



TECHNICAL NOTE

DATE
09-25-00

SeeDOS Ltd
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NUMBER
4419-00

SUBJECT: Calibration of the I-125 RAPID Strand

The following information is provided as a service to our users and customers:

Calibration of the I-125 RAPID Strand

How is the calibration done for the I-125 RAPID Strand™?

Is it for a single seed or for a fixed number?

Does the calibration change for different number of seeds in the strand?

The ADCL in Madison has helped us by determining a formula which allows the user to calculate the activity of the seeds in I-125 RAPID Strand™. One component is the ADCL Calibration for the particular HDR 1000 Plus Well Chamber being used. This is the calibration for Amersham 6711 seeds, REF 80040-B, in the Source Holder for Single LDR Seeds, REF 70016. Another component is the number of seeds in the I-125 RAPID Strand™.

The items a user needs are:

HDR 1000 Plus Well Chamber

REF 70016 Source Holder for Single LDR Seeds

REF 80040-B ADCL Calibration for Amersham 6711 in Source Holder 6711

REF 70023 Source Holder for I-125 RAPID Strand™ Iodine Seeds

An I-125 RAPID Strand™ containing 10 iodine seeds was obtained and an extensive evaluation was performed with the HDR 1000 Plus and the I-125 RAPID Strand™ Source Holder REF 70023. Following the evaluation, individual seeds of the I-125 RAPID Strand™ were cut from the strand and individually calibrated. To obtain a correction factor, these measurements were compared to the initial, collective seeds measurements of the I-125 RAPID Strand™ in Source Holder REF 70023. The following formula was determined.

$$\text{Seed Activity} = \frac{R * CF * C_{T/P} * EF}{N}$$

R = reading

CF (correction factor) is defined as 1.15 times the single ADCL 6711 iodine seed calibration factor

N = number of seeds

C_{T/P} = correction for temperature and pressure

EF = electrometer correction factor

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Example: Determining average seed activity from a RAPID Strand™ measurement of 5 seeds with the Standard Imaging Source Holder for RAPID Strand™ Iodine Seeds, REF 70023.

$$\text{Seed Activity} = \frac{R * CF * C_{T/P} * EF}{N}$$

If the ADCL single seed Air Kerma Strength Calibration factor is: $2.316 \times 10^{11} \mu\text{Gy m}^2 \text{h}^{-1}\text{A}^{-1}$

CF = 1.15 x the ADCL single seed calibration factor

$$CF = 1.15 \times 2.316 \times 10^{11} \mu\text{Gy m}^2 \text{h}^{-1}\text{A}^{-1}$$

$$CF = 2.663 \times 10^{11} \mu\text{Gy m}^2 \text{h}^{-1}\text{A}^{-1}$$

N = 5 (5 seeds)

If T = 21.5 and P = 740

$$C_{T/P} = (T + 273.15/295.15) \times (760/P)$$

$$C_{T/P} = (21.5 + 273.15/295.15) \times (760/740)$$

$$C_{T/P} = 1.025$$

Assume **EF** = 1.002

R = the reading for the 5 seeds together

$$\text{The average reading for each seed} = \frac{R * 2.663 \times 10^{11} * 1.025 * 1.002}{5}$$

$$\text{The average reading for each seed} = R * 5.472 \times 10^{10} \mu\text{Gy m}^2 \text{h}^{-1}\text{A}^{-1}$$

Where **R** is the electrometer reading in Amp or Coulomb

Sterility is maintained in your measurements by the ability to autoclave the Rapid Strand Source Holder.

Standard Imaging would like to thank The University of Wisconsin Accredited Dosimetry Calibration Laboratory in Madison Wisconsin, for performing complete initial performance testing of the I-125 RAPID Strand™ Source Holder with the HDR 1000 Plus Brachytherapy Well Chamber.

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