Who's in Charge?

The old joke about the third-grade class that finally resolved the question of whether their pet rabbit was a boy or a girl by voting on it is not quite as funny as it once was. Today, we have all kinds of complex technical matters being decided in much the same way by politicians, lawyers and news people with only the most superficial regard or understanding of the true nature of the underlying technical questions.

Certainty in the rightness of these kinds of decisions tends to bear an inverse relationship to meaningful knowledge, and the resulting disruptions are growing at an alarming rate. A common thread in this approach to problem-solving is a strong tendency to focus on one small aspect while ignoring the many related factors that should also be considered. One magnified point becomes the object of all manner of public breast- and drum-beating.

Alternatives

The real world is made up mostly of alternate choices. Every choice, even doing nothing, inevitably embodies the adoption of some alternative with some kind of consequences. But the narrow approach usually followed by lay "experts" rarely looks at even the unavoidable alternatives with equal vigor, if at all. Examples are all around us.

Space

One does not have to diminish the Challenger tragedy in any way to look at it in the larger perspective of space exploration and travel in general. The last two years have seen the public dismemberment of a highly skilled and remarkably successful team that is only now coming back toward where it left off. Outside pressures blind to the realities of flight on or off the earth were a major causative factor in that tragedy, and they are still greatly exascerbating the ensuing problems and future risks.

How fortunate we are that the Wright brothers wrought their skills in another day. If earthbound flight had been born in the same climate faced by today's space explorers, we would still be following horses' tails across the country. Had that been the case, we would now be rumbling along just as oblivious of the advantages of air travel as we now are of the losses that we are incurring at this moment with the ongoing harassment of our space exploration efforts.

Nuclear power

Nuclear power has been developed with incredible speed. The radio technology that has grown into our television and electronics industries is twice as old. Fire was known for millenia before it was applied to energy conversion beyond the flame. Design of our oldest online nuclear power reactors actually dates back to the *first third* of the nuclear age! Yet even with Three Mile Island and Chernobyl, the safety record of nuclear power is not even approached by any other major energy source.

Meanwhile, we have blindly chosen the alternative of acid rain, which has already produced greater devastation, and that is only one of our collective passive decisions.

We are running in circles with the coal power alternative by switching to low-sulfur coal to reduce (not eliminate) acid rain. Low-sulfur coal has much higher levels of uranium and its many decay products, so we now see coal stacks emitting *ten times* the radioactive emissions permitted for nuclear power plants. In reality, nuclear plants actually emit only a small fraction of their permissible limit, so the relative radioactive price of coal power is even greater.

And the stack with its elusive gaseous emissions is only one part of the problem. The scrubbers that remove the particulate matter to clean the plume produce an incredible volume of fly ash that contains solid radioactive isotopes. Disposition of these mountains of low-level radioactive waste has not even been addressed.

Radium in water

Some water supplies contain high levels of radium. Earlier this century, people sought them out for their supposed health benefits. Bottled radium water was even distributed widely. We now recognize the hazards of radium ingestion, and our capabilities for detecting ever more minute quantities have now detected it in the municipal water supplies of millions of people. Again with little thought of the alternatives that are part of the decision, extremely low maximum levels have been mandated. These are based more on the limits of detectability than on any careful evaluation of the consequences of ingestion versus various alternatives of reduction or removal.

Two avenues are available for bringing those water supplies under the EPA limits. One is to dilute the deep-well water with water from shallow wells with lower radium levels. No one knows what other contaminants with greater health risks are now becoming a part of the more costly daily intake of those people. The second method for dealing with the radium is to remove it, through a zeolite softening process. The effect of this method is similar to the smokestack scrubbers; it concentrates the radium in voluminous sludge. Though concentrations are still extremely low,

they are much greater than in the original water, and the "radioactive waste" tag is making this material a new political liability.

Man evolved in a radioactive world that is gradually cooling down. Radiation exposure can have serious consequences, and it must be minimized, but we have still made it this far as we face much greater risks every day. As we reach down into small fractions of background levels of radiation, we cannot ignore the unavoidable alternative risks that are never mentioned in the political arena where half-truths are the more exciting topics for our news media.

Orthodontics

Orthodontics does not deal in mass effects like energy, and we do not get the political attention of a space program, but we are still not immune from the disabling effects of outside intervention.

A century of experience in optimizing dentofacial relationships has brought continual improvement in treatment results and reduction of risks, even though we do not work in an environment of technical certainty. Our one-on-one ministrations interact with a living person who will respond like no other. Alan Brodie liked to quote a remark of the anthropologist Anton Carlson, who noted that when you kick a football, you can use forces and angles and velocities to calculate its exact trajectory and ultimate position, but when you kick a dog, anything can happen.

The inscrutable biologic component will always be a dominant factor in orthodontics, but our increasing understanding of the biology and the basic mechanics of therapy continues to revise and expand our options. A superficial look at this progress shows a disconcerting vacillation as such modalities as extraction, extraoral traction, and functional therapy shift in relative favor, but a closer look shows greater understanding underlying each shift in emphasis. The knowledgeable clinician knows better than to discard one for another, because an awareness of all of the alternatives makes it clear that there can be no single universal solution to such a varied array of problems.

We will always be sifting and winnowing, and as we continue to refine the clinical applications and the criteria for selection among all of the available treatment modalities, we must never lose sight of any of those options that could provide the best service for a particular patient. Single-minded 100% approaches to the complex problems that present to the orthodontist are a sure sign that the alternatives have not yet been adequately considered. They may appeal to the uninformed and the inexperienced, but they do not merit blind adoption by the specialist committed to providing the best service for every patient who puts their future in our hands.

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