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## Disruption propels technology

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New medical technologies often travel a one-way street, a route that leads to ever-higher quality of care but also to ever-higher costs.

It doesn't always have to be that way.

In fact, several Orange County biomedical companies are working on technologies that might cut costs while improving medical care.

Some of the new techniques could fit into the category of "disruptive technologies," which Clayton Christensen, an author and Harvard Business School professor, hopes will drive down prices in the medical field just as they have in electronic devices. Some inventions from local companies, such as a diabetes test from tiny Epinex Diagnostics and a heart-valve replacement system from large Edwards Lifesciences, might fit in this category.

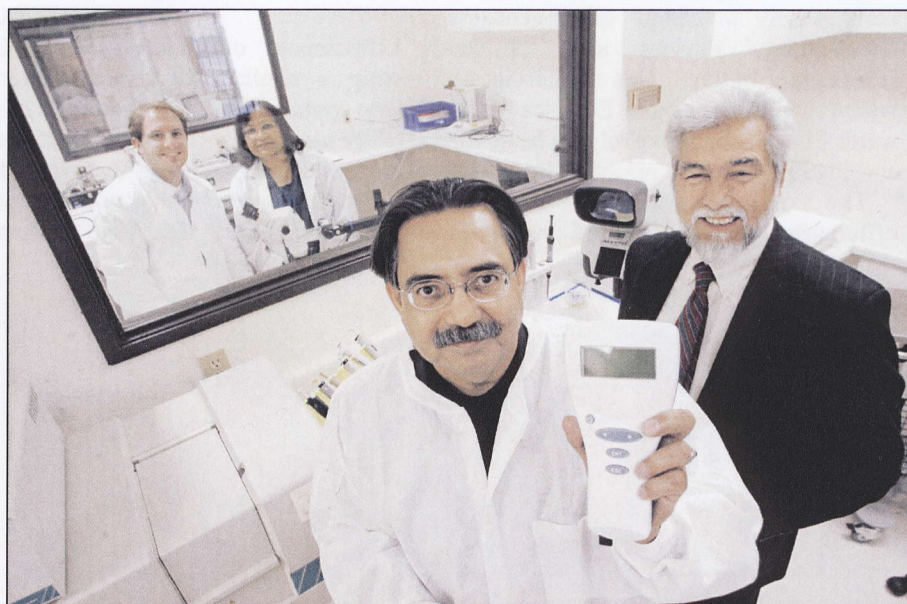
A disruptive technology typically begins as a low-budget, lower-quality alternative to an established, higher-priced standard, then improves to the point where it's dominant.

Even a flawed startup technology can disrupt an established, higher-priced standard if it's good enough to attract some early customers.

That's how PCs took over the world. They started out as toys for hobbyists, then gradually improved until they drove many other types of computers out of existence. Similarly, digital cameras began with low-resolution images that were much worse than film cameras, but now they are so good that they dominate the market.

Similar shifts can occur in medicine if the technology is right, Christensen says.

"When you bring technology to the experts to do more sophisticated things ... it does bring a lot of cost into the system,"



EUGENE GARCIA, THE REGISTER

**METER READERS:** A test for diabetics being developed by Epinex Diagnostics co-founders Asad Zaidi, front left, and Henry Smith, could help reduce medical costs.

he said in a recent interview with Mark D. Smith, executive director of the California HealthCare Foundation. "But when you deploy the technology ... to enable a lower-cost provider to do something that historically had required higher cost, then it actually takes cost out of the system." Among the examples he cited:

**The machine does it:** The cost of Lasik surgery has fallen dramatically because it has become "routinized," Christensen said. Instead of relying so much on experts' intuition and skill, he said much of this type of laser vision correction is automated so it "almost doesn't even require the skill of an ophthalmologist."

**The patient does it:** Do-it-yourself tests are increasingly available for diabetes patients. Christensen, a diabetic, has become a customer of a disruptive technology in this field — mail-in kits that test how much of his blood's hemoglobin has been damaged by excessive glucose. That lower-cost test has improved his

medical care, he said, because he now takes the test on a regular basis, since it's so much more convenient than a standard, expensive blood test at a hospital.

Epinex Diagnostics of Irvine is working on a similar at-home test, which also could serve as a disruptive technology for diabetics. The Epinex device, which is awaiting clinical trials, would let diabetes patients gauge their condition as often as once a month by measuring damaged albumin molecules in the blood. The hemoglobin test can only be performed every three months.

Overall, disruptive medical technologies face tougher going than similar developments in electronics. The examples of Lasik and at-home diabetes tests show why that's the case. In a sense, they're exceptions to the standard patterns of medical care.

Lasik is different from most medical procedures because the patient pays. That creates more pressure to lower prices

than with medical care that's covered by health insurance.

At-home diabetes tests are different because patients buy the kits and take responsibility for using them, which means their doctor needn't worry that a patient will file a malpractice suit.

With medical care in general, opportunities for disruptive technologies are more limited because highly paid experts remain in charge and lower-quality devices are seldom an option. This is where inventions from Edwards Lifesciences, CoreValve and CNS Response fit in.

**The expert does it more efficiently:** CoreValve of

Irvine is testing a system for implanting a replacement heart valve through a catheter, without open-heart surgery. Rob Michiels, the company's president, predicts the procedure will cost about \$50,000 instead of the \$100,000 and up that a valve implant costs with open-heart surgery. The work can be done in a catheter laboratory and won't require the presence of a cardiac surgeon.

Edwards Lifesciences of Irvine is testing a similar catheter-delivery system for heart valves, which also might eventually achieve a cost-cutting outcome. But that's not what Edwards is aiming for

right now, because it's not proposing shifting the work to a less expensive setting. Instead, with its eye on the most influential decision-makers among its potential customers, it suggests that a cardiac surgeon and a cardiologist both oversee the procedure.

Similarly, CNS Response of Costa Mesa has developed an inexpensive system that targets expert users rather than consumers. The CNS system analyzes a psychiatric patient's EEG pattern, compares it to thousands of previous patients' EEGs, and lists the drugs that worked best for patients with the same pattern. The CNS system would cut

costs if it succeeds in reducing the number of prescriptions that don't work.

Despite these encouraging steps, disruptive technologies can't cut health-care costs quickly because doctors have legal, professional and personal reasons for maintaining high standards.

After all, a disruptive technology typically begins as a lower-quality alternative, and no one is eager to settle for less than the best medical care – certainly not when an insurer is paying for it.

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