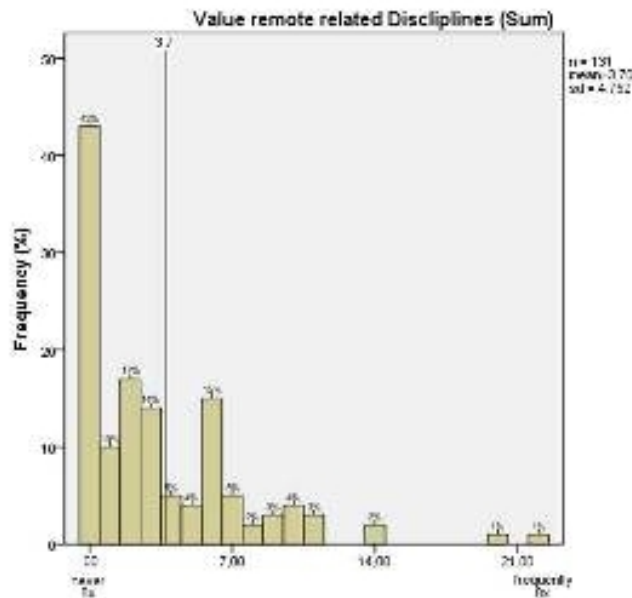
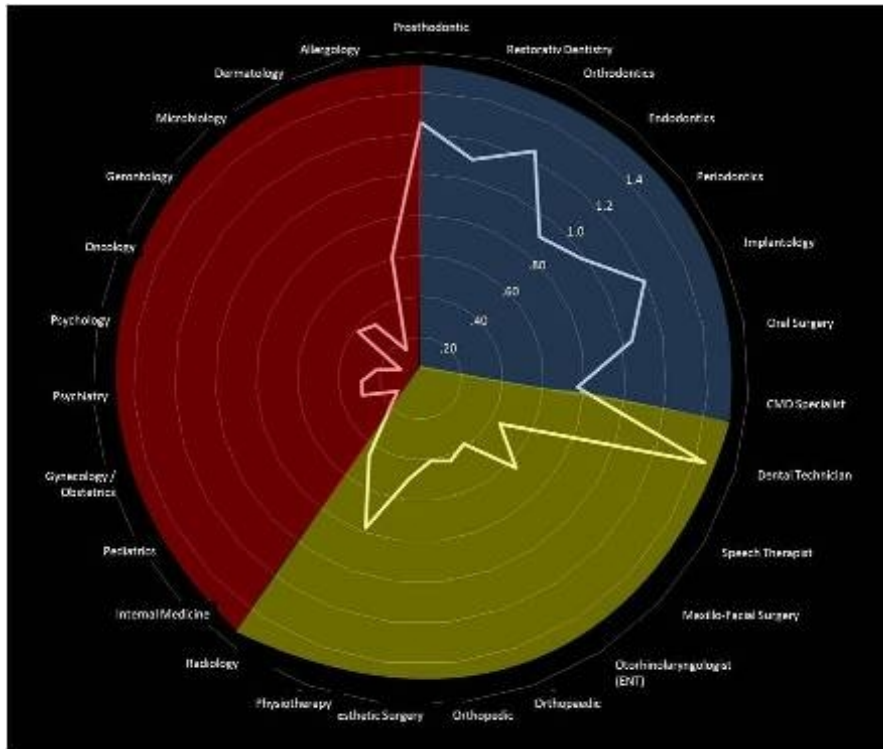


Fig. 10c. The "distantly related" group (remote related) of specialties consisted of internal medicine, pediatrics, obstetrics and gynecology, psychiatry, psychology, oncology, gerontology, microbiology, genetics, dermatology, and allergy





