COPY

bc: M J Clark
B K Fish
M R Ford
M D Wright

OAK RIDGE NATIONAL LABORATORY
OPERATED BY
UNION CARBIDE CORPORATION
NUCLEAR DIVISION

POST OFFICE BOX X
OAK RIDGE, TENNESSEE 37831

APR 22 1964

707715

April 20, 1964

Dr. H. D. Bruner, Assistant Director
for Medical and Health Research
Division of Biology and Medicine
U. S. Atomic Energy Commission
Washington, D. C. 20545

Dear Dave:

Your list of topics on I^{131} is certainly a very fine beginning. There were only a few concepts or terms I could think of that might be added, and I am not sure that they are not there already, depending on how one construes some of the items.

I shall begin by mentioning a general matter, that of variability. We need some measure of dispersion on just about every topic. Undoubtedly when you list "thyroid half-time of I^{131} in adults" or "mass of vegetation consumed per day by the average cow"--to cite just two examples--you intend that some attempt be made to indicate the variability to be expected. I think you should emphasize the importance of this all the way through the list. Perhaps it need not be repeated ad nauseam on every item, but a general statement might emphasize that it is not just an average value that is needed.

Secondly, I think it would be most valuable to have those compiling and evaluating data to indicate the identifiable factors which could be used in adjusting the "typical" or average values to a particular situation. For example, on the "mass of vegetation consumed per day by the cow," an average over all U. S. cows or some other extensive and presumably varied population is not nearly as valuable as data on various subpopulations (breeds, feeding practices, lactation) to cover whatever conditions there might be that would perturb the value. In the same way, are there any external indications that might correlate with thyroid size or activity? In short, we need guidance in assessing the individual's exposure, and few individuals, perhaps, will be exposed by an average release of an average aerosol which is deposited in an average manner and eaten by an average cow, etc., etc., etc.

Again, I would think the need for interpretation and guidance need not be repeated on every item, but the need for it should be present in the researcher's mind as he works over the data on each of the topics.

Under the general topics on page 1 concerning deposition and retention in the environment, I think it would be valuable to add a topic which I shall phrase as "Local conditions which influence deposition and retention of I^{131} in the environment." By this I mean to ask if we have any guidance as to what areas might be expected to be high, or low, etc., before we go out to sample. Perhaps this could come under some of the other topics, but I think it deserves mention.

"Aerial surveying" is another topic that I think might deserve to be included.

Next, I think methods of sampling have been neglected. It is not altogether easy to devise a practicable method of sampling an environment, or milk, or cows, or people so as to obtain a reasonably accurate description of the state of the population in question. I think topics of a distinctly statistical flavor might be added with profit. I will try my hand at it by suggesting the following:

"Sampling techniques to evaluate the distribution of I^{131} in an environment"

"Sampling techniques to evaluate the I^{131} levels in a community's milk supply system:

"Sampling techniques to estimate I^{131} uptake by various population groups in a community."

Next, I find no explicit mention of techniques of estimating thyroid burdens. Yet, I believe, there are problems concerning the "best" way of getting an estimate, particularly under field conditions. For example, the "best" position of the crystal(s), type of equipment needed, etc. I would suggest adding "Practical techniques for measuring thyroid burdens in cows and in man."

I think we should add topics concerning the metabolic model for uptake and retention of I^{131} and would favor not asking for specific constants unless they are carefully defined. I would leave the researcher free to describe his model in whatever terms he sees fit--but he must be specific and quantitative. To illustrate my meaning, if we ask for f_w--the fraction ingested that goes to thyroid--do we mean the fraction present in the thyroid one hour postintake, 5 hours postintake, an average over the first 24 hours, or what? As invited by your letter, I shall put down some suggestions, but only to get you and others to consider them and perhaps reformulate them. This item is more general than, and perhaps includes your more specific topics, "Rate of rise of I^{131} in the thyroid..," "Thyroid half-times..," etc.; but should we not put the general question to the researcher?

"A metabolic model for uptake and retention of inhaled or ingested I^{131} in the body and dietary, physiological, or other factors that perturb the model"

I hope these suggestions will start you thinking on the aspects mentioned, and although they are, perhaps, implicit in the list you have prepared, you may arrive at a formulation that is more explicit in these respects. However, the list you have prepared is certainly a comprehensive one and a long first step toward an extremely useful summary of our knowledge on this important topic.

I am including also comments by Drs. K. Z. Morgan and S. R. Bernard which they have asked me to forward to you.

Sincerely yours,

Walter S. Snyder

Walter S. Snyder
Assistant Director
Health Physics Division

Enclosures

cc: S. R. Bernard
K. Z. Morgan

WSS:ss

INTRA-LABORATORY CORRESPONDENCE

OAK RIDGE NATIONAL LABORATORY

March 23, 1964

MAR 24 1964

To: W. S. Snyder

From: K. Z. Morgan

Thank you for your memorandum of March 13, 1964, and the list regarding I^{131} from Dave Bruner. Offhand, I might suggest the following:

1. a restatement of a number of Bruner's items with reference to other radioisotopes of iodine,
2. the influence of various diseases on the human uptake of iodine,
3. the feasibility of administering KI and other salts of iodine in case of an emergency, the best method of distributing these salts and the possible consequences,
4. the feasibility of various methods for removing radioiodine from milk in the dairies or in the homes,
5. the possible consequence of substitution of canned milk free of iodine in case of high levels of fallout, and
6. various action levels that seem appropriate following high levels of iodine fallout.

