EDITORIAL

Correcting Misconceptions

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In clinical medicine, we frequently accept concepts or ideas that have been passed on from one generation of physicians to another as being correct even though such ideas have never been subject to scientific scrutiny. Generally, these concepts are derived from the experience of prominent physicians, and frequently such ideas take on a power of their own. In many situations, the concepts are correct, but this may not always be the case.

For example, in the early 1800s before the germ theory of disease had been developed, maternal fever with high mortality frequently complicated childbirth, and this condition called puerperal fever, also known as childbed fever, was attributed to an imbalance of basic "humours" in the body. In 1847, Dr. Ignaz Semmelweis noted that he was the only doctor who washed his hands before each delivery, and he was the only physician who had no patients with childbed fever. Semmelweis urged that doctors should wash their hands before dealing with a pregnant woman. The criticism of his new idea was that washing the hands before each delivery would be too much work.¹ It took Semmelweis 14 years to correct the misconception that the changing humours of the mother was the cause of childbed fever. Semmelweis is now recognized as a pioneer of antiseptic policy and is frequently referred to as the father of infection control.

In 1969, Mirowski and Mower carried out the first successful defibrillation in a dog. These innovative investigators had difficulty getting their implantable defibrillator concept accepted and articles published. In a 1972 editorial in *Circulation*, a leading cardiologist commented that the "implanted defibrillator is an imperfect solution in search of a plausible and practical application."² Subsequent clinical experience with the implantable cardioverter defibrillator and several randomized clinical trials have substantiated the life-saving benefit associated with defibrillator therapy in properly selected patients at high risk for sudden arrhythmic death.

The primary findings from the Multicenter Automatic Implantable Defibrillator Trial-II (MADIT-II) were reported in 2002,³ and secondary analyses have permitted corrections of several misconceptions.

Misconception #1: Electrophysiologic inducibility identifies patients who obtain the greatest benefit from ICD therapy. In MADIT-II, an electrophysiologic (EP) study was performed in 593 patients randomized to ICD therapy, with 36% inducible into sustained monomorphic or polymorphic ventricular tachycardia (VT) with ≤ 3 extrastimuli, or ventricular fibrillation (VF) with ≤ 2 extrastimuli. During long-term follow-up, EP inducibility was associated with greater ICD utilization for the termination of VT than was EP noninducibility. However, during this same follow-up period, EP noninducibility was associated with greater ICD utilization for termination of VF. The probability of the first ICD therapy for VF or fast VT (cycle length < 280 msec) was virtually identical in those who were initially inducible or noninducible at the EP study. The cumulative probability of life-saving ICD therapy for VF or VT was 20% in the inducible and noninducible patients during a 4-year follow-up. These findings from MADIT-II indicate that EP testing is not useful in identifying patients who benefit from ICD therapy.

Misconception #2: Younger patients obtain better benefit from ICD therapy than older patients. It had generally been assumed that older cardiac patients would be dying from a variety of cardiac and medical conditions that would impair the life-saving benefit associated with ICD therapy. In fact, several of the randomized ICD trials had excluded cardiac patients older than 75 or 80 years of age. In MADIT-II, there was no upper age restriction for entry. In the total MADIT-II study population the ICD was associated with a 31% reduction in the risk of all-cause mortality when compared to non-ICD-treated patients (hazard ratio = 0.69, adjusted P = 0.016). For patients ≥ 65 years of age, the ICD resulted in a 42%

reduction in mortality (hazard ratio = 0.58, adjusted $P = 0.002$); for patients ≥ 75 years of age, the life-saving benefit of ICD therapy was even larger with a 46% reduction in mortality (hazard ratio = 0.54, $P = 0.04$). These findings correct the misconception about ICD effectiveness in the older age group.

Misconception #3: The early postinfarction period is associated with the highest mortality risk and the greatest benefit from ICD therapy. The MADIT-II study enrolled patients a month or more after a qualifying enzyme-positive myocardial infarction, with a median time interval from myocardial infarction to enrollment of 48 months. The postinfarction period was subdivided into four time intervals (1–17, 18–59, 60–121, and > 121 months) with equal numbers of patients in each quartile, and the mortality risk and ICD efficacy were evaluated in each time interval. The mortality rate in the conventionally treated patients progressively increased with each

succeeding time interval, and the ICD effectiveness was significantly greater in the three later time intervals (≥ 18 months) than in the earliest postinfarction time period (1–17 months). Once again, objective findings have corrected a misconception.

Medical misconceptions exist, and these misconceptions can be corrected by scientific clinical investigation. There are many challenges in correcting misconceptions, not the least of which is the usual reluctance to accept new findings.

REFERENCES

1. History of antiseptics: <http://inventors.about.com/library/inventors/blantiscepsics> - Ignaz Semmelweis.
2. Lown B, Axelrod P. Implanted standby defibrillators. *Circulation* 1972;46:637–639.
3. Moss AJ, Zareba W, Hall WJ, et al. Prophylactic implantation of a defibrillator in patients with myocardial infarction and reduced ejection fraction. *N Engl J Med* 2002;346:877–883.