

## A Comparative Study of Cooltech® Handpieces for Cryoadipolysis Using Numerical Simulation

### 利用數值模擬比較Cooltech®探頭進行冷凍溶脂的研究

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#### KEY TAKEAWAY

- Comsol Multiphysics was used to compare the cooling dynamics of Cooltech handpieces analysing simulations of their performance and operational efficiency. Comsol Multiphysics用於比較Cooltech探頭的冷卻動力，模擬分析其性能和操作效率。
- The following handpieces have been assessed: Straight HP, Tight HP, Double HP and Tiny HP.  
對以下探頭作出了評估：Straight HP, Tight HP, Double HP and Tiny HP.
- To characterize the different types of handpieces, three sets of variables have been analysed: temperature distribution inside the applicator, average fat temperature inside the handpiece, and fat percentage below the reference temperatures. 為了分辨不同類型探頭的特性，分析了三組數據：探頭內的溫度分佈，探頭內脂肪的平均溫度，及低於參考溫度的脂肪百分比。

**Table 3. Summary of results 結果總覽**

手製 Handpiece	最終溫度 T <sub>Final</sub> °C			平均溫度 T <sub>Average</sub> °C	平均溫度達到的最快時間 Minimum time to reach T <sub>Average</sub>			70分鐘達到溫度的脂肪百分比 Fat % below reference T at 70 min		
	P1	P2	P3		10,38°C	6°C	2°C	10,38°C	6°C	2°C
Straight HP	-0,41	-3,17	-7,00	6,37	49	70	-	69,06	55,70	39,32
Tight HP	-4,35	-5,07	-7,36	0,11	27	37	54	85,98	78,33	69,76
Double HP	-3,02	-4,85	-6,85	1,79	29	42	67	81,93	73	62,11
Tiny HP	-5,23	-	-	-3,77	7	9	13	100	99,95	88,31

備註：手製區域：P1 – 中央區域；P2 – 中間區域；P3 – 最接近冷卻板的區域；T – 溫度；% – 百分比

**Notes:** Zone of handpieces: P1 – central zone of the cavity; P2 – intermediate zone; P3 – closest zone to the plate. T – temperature; % – percentage.

- All handpieces showed a time-based decreasing tendency in temperature.  
所有探頭均顯示隨時間下降溫度的趨勢。
- All handpieces reached different final temperatures, although these were all below zero.  
所有探頭的最終溫度有所不同，但它們均低於零。