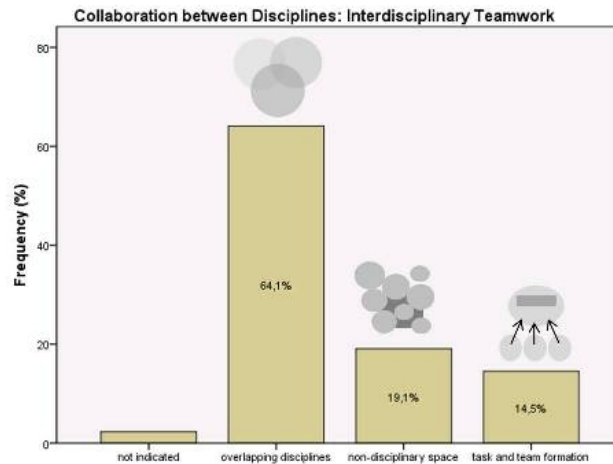
**Fig. 11. Respondents were offered 27 specialties and 3 additional description fields to mark those specialties with which they never (0), rarely (1), or frequently (2) cooperated. The listed specialties were then divided into 3 groups: closely related disciplines**

### 3.5 Concepts of Interdisciplinary Work

The definition of IDD as cooperation between specialties was rejected by 51 responders (38.6%) while 39 (29.5%) agreed and 42 (31.8%) strongly agreed. Forty-three respondents (32.6%) disagreed with the concept that IDD was based on a mixture of specialties while 37 respondents (28.0%) strongly agreed with this definition. The majority of respondents, i.e. 52 (39.4%), agreed with this definition. The third question was based on the presumption that IDD requires no clearly divided and strongly independent specialties: 36 responders (27.3%) rejected this viewpoint, 41 (31.1%) agreed, and the majority (55; 41.7%) strongly agreed with the definition. The determined means for the individual statements were 2.48 (SD 2.12) for IDD being based on cooperation between specialties, 2.59 (SD 1.98) for IDD being a mixture of specialties, and 3.02 (SD 2.04) for IDD being based on strong and independent specialties.

The results were more evident on graphic representations of possible scenarios. Here the respondents could only select a specific illustration. Eighty-four respondents (64.1%) selected the graphic diagram that showed overlapping specialties, 25 (19.1%) selected the graphic diagram that focused on the intervening space between specialties, and 19 (14.5%) selected the illustration that showed the formation of teams. Only 3 questionnaires (2.3%) could not be taken into account for this evaluation (Fig. 12).





**Fig. 12. Different concepts in Interdisciplinary Teamwork**

#### 4. DISCUSSION

Evaluation of the data collected from the survey showed that the respondents rated about 45% of their current working hours as being taken up by interdisciplinary work. This Fig. was equally true of men and women, and did not differ significantly between countries. In view of the number of questionnaires, however, we could draw conclusions only for Germany, Russia and France. This value was initially quite satisfactory. Approximately one half of the available working hours being invested in interdisciplinary work appears to be an acceptable value, especially if one considers this Fig. in relation to the additional effort involved, including communication, administration and specialized training. However, the wide range of data and the distribution of data indicate the presence of potential parameters that one will have to investigate further in future studies: How does one's personal definition of interdisciplinary work influence this outcome? What activities are considered interdisciplinary and what are considered part of one's specialty? Do differences exist between individual specialties? How does the existing training and postgraduate training concept influence this outcome?

Data concerning the desired share of ID in one's working hours were similar to data concerning the current share of ID in one's working hours: the respondents wished to invest about 70% of their working hours in interdisciplinary team work. The distribution of data revealed a wide range in this regard as well, although a large portion of the data (>80%) was to be found in the upper range (50% cumulative).

The difference between the current and the desired share of working hours in IDD shows that the large majority of respondents wished to increase this share; the desire to reduce the share of ID was expressed in just a few exceptional cases. In this regard as well, the questionnaire is not sufficient to determine whether the desire to increase the share of IDD depends on the baseline condition, and what factors might influence this outcome.

An unexpected, and therefore very interesting outcome, was noted in the correlation between work experience and the desired share of ID in one's daily work; a negative correlation was established here for all respondents and especially for female respondents. The obvious and immediate question that arises here is the reason for this negative

association. A point of criticism worthy of mention is that the cause possibly lies in the small number, and the selection, of the surveyed persons. This outcome will have to be confirmed in a larger investigation. However, if it does prove to be true, one may consider potential models of explanation for the phenomenon: dentists and dental technicians who have been professionally active for a longer period of time consider interdisciplinary work with their colleagues a part of their daily routine and do not regard it as a specific interdisciplinary action. However, after a few years of professional experience one's routine daily work may well be filled with predefined work procedures in a specific field of work (specialization) so that one has little time for ID. Finally, one may opt for the interpretation that the negative aspects of ID cause a certain degree of frustration, and IDD is therefore deemed undesirable.

