The femtosecond laser is more than a one-trick pony
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I think one of the most commonly asked questions I encounter in practice is “Do you think I should get LASIK?” While I address many different things during these conversations, I almost always advise my patients to seek a clinic with a state-of-the-art laser. The femtosecond laser (FSL) was first FDA approved for laser in situ keratomileusis (LASIK) in 2001.\(^1\) This device focuses near-infrared (1053 nm) light in the area of interest to produce cavitation bubbles, which subsequently cause separation of the tissue and corneal flap creation.\(^1,2\) The main advantage of the FSL is that it fires light pulses at a rate of $10^{15}$ seconds to produce highly accurate tissue dissection with less collateral damage than other devices on the market.\(^1\) These advantages have also proved useful for treating other ocular and even dental conditions.\(^3,4\)

Although most widely known for corneal flap creation during LASIK, it is easy to overlook femtosecond lasers and many other ocular applications including:

- Capsulorhexis, lens fragmentation, and corneal wound creation in cataract surgery.\(^1\)
- Lamellar keratectomy for treatment of anterior stromal corneal opacities.\(^5\)
- Channel formation for placement of intrastralomal rings (Intacs) for treatment of conditions like myopia and keratoconus.\(^6\)
- Cutting corneal buttons for penetrating keratoplasty to treat severe corneal disease.\(^3\)
- Creation of an intrastralomal pocket for riboflavin in collagen cross-linking treatment.\(^3\)
- Corneal tattooing for cosmetic treatment of disfigured eyes.\(^3\)

While the FSL is more accurate and possibly safer than alternative devices (e.g., microtomes, neodymium:YAG lasers, mechanical drills),\(^3,7\) it is a high-cost machine that is initially more difficult to use because it can cause the tissue to behave differently than traditional surgical methods.\(^1,3\) Nevertheless, the cost and availability of the FSL will likely improve over time, and its strengths will likely lead to it being incorporated into other innovative procedures. It will be exciting to see what applications we come up with next!

References:

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