

## Ottawa, Canada





## Product Lines

- **Gamma Teletherapy Systems**

Equinox & Phoenix



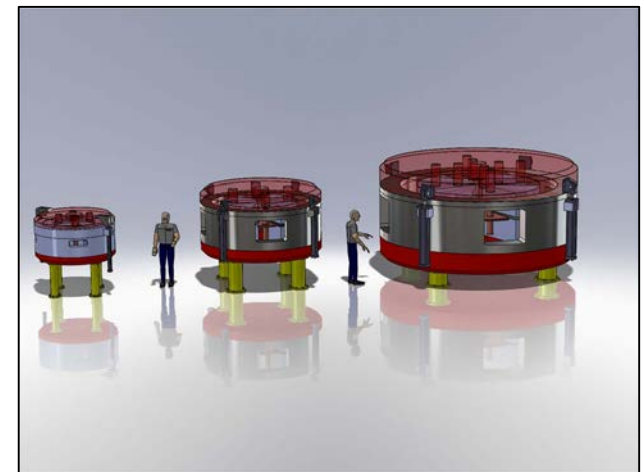
- **Blood Irradiators**

Gamma & X-ray



- **Cyclotron Systems**

14, 25, 35, & 70 MeV





## Our Global Impact

- 150 employees and 70+ worldwide agents
- More than 1000 active cobalt teletherapy units installed worldwide
- More than 1900 Gammacells<sup>®</sup> installed worldwide
- More than 300 Raycells<sup>®</sup> installed worldwide, and
- Cyclotrons - one, 70 MeV installed in Italy



## Our History

- Founded in 1946 by Atomic Energy of Canada Ltd.
- Purchased/Privatized in 1991 by MDS Inc.
- Purchased in May 2008 by Krishnan Suthanthiran to become Best<sup>®</sup> Theratronics Ltd.

## Our Future

Best<sup>®</sup> Theratronics is part of Mr. Suthanthiran's vertically integrated private enterprise of companies known as TeamBest<sup>™</sup> - the world's single-source oncology provider



## Purpose

- To prevent Transfusion-associated Graft-versus-host Disease (TA-GVHD)
- Patients that need irradiated blood:
  - Bone marrow transplant patients
  - Stem cell transplant patients
  - Congenital Immune Def. Syndrome
  - Hodgkin's disease
  - Directed donations - blood relatives
  - Intrauterine transfusions
  - Acute leukemia patients
  - Non-Hodgkin's lymphoma patients
  - Premature infants
  - Neuroblastoma, glioblastoma





- Mainly by dedicated caesium-137 or x-ray blood irradiators
- LINACS or Cobalt 60 teletherapy devices
- Alternative technologies (chemicals and UV light)



## So What Are the Differences?

- Gamma Irradiators:
  - 662 KeV
  - 30-year source half-life – no replacement needed
  - No water requirements/costs
  - Ideal for medium to high throughput
  - Downtime minimal
  - Minimal service costs
  - Room requirements
  - High regulations/personnel
  - Disposal costs are high
- X-ray Irradiators:
  - 160 KV (60-80 KeV avg.)
  - tube/power supplies eventually need replacing
  - Water requirements/costs
  - Ideal for low to medium throughput
  - Downtime moderate
  - Moderate service costs
  - No room requirements
  - Low regulations/personnel
  - Disposal costs are low <sup>7</sup>



## Features

- Two canister size options to fit your needs (2.0 or 3.5 L)
- Two opposing x-ray tubes deliver a uniform dose
- Fixed tubes & canister (not vulnerable to moving parts failure)
- Two independent processors control the irradiation time
- IPDM software allows users to scan the relevant barcodes
- Ergonomic workstation design







## Dimensions & Throughput

	Raycell® Mk2 (2.0 L)	Raycell® Mk2 (3.5 L)
<b>Canister Volume</b>	2.0 L (0.53 US Gal.)	3.5 L (0.92 US Gal.)
<b>Canister Diameter (internal)</b>	167 mm (6.6 in.)	175 mm (6.9 in.)
<b>Canister Height (internal)</b>	97 mm (3.8 in.)	150 mm (5.9 in.)
<b>Bags (300 ml) Per Canister Volume</b>	4	6 to 8
<b>Dose Uniformity (min/<u>CEN</u>/max)</b>	20 – 30 Gy	23 - 40 Gy
<b>CDR (Oldest to Current Models)</b>	8.9 Gy/min (± 5%)	5.1 Gy/min (± 5%)
<b>Timer Setting for CDR</b>	~ 3 min	~ 4.9 min
<b>Cycles per Hour for 25 Gy Central</b>	15 (+1 min/c)	10 (+1 min/c)
<b>Bags per Hour for 25 Gy Central</b>	60	60 to 80
<b>Dose Uniformity (<u>MIN</u>/cen/max)</b>	25 – 44 Gy	27 - 47 Gy
<b>Timer Setting for MDR</b>	~ 4 min	~ 5.8 min
<b>Cycles per Hour for 25 Gy Minimum</b>	12 (+1 min/c)	8 (+1 min/c)
<b>Bags per Hour for 25 Gy Minimum</b>	48	48 to 64



