Best Medical International and Best Particle Therapy of TeamBest Companies, have recently entered into a Memorandum of Understanding (MOU) with the University of Wisconsin Medical Radiation Research Center (UWMRRC).

Best Particle Therapy will be introducing their unique 400 MeV ion Rapid Cycling Medical Synchrotron (iRCMS) with Variable Energy, Heavy Ion Treatment Technologies, offering Proton-to-Carbon Heavy Ion, for Highly Precise, Conformal and Hypo-Fractionated Radiation Therapy. This will be the most advanced new technology for Cancer Therapy, enhancing the cure for many millions of Cancer patients, who do not have this option currently.

The advantages of the Best 400 MeV iRCMS are:

- Intrinsically small beams – facilitating beam delivery with precision for the most conformal radiation therapy
- Hypo-fractioned radiation therapy
- Small beam size – small magnets, light gantries – smaller footprint
- Highly efficient single turn extraction – less shielding
- Flexibility – heavy ion beam therapy (protons and/or carbon), beam delivery modalities.

In partnership with Best Cure Foundation (BCF), TeamBest Companies will set up a Hub-and-Spoke Model of Healthcare Delivery System, using Express and Mobile Clinics, linked to General and Multi-Specialty Medical Centers, using all of TeamBest’s new and advanced technologies globally.

University of Wisconsin and Best Medical are excited about the collaboration, as this brings much needed carbon ion therapy to Midwestern states such as Illinois, Wisconsin, Indiana, etc.

For more information, please visit: [www.teambest.com](http://www.teambest.com) and [www.bestcure.md](http://www.bestcure.md).

For more information about Krishnan Suthanthiran, please visit his bio page at: [http://www.teambest.com/about_bio.html](http://www.teambest.com/about_bio.html).

Contact:

**Krishnan Suthanthiran • President & Founder**

TeamBest Companies & Best Cure Foundation

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Best Particle Therapy is developing a Proton-to-Carbon therapy system to deliver energetic particle beams of protons and carbon ions, achieving a high level of precision to treat deep-seated as well as radiation-resistant tumors.

400 MeV Rapid Cycling Medical Synchrotron for Proton-to-Carbon Heavy Ion Therapy:
- A unique combination of advanced spot scanning with rapid energy modulation
- Elimination of neutron contamination associated with patient specific hardware
- Intrinsically small beams facilitating beam delivery with precision
- Small beam sizes – small magnets, light gantries – smaller footprint
- Highly efficient single turn extraction
- Efficient extraction – less shielding
- Flexibility – heavy ion beam therapy (proton and/or carbon), beam delivery modalities

Peak-to-Plateau ratio of the RBE (a/b) is larger in carbon ion beams than for proton beams.

Graph courtesy of Hirohiko Tsuji et al., Radiological Sciences, 50(7), 4, 2007
Clinical Comparison: X-rays, Protons & Carbon Ions

Accelerator Comparison Table

<table>
<thead>
<tr>
<th>Energy Maximum (MeV)</th>
<th>Avg. Current Delivered (nA)</th>
<th>Charge Accelerated (nC/s)</th>
<th>Risk Ratio MCI/Delivered</th>
<th>Shielding (50 mSv/yr) Concrete @10.00 m (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Protons (206 MeV)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Isochronous Cyclotron (NC)</td>
<td>230</td>
<td>2</td>
<td>1250</td>
<td>625</td>
</tr>
<tr>
<td>Isochronous Cyclotron (SC)</td>
<td>250</td>
<td>2</td>
<td>313</td>
<td>156</td>
</tr>
<tr>
<td>Synchro Cyclotron (SC)</td>
<td>250</td>
<td>2</td>
<td>1</td>
<td>0.50</td>
</tr>
<tr>
<td>Slow Cycling Synchrotron</td>
<td>250</td>
<td>2</td>
<td>20</td>
<td>10</td>
</tr>
<tr>
<td>Best Ion Rapid Cycling Medical Synchrotron (iRCMS)</td>
<td>1200</td>
<td>2</td>
<td>0.133</td>
<td>0.067</td>
</tr>
</tbody>
</table>

RBE: Relative Biological Effectiveness
OER: Oxygen Enhancement Ratio

RBE represents the biological effectiveness of radiation in the living body. The larger the RBE, the greater the therapeutic effect on the cancer lesion.

OER represents the degree of sensitivity of hypoxic cancer cells to radiation. The smaller the OER, the more effective the therapy for intractable cancer cells with low oxygen concentration.

