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November 24, 1958

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Dr. Neil's I¹³² manuscript

1. Although this manuscript would have passed as a basis for a proposal to the local committee requesting permission for the use of I¹³² in patients, it is not publishable as it stands.
2. Mercifully, a revision of the whole paper is forced by the fact that the I¹³² generator described (?) has been superseded by a new, simpler device which virtually eliminates the tellurium problem. Unfortunately the tellurium section is the only part of the paper which is reasonably well written.
3. The following more specific comments further explain the above thoughts.

Title: The title is deceptive. No experiments are reported, no biological effects are observed, and the manner in which biological effects are mentioned is more an arm-chair prediction than "analysis." Suggested substitution: Consideration of the use of Iodine-132 in thyroid studies.

Page 1, paragraph 1: There is no introduction. The disorderly presentation of ideas in the first paragraph is too confusing to encourage a reader to continue. There is no clue as to what follows. Suggested revision:

Introduction

Iodine-132, with a half-life of 2.33 hours, offers the advantages of a shorter half-life and a lower radiation dose when its use for thyroid iodine uptake studies is compared with the established use of I¹³¹. The problem of making I¹³² available at locations remote from a nuclear reactor is met by the use of the BNL I¹³² generator (1) in which I¹³² is "milked" from a longer-lived parent isotope, Te¹³², a uranium fission product with a half-life of 77 hours. This paper presents fundamental information concerning radiation doses and tellurium toxicity to be expected in proposed clinical uses of I¹³².

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Principle of Production of I¹³²:

The BNL I¹³² generator consists of an alumina ion exchange column charged with Te¹³². After 16 hours the I¹³² is in secular equilibrium with the parent Te¹³², and the amount of I¹³² present subsequently diminishes with the parent isotope's half-time, 77 hours. To separate the I¹³², a 0.01 molar solution is poured through the column. The effluent solution contains the I¹³² with no detectable amount of Te¹³² coming through.

After all of the I¹³² has been separated from the Te¹³², fresh I¹³² is produced by beta decay of the parent isotope and a new maximum I¹³² activity is attained in 12.1 hours. The milking process can thus be repeated numerous times but, of course, successive yields of I¹³² will diminish according to the decay of the Te¹³².

Page 2, last paragraph: Since all the data on the safety of tracer studies of the thyroid isn't in yet, it isn't quite accurate to say that 15 µc "has been shown" to be safe. It would be better to say, "Calculation (4) and experience indicate that in adults 15 µc may be regarded as a "safe" tracer.

Page 3, Table II, Footnote 6: New Seaborg Table: Rev. Mod. Physics 30, 585-904, 1958 should be substituted.

Page 4, line 2: Delete.

paragraph 2: For "simulating" evidently "representing" is meant.

If the isotope distribution is assumed to be confined to the blood, the dose to the whole body is less than that calculated for the blood (total mass should be used). However, since the dose to the bone marrow, the critical tissue, is more closely related to the dose to the blood, the calculation given may be retained with a modified explanation. The assumption made is conservative and wouldn't be challenged except that later it is used in comparison with I¹³¹ for which a different set of assumptions is made.

Page 5, Table III: Evidently presents figures for a proposed experiment involving giving the same patient I¹³¹ once and I¹³² twice. No such experiment is described in the text.

Footnote (b) replace = by X and insert = before (I¹³²).

Footnote (e) The ratio of gonad dose to whole-body dose should be the same for the two isotopes. Actually the I¹³² whole-body dose is too high for the reason cited above and the dose in the table for the gonads is about right. If the whole-body dose is calculated on a basis of uniform distribution for I¹³¹, this should not be compared with an assumption of confinement to blood for I¹³².

Table IIIA: Why put the dose in rep and then convert to rad? Better to use rad only.

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Page 9, paragraph 2: Sentence 2, delete.

Page 10, line 1: Another aspect (instead of one aspect).

line 3: The previous calculations have been based on the assumption of intravenous injection and all of a sudden "ingests" is casually introduced. This is part of the problem that "the experiment" often referred to isn't described.

Page 15: At last something is said about the mode of administration. The last sentence in this paragraph isn't good, though.

Page 16: Now the doses to be used are mentioned. The radiation and tellurium considerations are getting scrambled, however.

Page 17: It would seem better in the summary to follow the organization of the paper and transpose the tellurium question to the end rather than the beginning.

The summary should include a statement about the assumed I^{132} dose and its hazard and usefulness relative to I^{131} .

General:

The section on tellurium toxicity is the best part of the paper, but with the new device such an extended discussion is academic. The rest of the paper is not well written. It is necessary to study the tables and to read the section on tellurium to find out what is proposed with respect to administering I^{132} to patients. Actually nothing is ever definitely proposed, unless the cases considered under radiation dosage constitute proposal.

The uses of I^{132} which have already been reported (refs. 8, 9, 10) should be discussed from the standpoint of comparative thyroid uptake, not just that of tellurium toxicity. If the use of I^{132} were a brand new idea and there hadn't been time to give it a try, the paper, taken as a proposal to use I^{132} , might be considered. But with the use of I^{132} already having been reported, the proposal becomes sterile unless accompanied by new data.

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