

What is the value of basic researchers in dentistry?



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Those of us who have been doing research long enough can share stories about that summer or rotation student that entered the lab believing they would cure cancer during their 10-week tenure. We may have chuckled privately, or admired their audacity, but were glad they were in the lab, so that they could come to understand how research is done. Many of us also lament that carefully phrased, gently nuanced conclusions about our work or the work of colleagues, ends up as overblown and hyped inappropriate headlines by the media. Finally, we are probably all discouraged by the current atmosphere of anti-science, and the ease with which decades upon decades of careful research and data are dismissed, or placed on an equal footing with the opinions of celebrities, politicians, and talk show hosts with an agenda. How do we convince the public to believe anything associated with their health in such an atmosphere?

This is intertwined with another question: What is the value of basic researchers in dentistry? Undergraduate research has been documented to enrich the education experience in multiple disciplines, but of what value is it to a dental student? Dentistry is a profession with heavy emphasis on technical skills. Dental school programs also have a strong role in teaching ethics and professionalism. Where does research fit in?

If we ask the students, they often comment that their research experience did have value. They learned how research is done, and for some this can be extremely eye-opening. They learned important concepts of the scientific method, how to work collaboratively, how the evidence in support of a hypothesis is developed, and, for some, how to write and present

their data for knowledge translation. A few will find their passion in research, and pursue an academic career. Although at the individual dentistry student level, these outcomes can be considered major positives, as a whole, this is not the top benefit of employing basic scientists on a dental faculty.

The real importance in having basic scientists on the faculty, especially if they are integrated into the theory and practice of dentistry, is the change in culture that permeates. If you ask a clinician why they approach a procedure the way that they do, the answer is sometimes: this is how I have always done it or this is how I was taught in dental school or by subsequent mentors. They may have been taught that practice decades ago. In other cases, anecdotal evidence, rather than patient-based outcomes or scientific rationale, explains the practice. Once you incorporate basic scientists in the faculty, whose major agenda is to ask why, you are faced with challenges to that rhetoric. Importantly, they ask for proof, and they want to share it with students and clinicians.

In order for basic scientists to share that proof, they need to teach students critical thinking skills. We basic scientists are known to engage in journal clubs, long after we have finished graduate school. We have heard it described by students as sitting around, tearing a paper apart, figure by figure—and to tell the truth, that's exactly what it is. At the start of the course, students often comment that they believed if something was published, it had to be true. They often believed that the evidence for the conclusions had to be solid, if it made it to print. When we teach them to look at the data, apart from the text, and ask them—what do they show? What



do you see with your own eyes? They are often surprised to find that the evidence isn't quite there.

Of course, in order for students to evaluate the evidence, they have to understand concepts of experimental design (are the proper controls in place?), techniques used (how do they work and do they address the specific question appropriately?), data robustness (are there replicates within the experiment and has the experiment been replicated? Has the same conclusion been substantiated with a different type of experiment?), and statistical analysis. Then they have to decide: do the data support the conclusions? Are the data overinterpreted? Are the conclusions overstated?

Thus, the initial effect of having basic scientists on the dental faculty is to change the culture from one that blindly follows protocol, to one that actively asks for the evidence. But it goes beyond that. Let's say there is evidence for technique x versus y, yet technique y is the most employed. The basic science then begins to drive other disciplines: what are the barriers for the dental professional or the patient that explains why technique x is not implemented? How do we overcome those barriers? Do we need to change our education practices? This can drive policy: how do we get professionals to use this better technique?

More important, however, is the legacy of that type of education. Every day, there seems to be some new innovation—whether a device, drug, or surgical procedure. There are stories in the news about never having to drill teeth again, growing new teeth from stem cells, and the dangers of fluoride. Dental professionals are faced with greater choices than ever before from companies that excel at marketing strategies. The legacy of being taught in a dental school with a strong basic research faculty is the ability to go beyond the hype, and to question the validity of the findings, of the evidence. A graduate from such a program will likely put more weight on the statements from their faculty on that subject, because they know it has been vetted by those who have gone line by line through the data. They will also be able to go themselves to the primary data, to critically evaluate the strength of the conclusions. We talk about teaching evidence-based dentistry,

but what we really need to do is to train the student to be life-long learners and to gather the evidence before using a protocol in dentistry.

Like dental professionals, patients are bombarded by sensational claims, and often do internet research of their own. They no longer just comply with the recommendations of their health professionals—they question, and they come in with opinions from what they have heard and read. The only way that dental professionals can help patients to have the best evidence is for them to actively educate themselves, so that they can talk to their patients from a position of knowledge and confidence. Dental professionals who are actively engaged in gathering the evidence can show patients facts, data, and opinions that have greater weight. More importantly, they can explain why they support or oppose a certain claim.

The most important reason to have basic scientists on a dental faculty is to teach critical evaluation of evidence, whether through active participation in a project or through journal clubs and coursework, so that graduates can understand and share with their patients what is essential to their oral health. Without this skill, we will continue to lose ground to the anti-science movement and lose the trust of our patients. Now, more than ever, we need to be a voice of knowledge and reason, but we also need to realize that our academic degrees alone no longer automatically ensure that our words will be believed above anyone else.

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