Difficulties in IDD indicate significant problems concerning communication, the formation of teams, and just distribution of workloads and payments. This is surprising because, especially in this regard, we have multifaceted and proven concepts and tools from the world of finance, business management, personnel management, and communication science. However, it would appear that these are rarely used. There may well be a greater need to impart these competences in the course of training and postgraduate training.

Traditionally, however, in many countries the practice of dentistry is based on hierarchical structures that are very specifically oriented to individual persons; these tend to oppose rather than promote interdisciplinary work. The structures are not taken apart easily without endangering the ongoing technical and financial success of the involved persons. One's own team of staff members must be led into and motivated to accept this new orientation. Communication pathways need to be established. Successful crisis management within the ID team requires additional experience, motivation, and commitment. Focusing on these aspects of economic life in one's training would be necessary if one wished to use IDD more intensively in the future.

As expected, we found marked differences in cooperation between specialties, depending on how closely these were related to each other. This is certainly a confirmation of one's expectations at first glance. This view suggests no more than an apparent proximity or distance between specialties. If one views interdisciplinarity merely from the perspective of required cooperation between specialties in dentistry, one easily concludes that such interdisciplinary cooperation is almost inevitable. It is a fixed component of teaching as well as one's perception of modern dentistry: prosthetics without endodontics or without periodontology can no longer be regarded as the state of the art today. Likewise, orthodontists must communicate with maxillofacial surgeons as well as with prosthetics and periodontologists. However, when one considers the numerous interdisciplinary publications on ID between dentistry and speech therapy, psychology, orthopedics, physiotherapy, oncology, internal medicine, obstetrics and gynecology, etc., this thesis is not very clearly confirmed by the results of the present study. One may well raise the question as to whether such absence of cooperation originates from dentistry alone or whether the possibility of pursuing ID with dentists is not known to, or not perceived by, other medical specialties. Is this an expression of a greater drift between dentistry and medicine? Further investigations are needed to answer these questions. It appears important to involve medical specialties more intensively in training and postgraduate training concepts for dentists. The same is true for the integration of essential elements of dentistry into medical training and postgraduate training.

A major point of focus in the present study was to determine the respondents' perception of IDD: What do they define as IDD? If IDD necessarily requires overlapping and mixed specialties, it would lead to further concepts derived from this thesis: the overlapping area of specialties may be regarded as a sum of specialty A and specialty B and specialty C. However, this viewpoint contradicts many definitions of ID: cooperation and team work between specialties is not merely the sum of individual specialties (which could be referred to as a multidisciplinary phenomenon), but must give rise to additional value. The overlapping field must yield a greater value than the mere sum of A+B+C. Of course, from the patient's viewpoint one may well ask whether there is a personal need for such an interdisciplinary overlapping structure. Just as the patient has to make a decision as regards the selection of his/her dentist, such selection is required in this context as well. The risk of over-treatment (performing unnecessary treatment measures within an IDD team) must be mentioned here as a point of criticism. From the authors' point of view, it is a counterpart to those parts of IDD that appeared necessary but were not performed. This model of "overlapping specialties" is frequently used in existing insider relationships which, in a metaphorical sense, should not become a part of the "food chain" within the involved specialties.

The second model of IDD that refers to the space between specialties differs considerably. This model may be regarded as adisciplinary. It specifically addresses the following aspects:

- The unknown problem.
- The known problem with no standardized solution in terms of evidence-based medicine (EbM).
- The known problem that cannot be assigned to any of the individual specialties.
- The known problem with unknown risks, but expected risks.
- The known problem with complex and ambiguous margins.
- The unknown problem with complex and ambiguous margins.
- The new approach to a known problem.

The primary notable features of this model are its clarity and logic. However, from the patient's point of view it is quite prohibitive: what patient would like the idea of his/her personal health problems being referred to as unknown, ambiguous, or unassignable to a specific specialty? It would immediately result in a significant degree of uncertainty. The ID team would be confronted with problems concerning responsibilities, barriers due to different definitions, and communication difficulties resulting from different viewpoints and opinions. However, these unknown factors are exactly those that demonstrate and clarify the limitations of one's own specialty, calling for a quest for, and the implementation of, a joint approach.

