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ABSORBABLE HYDRODISSECTION FLUID

EXECUTIVE SUMMARY

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PROBLEM: During radiofrequency and cryoablation of hepatic tumors, extreme temperatures are used to destroy cancerous tissue. Hydrodissection fluids are injected between the tumor and healthy tissue to create an electrical and thermal barrier which reduces unwanted tissue necrosis. Current hydrodissection fluids migrate throughout the peritoneal cavity which results in barrier degradation and unwanted tissue death, increasing post-operative patient complications.

COMPETITION: The most frequently used hydrodissection fluid is 5% dextrose in water (D5W). D5W acts as an electric and thermal barrier but migrates throughout the ablation procedure reducing the protective barrier surrounding the targeted tumor. Our clients - Dr. J. L. Hinshaw, Dr. Meghan Lubner, and Dr. Chris Brace - have stated that over a liter of D5W may be necessary for adequate hydrodissection which often leads to post-procedural complications.

PROPOSED SOLUTION: In order to prevent fluid migration and barrier degradation, a more viscous and adhesive hydrodissection fluid was proposed to reduce unwanted tissue death during ablation procedures. A 15.4 w/w% poloxamer 407 solution was developed. At room temperature it is injected between the ablation site and the surrounding tissue, where it then forms a gel when warmed to body temperature.

TESTING/ RESULTS: The solution was developed to gel at 32^{o}C as per client specifications. Viscometer measurements showed the prototype was more viscous than D5W. The prototype had similar electrical impedance to D5W. The prototype did not inhibit imaging with CT or ultrasound. In vivo tests performed on swine indicate this solution would work for hydrodissection. Current testing is being done to determine its efficiency versus D5W in vivo.

CLIENT ERGONOMICS: Testing has shown poloxamer 407 would create an adequate barrier which would resist fluid migration and reduce healthy tissue damage by preventing barrier degradation during ablation procedures. It is recommended that a syringe gun be used for initial fluid placement due to the high viscosity of the prototype.

MARKETABILITY: The current prototype would be marketed in a 250 mL unit with a materials cost of approximately $10. At the UW-hospital, 300 - 400 ablation procedures are performed each year; these numbers are similar to hospitals worldwide. Clients stated this would see widespread use if under $250 as this would be a relatively small cost compared to the ablation procedure (~$5,000). The design has been presented to the Wisconsin Alumni Research Foundation (WARF), who has decided to endorse the design for patent filing. Steps are being taken to submit the patent application by December 2011.