* Specifications are subject to change. Product shown not available for sale currently.
Best Medical International (BMI) entered a Cooperative Research and Development Agreement (CRADA) with Brookhaven National Laboratory to advance the design of the ion Rapid Cycling Medical Synchrotron (iRCMS). The iRCMS is a state-of-the-art synchrotron designed for future cancer therapy facilities that foresee the need to deliver clinical or pre-clinical beams heavier than typical protons. The Collider Accelerator Department (CAD) at Brookhaven National Laboratory (BNL) has optimized an accelerator design under the CRADA funded by BMI specifically for the generation of carbon ions with a maximum energy of 400 MeV/u in addition to protons of typical clinical energies. The accelerator is optimized to cycle with a frequency of 15 Hz to the top energy required to deliver treatment at a maximum depth of 27 cm. The iRCMS uniquely combines advanced spot scanning with rapid energy modulation thereby eliminating the contamination associated with patient specific hardware. Extremely small beam emittances are also associated with rapid cycling, which facilitates the generation of particle beams with unprecedented precision. The iRCMS lattice design is a racetrack with two zero dispersion parallel straight sections ideal for injection, extraction and RF systems. The racetrack is 12 meters wide and 23 meters long with the two arcs having a bending radius of ~5 meters. These arcs are made up of 24 combined function magnets with a maximum magnetic field of Bmax~1.3 Tesla. The iRCMS was conceived to include highly efficient single turn injection and extraction and shall utilize a linac to inject carbon ions and protons at a kinetic energy of 8 MeV/u.

Clinical Comparison: X-rays, Protons & Carbon Ions

Peak-to-Plateau ratio of the RBE (a/b) is larger in carbon ion beams than for proton beams.

Spread out the Bragg Peak to match tumor volume

Depth from the body surface (cm)
Protons – Base/Peak = 60% Carbon Ions – Base/Peak = 45%

“Lines to guide the eye”

Best Particle Therapy
ION RAPID CYCLING MEDICAL SYNCHROTRON (IRCMS)
STATUS AND FUTURE PLANS

Manny Subramanian1, Stephen G Peggs2, Joseph P. Lidestri2, JK Kandaswamy1, Krishnan Suthanthiran1

1Best Medical International, Springfield, VA, 22153 USA • 2Brookhaven National Laboratory, Upton, NY, 11973 USA • 3Columbia University, New York, NY, 10032 USA

Best Particle Therapy Center • Prague, Czech Republic • May 22–28, 2016

BMI & BNL have jointly developed a rapid cycling proton/carbon synchrotron that enables advanced features including:
- A unique combination of advanced spot scanning with rapid energy modulation
- Elimination of neutron contamination associated with patient specific hardware
- Rapid cycling technology has several natural advantages:
  - Intrinsically small beam emittances facilitating beam delivery with unprecedented precision
  - Small beam sizes – small magnets, light gantries – smaller footprint
  - Highly efficient single turn extraction
  - Efficient extraction, less charge per bunch – less shielding
  - Flexibility – protons and or carbon, future beam delivery modalities

- Currents from 100uA to 1000uA (or higher) depending on the particle beam are available on all Best Cyclotron Systems
- Best 20u to 25 MeV and 30u to 35 MeV are fully upgradeable on site

<table>
<thead>
<tr>
<th>NEW Best Cyclotrons</th>
<th>Currents</th>
<th>Applications</th>
</tr>
</thead>
<tbody>
<tr>
<td>1–3 MeV Deuterons</td>
<td>100–1000 µA</td>
<td>For materials analysis (Patent Pending)</td>
</tr>
<tr>
<td>70–150 MeV Protons</td>
<td>200–1000 µA</td>
<td>For Proton Therapy (Patent Pending)</td>
</tr>
<tr>
<td>3–90 MeV Protons</td>
<td>400–1000 µA</td>
<td>High current proton beams for neutron production and delivery (Patent Pending)</td>
</tr>
<tr>
<td>Best 15p Cyclotron</td>
<td>15 MeV</td>
<td>Proton only, capable of high current up to 1000 Micro Amps, for medical radioisotopes</td>
</tr>
<tr>
<td>Best 20u/25p Cyclotrons</td>
<td>20, 25–15 MeV</td>
<td>Proton only, capable of high current up to 1000 Micro Amps, for medical radioisotopes</td>
</tr>
<tr>
<td>Best 30u/35p Cyclotrons</td>
<td>30, 35–15 MeV</td>
<td>Proton only, capable of high current up to 1000 Micro Amps, for medical radioisotopes</td>
</tr>
<tr>
<td>Best 70p Cyclotron</td>
<td>70–35 MeV</td>
<td>Proton only, capable of high current up to 1000 Micro Amps, for medical radioisotopes</td>
</tr>
<tr>
<td>Best 150p Cyclotron</td>
<td>From 70 MeV up to 150 MeV (non-variable)</td>
<td>For all Medical Treatments including Benign and Malignant Tumors for Neurological, Eye, Head/Neck, Pediatric, Lung Cancers, Vascular/Cardiac/Stenosis/Ablation, etc. (Patent Pending)</td>
</tr>
</tbody>
</table>

COMING SOON!
Best Proton Therapy Cyclotron up to 150 MeV dedicated for proton therapy with two beam lines and two treatment rooms (Patent Pending)

Installation of Best 70 MeV Cyclotron at Italian National Laboratories (INFN), Legnaro, Padua, Italy
Introducing...Exciting new products under development from TeamBest® Companies!

* Certain products shown are not available for sale currently.

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