## Water Requirements

	Raycell <sup>®</sup> Mk2 (2.0 & 3.5 L)
<b>Water Flow Rate</b>	2.6 - 4 US gal./min (10 - 15 L/min)
<b>Water Pressure</b>	35-60 psi (241-414 kPa)
<b>Potable Quality</b>	≤ 7 grains/US gal. hardness (Grade 7)
<b>Water Temperature</b>	10-25 °C (50-77 °F)
<b>Heat Exchanger</b>	If Water Quality & Temperature Not Good
<b>Chiller</b>	If Heat Exchanger Not Enough



## Electrical Details

- **Requirements**

- Single phase: 60 Hz, 240 V +/- 10%, 60 A max or
- Three phase: 50 Hz, 400 V +/- 10%, 25 A max
- Both are hardwired to safety disconnect

- **Consumption**

- Single phase: 45 A at 240 V or
- Three phase: 16 A at 400 V



## Reliability

- **Recent data:**
  - X-ray tubes are typically lasting 5 - 7 years
  - Power supplies are typically lasting 3 years
- With full-service contracts including regular preventive maintenance, and optimal water characteristics, the reliability is good



## Service & Preventive Maintenance

- **2 types of service contracts**
- Full Service Contract – parts included
- Preventive Maintenance Contract – parts not included





## Main Points

- Optimal dose uniformity
- 2.0 or 3.5 L canister option
- Barcode scanning
- Easy to use -1 canister, 1 lid
- Fast irradiation time
- Low regulations/personnel
- Minimal budget for disposal





## Features

- Canister size 1.7 L
- Irradiates 3 red cell bags in 4 minutes for 25 Gy central
- No external water required
- Syringe holder
- Barcode reader
- Download cycle info to printer, computer or LIMS
- Ergonomic workstation
- Compact and lightweight





## Dimensions & Throughput

	Raycell® Mk1 (1.7 L)	Raycell Mk2 (2.0 L)
<b>Canister Volume</b>	1.7 L (0.45 US Gal.)	2.0 L (0.53 US Gal.)
<b>Canister Diameter (internal)</b>	173 mm (6.8 in.)	167 mm (6.6 in.)
<b>Canister Height (internal)</b>	79 mm (3.1 in.)	97 mm (3.8 in.)
<b>Bags (300 ml) Per Canister Volume</b>	3	4
<b>Dose Uniformity (min/<u>CEN</u>/max)</b>	20 – 34 Gy	20 - 30 Gy
<b>CDR</b>	6.3 Gy/min (± 5%)	8.9 Gy/min (± 5%)
<b>Timer Setting for CDR</b>	5min	3 min
<b>Cycles per Hour for 25 Gy Central</b>	10 (+1 min/c)	15 (+1 min/c)
<b>Bags per Hour for 25 Gy Central</b>	30	60
<b>Dose Uniformity (<u>MIN</u>/cen/max)</b>	25 – 44 Gy	25 – 37.5 Gy
<b>Timer Setting for MDR</b>	6 min	4 min
<b>Cycles per Hour for 25 Gy Minimum</b>	8 (+1 min/c)	12 (+1 min/c)
<b>Bags per Hour for 25 Gy Minimum</b>	24	48





## Power and water requirements

Water requirements	Raycell <sup>®</sup> Mk1 (1.7 L)	Raycell Mk2 (2.0 L)
flow	Own internal water supply	> 10 L /min
pressure	Own internal water supply	35-60 psi
temperature	Own internal water supply	10-25 C
water quality	Distilled water – 30 L tank	Potable water

Power requirements		
North America	208 V, Single phase, 60 Hz	240 V, single phase, 60 Hz
Rest of World	230 V, single phase, 50 Hz	400 V, three phase, 50 Hz
boost transformer	Not needed	Provided for 240 V system
IEC 60309 plug	provided	Not required

Dimensions and weight		
Height	1225 mm (49.4 in)	1525 mm (60 in)
Width	1060 mm (41.75 in)	1450 mm (57 in)
Depth	975 mm (38.4 in)	1000 mm (40 in)
Weight	600 kg (1300 lbs)	1000 kg (2200 lbs) <sup>17</sup>



## Electrical Details

- **Requirements**

- Single phase: 60 Hz, 208 V +/- 10%, fused to 30 A
- Single phase: 50 Hz, 230 V +/- 10%, fused to 30 A
- We provide a IEC 60309 plug (250V, 30A)

- **Consumption**

- Single phase: 21 A at 208 V or
- Single phase: 19 A at 230 V



## Main Points

- No external water needed
- Irradiates 3 bags in 5 minutes
- Barcode scanning
- Downloads to a printer, standalone PC or to LIMS
- Easy to use -1 canister, 1 lid
- Irradiates 60 ml syringes
- Lightweight
- Small footprint





## Blood irradiation

- More countries switching from gamma to x-ray
- More incentives (gov't or other) to pay for disposal of gamma irradiators if new x-ray unit purchased
- Still a few countries that prefer gamma over x-ray
- Potential increase in chemical and UV light for platelets