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Background:

Over 20,000 patients have been treated with partial breast irradiation (PBI) using the MammoSite™ (MS) brachytherapy applicator. We compare PBI using the MS brachytherapy balloon catheter applicator, which employs a single port for a HDR source, with the recently introduced ClearPath™ (CP) multi-channel brachytherapy device, which can be inserted through a single breast incision like the MS device. Multiple HDR source channels in the CP device create opportunities for improved dose optimization, with the potential for decreased doses to normal tissues.

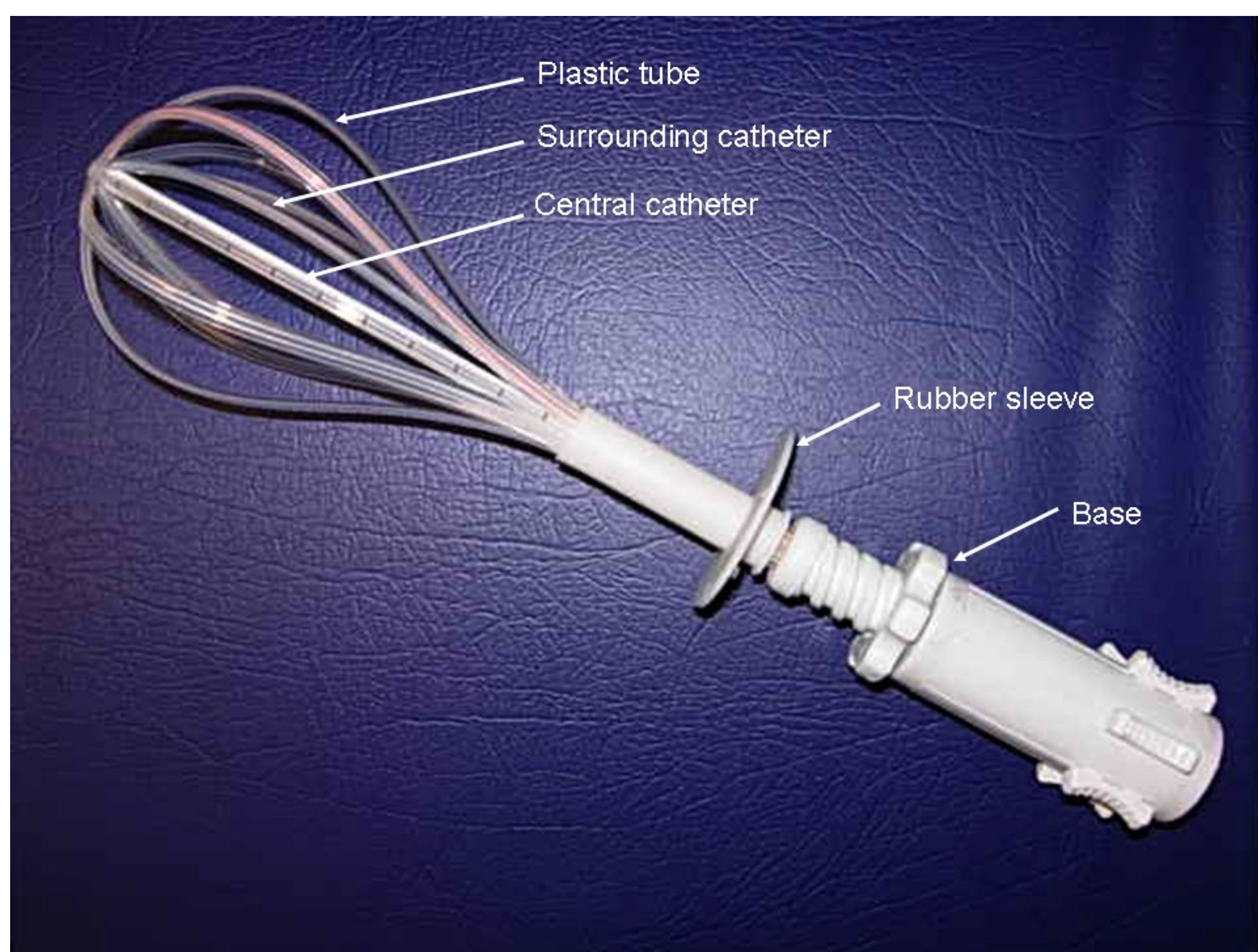


Figure 1. ClearPath™ Multi-channel Brachytherapy Device

Methods:

A CT scan of the CP device in a water bath was used to reconstruct dimensions and positions of the multiple channels in the planning CT scans from 15 patients previously treated with the MS device. CP plans were constructed and optimized using the same dose fractionation prescribed to an identical PTV as the MS plans.

Results:

The mean PTV coverages for the 15 patients using the two methods are shown in Table 1, and mean doses to normal tissues are shown in Table 2. Mean absolute volumes (cm³) receiving more than 150% and 200% of the prescribed dose (35.9 and 9.7 for MS, 36.6 and 13.0 for CP) were well below those previously shown to be associated with fat necrosis.

	MammoSite™	ClearPath™	P
%V90 (3060 cGy)	99.6	99.7	ns
%V100 (3400 cGy)	96.5	96.5	ns
%V150 (5100 cGy)	42.1	42.9	ns
%V200 (6800 cGy)	11.4	15.2	<.05

Table 1. Planning Target Volume Coverage

	MammoSite™	ClearPath™	P
Breast %V50 (1700 cGy)	19.8	18.0	<.05
Ipsilateral Lung %V30 (1020 cGy)	3.7	2.8	<.05
Heart %V5 (170 cGy)	57.0	54.3	<.05
Max Skin Point Dose (cGy)	312.2	273.6	<.05

Table 2. Mean Normal Tissue Doses

Conclusions:

MammoSite™ and ClearPath™ offer equivalent target volume coverage. CP was associated with some increased “hot spots”, as evidenced by the larger mean %V200; however, CP allowed significantly more normal tissue sparing to the heart, skin, ipsilateral breast and lung. Further research will be needed to determine whether this improved normal tissue sparing will justify the somewhat increased complexity of treatment with the CP device.