A husband-and-wife team at the University of Texas’s Health Science Center in San Antonio has developed a way to use fluorescent light to uncover tooth decay in its earliest stages. The new technology, which is being used by only a handful of dentists, could revolutionize dental care.

Quantitative light-induced fluorescence uses fluorescent lighting to analyze the mineral content of enamel, enabling dentists to spot lesions before they become severe enough to require fillings or other invasive procedures. A small, portable camera equipped with a blue light illuminates teeth and captures images with a yellow filter. The fluorescence of the light on the teeth displays cavities, or lesions, as dark spots.

“There is a need for better dental diagnostic techniques so that dentists can avoid invasive dental procedures,” says Dr. Kevin Donly, DDS, MS, professor and chair of pediatric dentistry. “Instead of waiting until a cavity needs to be filled, QLF allows us to see the problem early enough so we can intervene using sealants or fluoride.” He notes that 60 to 75 percent of all dental work is to replace fillings, but when lesions are detected early, sealants or other minimally invasive procedures can be used to prevent further decay.

He explains that when enamel becomes demineralized, it does not have the same fluorescence as natural enamel. “This can be detected early with QLF, when demineralized lesions are less than 100 microns,” he says. “We have found good success with the early diagnosis of enamel demineralization, using this system, for the diagnosis of pit and fissure lesions on the top surface (occlusal) of the tooth and on visible smooth surfaces of the tooth. The next step in development is further validation of the system for accuracy in lesion presence and lesion depth. We have work with the Inspektor Company in Amsterdam, the Netherlands, and with Indiana University and the University of Iowa.”

For five years, Donly and Adriana Segura, D.D.S., M.S., professor of general dentistry, have used the technology to treat tooth decay in children’s primary teeth. Children between six and 10 participated in an early caries detection and intervention study that also included the University of Iowa and Indiana University. The study was supported by a grant from the National Institute of Dental and Craniofacial Research.

Drs. Donly and Segura are in the final stages of their study and have applied for another grant to continue it. Although Donly and Segura have only examined children, they expect the technology to benefit all patients.