A model clearly focused on the formation of an interdisciplinary team is offered in this report. The team should be re-formed when confronted with a new task. This model has become a standard approach in many research and development processes. However, the model calls for immense effort in dentistry because the team has to be formed a new every time. The team focuses on the task. It requires a strong willingness to accept one's position or personal share in team work; the acceptance of a team coordinator from a different discipline is taken for granted; and the individual's willingness to coordinate his/her activities must be very high. All involved persons must have a strong willingness to communicate, the ability to work in a team, and also possess management abilities. From the patient's point of view, the model may signify a confrontation with very diverse disciplines, which may possibly be

regarded as an impersonal action when devoid of intensive personal relationships. The patient should not be confused by too many expert opinions. The principle of communicating with one voice ("One Voice") must be clearly established and followed. Just as the team focuses on the solution of the basic problem, the patient also must primarily orient himself/herself to this solution, and possibly accept the necessity of a somewhat impersonal mode of treatment.

## **5. CONCLUSION**

The following conclusions may be derived from the data we collected:

- ✓ Concepts of IDD
  - The surveyed dentists and dental technicians do not view or comprehend IDD uniformly. This is possibly related to the frequently mentioned problems of communication, the formation of a team, and a high conflict potential. Therefore, it will be necessary to create a clearer concept of IDD and incorporate it in training concepts as well as postgraduate training courses.
  - The negative correlation between work experience and the desired share of ID in daily routine initially permits the conclusion that the negative aspects of and experience concerning IDD have led to a reduction of this mode of operation. On the other hand, an experienced treating dentist may not consider his work as ID at all, but may regard this mode of operation as a routine procedure. This questionnaire was not designed to obtain an answer to this question. A further study focusing on this aspect in greater detail would have to be performed in order to answer this question.
  - The negative correlation between work experience and the desired share of ID in one's daily work was an unexpected outcome among female respondents. It should be investigated and analyzed more closely in future studies. This outcome may possibly reflect the still existing double burden of family and professional work among female respondents. A further explanation would be the dominant and non-consensus-oriented communication behavior of male respondents as regards ID, thus excluding women from the decision process within a team. It may also reflect the traditional selection of specialties by men and women. However, the present study is not sufficient to answer these questions. Future investigations will have to focus on determining causes and then working out solutions for these problems.
- ✓ Cooperation between specialties
  - Cooperation between specialties functions mainly within closely related specialties that still constituted a uniform discipline of dental, oral, and maxillofacial medicine a short while ago. The need for interdisciplinary treatment concepts, however, is widely dispersed. It includes dental care of older and elderly persons, even in care homes. Prophylactic measures during chemotherapy and radiotherapy to avoid mucositis as a side effect of cancer therapy - in cooperation with oncology. Oral hygiene and prophylaxis

as targeted measures in diabetes for the purpose of blood sugar control, especially in children and adolescents, as well as during pregnancy to avoid low birth weight and preterm birth. This aspect should also be incorporated more specifically in training and postgraduate training concepts.

✓ Patients perspective

- The external viewpoint: This obviously raises the question as to how IDD is perceived from the outside. How do more distant specialties view dentistry? Do these specialties wish to collaborate with dentistry in the immediate future? Is the state of knowledge in medical specialties about the negative effects of chronic intraoral inflammation by way of chronic periodontal disease sufficient to consider interdisciplinary cooperation a desirable goal?
- The reasons for cooperation may be regarded positively from the patient's perspective. Such cooperation will provide better care for the patient (by way of being better oriented to the patient's individual needs). The difficulties of a greater financial burden and a greater need for resources must be given more attention. The patient should be informed in a simple way. One should also convince insurance institutions about the need for such care.

✓ Aims and drawbacks of IDD

- Associations with other specialties, solutions for unresolved problems, and expansion of one's own specialty were the most frequently cited reasons that were believed to favor the use of interdisciplinary task groups, followed by changes in one's own perspectives and modification of one's own conceptual framework.
- Difficulties in IDD indicate significant problems concerning communication, the formation of teams, and just distribution of workloads and payments. This is surprising because, especially in this regard, we have multifaceted and proven concepts and tools from the world of finance, business management, personnel management, and communication science. However, it would appear that these are rarely used.

