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Directed energy for diagnosis and therapy (DEDAT): The fifth generation in non-invasive surgery

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Non-healthcare industries have used a wide spectrum of energy-based systems for literally all different purposes, from manufacturing to artist creations, whereas only a small portion of these commercially available systems have been exploited by surgeons. Although many of the technologies are large and sophisticated image-guided systems, numerous other technologies are small, hand-held portable systems. Thus, many time-honored procedures will be performed as outpatient or office procedures with small, hand-held devices. Even as the fourth revolution in surgery in 25 years (robotic surgery) is gaining in popularity, a much more disruptive change is beginning with the next revolution: Directed energy for diagnosis and therapy (DEDAT). While surgeons have been investigating a few different types of energy for decades, including success with some forms such as lithotripsy, photonics, high-intensity focused ultrasound (HIFU), etc., these pioneering techniques are nothing but the tip of the iceberg that heralds the transition to non-invasive surgery. Such systems are based upon the premise which robotics and biomolecular technologies can bring – precision, speed and reliability, especially as surgery 'descends' into operating at the cellular and molecular level. Nobel Laureate Richard Feynman was right – there is "room at the bottom"!.

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