Chip checks for oral cancer
Rice’s nano-bio-chip effective in pilot study to detect premalignancies

By Mike Williams, Rice News Staff

The gentle touch of a brush on the tongue or cheek can help detect oral cancer with success rates comparable to more invasive techniques such as biopsies, according to preliminary studies by researchers at Rice University, the University of Texas Health Science Centers at Houston (UTHSC) and San Antonio and the University of Texas M.D. Anderson Cancer Center.

New test that uses Rice’s diagnostic nano-bio-chip was found to be 97 percent “sensitive” and 95 percent specific in detecting which patients had malignant or premalignant lesions, results that compared well with traditional tests.

The study is available online in the journal Cancer Prevention Research.

“One of the key discoveries in this paper is to show that the miniaturized, noninvasive approach produces about the same result as the pathologists do,” said John McDevitt, the Brown-Wiess professor of chemistry and bioengineering at Rice.

His lab developed the novel nano-bio-chip technology at the university’s Bio-Science Research Collaborative.

Oral cancer afflicts more than 300,000 people a year, including 35,000 in the United States alone. The five-year survival rate is 60 percent.

‘This Is Your Mouth’ video benefits NCOHF: America’s Toothfairy
By Fred Michmershuizen, Online Editor

“This Is Your Mouth,” a new video from Johnson & Johnson Healthcare Products that is narrated by actor Neil Patrick Harris, takes a closer look at the potential effects of rapidly multiplying bacteria in the mouth and illustrates how LISTERINE® Antiseptic destroys the millions of germs that are left behind from brushing alone.

Each time the documentary is viewed, a $1 donation will go from Johnson & Johnson Healthcare Products to National Children’s Oral Health Foundation: America’s Toothfairy.

“I never realized how much goes on ‘behind the scenes’ in our mouths, and ‘This Is Your Mouth’ video benefits NCOHF: America’s Toothfairy
The heart of this paper is developing a more humane and less painful way to do that diagnosis, and our technique has shown remarkable success in early trials.

Nano-bio-chips are small, semi-conductor-based devices that combine the ability to capture, stain and analyze biomarkers for a variety of health woes that also include caries disease, HIV and trauma injuries. Researchers hope the eventual deployment of nano-bio-chips will dramatically cut the cost of medical diagnostics and contribute significantly to the task of bringing quality health care to the world.

The new study compared results of traditional diagnostic tests to those obtained with nano-bio-chips on a small sample of 52 participants. All of the patients had visible oral lesions like leukoplakia or erythroplakia and had been referred to specialists for surgical biopsies or removal of the lesions.

The chips should also be able to see when an abnormality turns precancerous. You want to catch it early on, as it’s transforming from pre-cancer to the earliest stages of cancer, and get it in stage one. Then the five-year survival rate is very high,” he said.

“Currently, most of the time, it’s captured in stage three, when the survivability is very low.”

The device is on the verge of entering a more extensive trial that will involve 500 patients in Houston, San Antonio and England. That could lead to an application for FDA approval in two to four years.

Eventually, McDevitt said, dentists may be the first line of defense against oral cancers, with the ability to catch early signs of the disease right there in the chair.

McDevitt’s co-authors include Rice senior research scientist Pierre Floriano, Rice postdoctoral associate Shannon Weigum and Spencer Redding, a professor and chair of the Department of Diagnostic Science at the THSC at San Antonio.

Also contributing were: UTHealth San Antonio’s Chih-Ko Yeh, Stephen Westbrook and Alan Lin, all of the Department of Dental Diagnostic Science; H. Stan McGill of the Department of Pathology and Frank Miller, Fred Villarreal and Stephanie Rowan, all of the Department of Otolaryngology, Head and Neck Surgery; UTHealth Houston’s Nadarajah Vigneswaran of the Department of Diagnostic Science; and Michelle Williams of the Department of Pathology at the University of Texas M.D. Anderson Cancer Center.

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