A "^{99m}Tc CLOCK" FOR CALCULATING INDIVIDUAL PATIENT DOSES

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The practice of eluting a ^{99m}Tc generator daily and withdrawing multiple doses from a single vial of eluate prompted us to devise a "^{99m}Tc clock". The clock is now a time-tested aid, used daily in the routine calculation of individual patient doses.

A standard electric wall clock was modified for this purpose by removing the minute hand. The calibration increment of time was designated as ¼ hr; this increment is easy to determine by observing the hour hand. The sweep second hand was retained to indicate a possible power failure or malfunction. The clock is shown in Fig. 1.

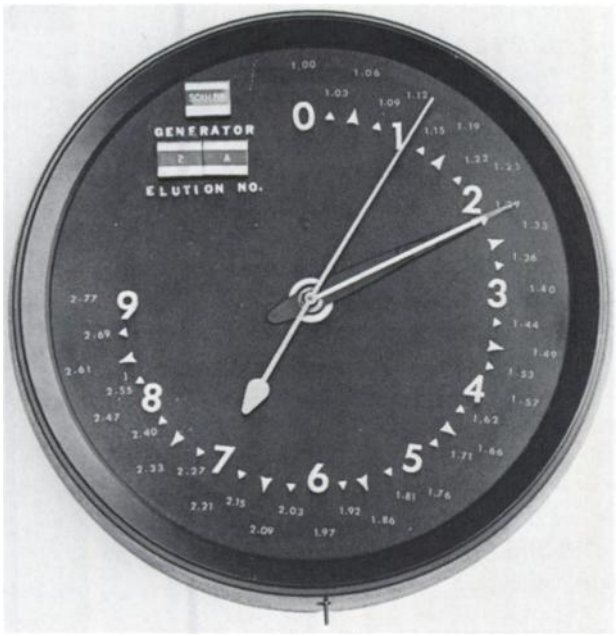

FIG. 1. Technetium-99m clock is constructed by removing ordinary numeral face from standard electric wall clock. Desired numerals are replaced using transfer lettering. Minute hand is removed because it is unnecessary, leaving hour hand to denote time increment. Second hand provides indication that clock is running properly. Identification magnets cling to steel face.

In the circumferential margin of the clock there were placed the working factors for computing the volume to which a given amount of eluate must be increased (compensating for exponential decay) to deliver a certain number of millicuries. Also included for identification of generators and elution numbers are magnets bearing the name of the commercial generator suppliers and alphanumeric symbols. These magnets cling to the steel face of the clock well away from the clock mechanism and are seen at the upper left in the illustration.

The choice of $e^{\lambda t}$ over $e^{-\lambda t}$ was deliberate, and a matter of practical consideration. The quantity that is most commonly calculated is the volume of eluate required to deliver a certain number of millicuries. The volume required increases as $e^{\lambda t}$ with the passage of time. Additionally, multiplication by the reciprocal decay factor is probably more likely to be error-free. If it is desired to display values of $e^{-\lambda t}$, the space inside the clock numerals could be used. The factor $e^{\lambda t}$ which corresponds to 6 hr on the clock indicates our use of the more nearly correct 6.13-hr half-life rather than the commonly accepted 6-hr figure for ^{99m}Tc.

We have found this clock to be of considerable value in a high-density clinical situation where ten or more patient administrations of pertechnetate are drawn up over the course of a single morning. The use of the reciprocal decay factor seems to simplify calculations. It is probably worth noting that despite the simplicity and reduced chance for error we still feel that it is necessary to check each individual patient dose in a dose calibrator.

Received May 18, 1971; original accepted June 22, 1971.

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