NanoKnife system for irreversible electroporation treatment of locally advanced pancreatic cancer

HAYES, Inc.

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Citation

Authors’ objectives
An estimated 53,000 individuals in the United States will be diagnosed with pancreatic cancer in 2016, of whom nearly 42,000 will die from the disease. Surgery can cure early disease but most cases are unresectable. In some cases, tumors can be downstaged by chemotherapy or radiotherapy, permitting resection. Thermal ablation techniques such as radiofrequency ablation and microwave ablation may be used in conjunction with or following standard therapies. Thermal ablation methods heat the tissue, causing a zone of tissue destruction that can encompass healthy tissue. These problems drove investigation into alternative therapies, including irreversible electroporation (IRE), that maintain the tumor ablative capability of thermal techniques with fewer adverse effects. Description of Technology: The NanoKnife System (AngioDynamics Inc.) employs IRE; a nonthermal technique for delivering multiple, directed, millisecond-long pulses of highvoltage, electrical current across cell membranes. This creates numerous nanoscale-sized holes in the membrane, leading to cell death. Due to its unique mechanism, IRE causes less damage in the area of ablation compared with thermal methods. The NanoKnife System comprises a console with screen; generator; foot pedal; and, single-use, disposable electrode probes. Prior to IRE, the tumor is assessed with computed tomography (CT) or magnetic resonance imaging, and then the NanoKnife system uses a proprietary algorithm to generate a treatment plan. Electrodes are placed into the tumor under CT or ultrasonographic guidance. The device generates approximately 90 pulses of 1500 to 3000 volts to the tumor.

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