Interdisciplinarity should not be regarded as the opposite of technological specialization. On the contrary, advancing technological developments in IDD will probably enforce a certain degree of specialization. Therefore, in the future it will become necessary not to lose contact with other specialties, keep open communication lines by means of a common language and common concepts, and also maintain communication with other medical specialties.

**CONSENT**

Not applicable.

**ETHICAL APPROVAL**

Not applicable.

## ACKNOWLEDGEMENTS

This research project (*BID\_11*) was supported as part of the Project Interdisciplinary Dentistry (IDD) of the Steinbeis Transfer Institute Biotechnology Interdisciplinary Dentistry (STI-BID), Steinbeis University Berlin by the standard research financial plan of STI-BID.

## COMPETING INTERESTS

The authors declare no conflict of interest.

## REFERENCES

1. Højland P, Johansen LN. Thinking across disciplines – Interdisciplinarity in Research and Education DEA / FBE Copenhagen. 2008. Accessed 12<sup>th</sup> March 2012. Available: [www.dea.nu](http://www.dea.nu).
2. Graham J, Wealthall S. Interdisciplinary education for the health professions: taking the risk for community gain IntFocus on Health Prof Education. 1999;1(1):49-69.
3. Humphrey LL. et al. Periodontal disease and coronary heart disease incidence: a systematic review and meta – analysis JGen Intern Med. 2008;23:2079–2086.
4. Kötter R, Balsiger PW. Interdisciplinarity and transdisciplinarity: A Constant Challenge to the Sciences Issues In Integrative Studies. 1999;17:87-120.
5. Besimo CE. Zahnärztliche Betreuung des alternden Menschen Dentalhygiene Journal 2007;4:12-6.
6. Levine AE, Bebermeyer RD, Chen Jung-Wei, et al. Development of an Interdisciplinary Course in Information Resources and Evidence-Based Dentistry J Dent Edu. 2008;72(9):1067-76.
7. Paquette-Warren J, Vingilis E, Greenslade B, et al. What do practitioners think? Q qualitative study of a shared care mental health and nutrition primary care program Int J Integrated Care. 2006;6(9):1-9.
8. Slavicek G Interdisciplinary – A Historical Reflection IJHSS. 2012;2(20):107-113.
9. Pistorius A, Kunz M, Jakobs W, Willershausen B. Validity of patient supplied medical history data comparing two medical questionnaires EurJMedRes 2002;7(1):35-43.
10. Östberg AL, Halling A, Lindblad U. Gender differences in knowledge, attitude, behaviour and perceived oral health among adolescents Acta Odontologica Scandinavica. 57(4):231-236.
11. Bahekar AA, et al. The prevalence and incidence of coronary heart disease is significantly increased in periodontitis: A meta-analysis Am Heart J. 2007;154:830–837.
12. Chen YW et al. Periodontitis may increase the risk of peripheral arterial disease Eur J Vasc Endovasc Surg. 2008;35:153-158.
13. Friedewald VE, et al. The American Journal of Cardiology and Journal of Periodontology Editors' Consensus: Periodontitis and Atherosclerotic Cardiovascular Disease JPeriodontol. 2009;1021–1032.
14. Wu T, et al. Periodontal disease and risk of cerebrovascular disease: The First National Health and Nutrition Examination Survey and its follow-up study Arch Intern Med. 2000;160:2749-2755.
15. Borrell L, et al. Diabetes in the dental office: using NHANES III to estimate the probability of undiagnosed disease J Periodont Res. 2007;42:559-565.
16. Joshipura KJ. et al Periodontal disease, tooth loss, and incidence of ischemic stroke Stroke. 2003;34:47-52.

17. Taylor GW. Bidirectional interrelationships between diabetes and periodontal diseases: an epidemiologic perspective *Ann Peridontol*. 2001;6:99-112.
18. Slavicek G, Slavicek B. Periodontitis and diabetes: a challenge for interdisciplinary teams *JSOM*. 2008;1(1):58-62.
19. Slavicek G, Gruber H, Siegl P, Slavicek B. Periodontitis and atherosclerotic cardiovascular disease *IJSOM*. 2009;2(3):137-140.

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