Karl Z. Morgan

KZM:jc

cc: S. R. Bernard
M. J. Cook
B. R. Fish
M. R. Ford

1026148

UCN-430
(3 5-61)

INTRA-LABORATORY CORRESPONDENCE

OAK RIDGE NATIONAL LABORATORY

MAR 2 3 1964

March 19, 1964

To : W. S. Snyder

Subject: Comments on Dr. Bruner's List of Specific Topics for Consideration by the Iodine Study Group (if they meet)

Although the list of topics suggested by Dr. Bruner is fairly inclusive, I feel there is one additional area which needs to be included and one topic which needs to be modified.

The additional topic which should be included deals with exposure of the population and irradiation of embryos. The FRC makes recommendations for the permissible intakes by members of the population. The newborn child is taken as the most sensitive member of the population, chiefly because of the smaller mass of the thyroid, and consequently the permissible intakes are based on the newborn child. Now the question arises, does the RPG applied to pregnant women afford protection to the embryo in the womb? The RPG affords protection to the thyroid of the mother, and thus it is apparently assumed that the developing embryo is safe so long as the mother's thyroid does not exceed the RCG. (Needed here are data on the uptake by the embryo and organs or parts of the embryo of I^{131} from the mother's blood. With these data the dose to the embryo (organs of embryo) can be estimated.) I feel that this assumption re the effects on the fetal and maternal thyroid should be discussed.

Also, on page 4, I think the topic entitled "Ratio of I^{131} concentration per specified unit in fetal thyroids (relate to age) to the I^{131} concentrations per unit in the maternal thyroid" should be modified. There is need for data on f_2 (the fraction of the total body burden present in the thyroid) for embryos too. Thus, I suggest that fetal body burdens as well as fetal thyroid burdens be measured. With these data some estimates of dose to the whole embryo from I^{131} in the thyroid and whole body can be made.

If you wish to transmit this memo (or a copy) to Dr. Bruner, it is all right with me.

SRB

S. R. Bernard

cc: M. J. Cook
B. R. Fish
M. R. Ford
K. Z. Morgan

SRB:ss

UCN-430
(3 5-61)

1026149

INTRA-LABORATORY CORRESPONDENCE

MAR 26 1964

OAK RIDGE NATIONAL LABORATORY

March 19, 1964

COPY

To : W. S. Snyder

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If you wish to transmit this memo (or a copy) to Dr. Bruner, it is all right with me.

SRB

S. R. Bernard

cc: M. J. Cook
B. R. Fish
M. R. Ford
K. Z. Morgan

SRB:ss

1026150

UCN-430
(3 5-61)

COPY

March 23, 1964

To: W. S. Snyder

From: K. Z. Morgan

Thank you for your memorandum of March 18, 1964, and the list regarding I^{131} from Dave Bruner. Offhand, I might suggest the following:

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4. the feasibility of various methods for removing radioiodine from milk in the dairies or in the homes,

5. the possible consequence of substitution of canned milk free of iodine in case of high levels of fallout, and

6. various action levels that seem appropriate following high levels of iodine fallout.

Original Signed By
K. Z. MORGAN

Karl Z. Morgan

KZM:jc

cc: S. R. Bernard
M. J. Cook
B. R. Fish
M. R. Ford

1026151

INTRA-LABORATORY CORRESPONDENCE

OAK RIDGE NATIONAL LABORATORY

MAR 19 1964

COPY

March 13, 1964

To: K. Z. Morgan
S. R. Bernard
M. J. Cook
B. R. Fish
M. R. Ford

Dr. Bruner has replied to my suggestion that a list of specific topics be prepared as a basis for discussion if future meetings of the Iodine Study Group are to be held. This is his preliminary list, and he asks for suggestions.

If you will give me your suggestions by April 5, I will combine them to send to Dr. Bruner with proper acknowledgment. If you prefer, please reply to Dr. Bruner directly.

W. S. Snyder

Attachment:
Ltr. dtd. 3/9/64 fm. HDB to WSS

WSS:ss

9-10

UNITED STATES
ATOMIC ENERGY COMMISSION
WASHINGTON, D.C. 20545

MAR 12 1964

March 9, 1964

Dear Walter:

The enclosed sheets contain items which, on a first-round basis, seem to be worth collecting and collating into a compendium for general use. Please regard this list as a starter: Delete, add, or modify as you see fit; especially, please change the diction to clarify, identify, etc.

If you will then send them back to me sometime before mid-April, I will undertake to combine viewpoints together into a single questionnaire which would be circulated more widely, asking the addressees for the numbers appropriate to the items, as well as the reference from which the number is obtainable. The final product, conceivably, would be a document listing 1) the items finally agreed on; 2) the number or numbers suggested for that item; and 3) the proposer, together with the reference on which he bases the number proposed. I live very close to the National Library of Medicine and can do reference checking, etc.

I don't hold a special brief for any specific items, but the pattern is obvious. I hope you will examine each one critically, as you see fit. By all means, add any that you feel ought to be there.

Best personal regards.

Sincerely yours,

Dan
H. D. Brumer

H. D. Brumer, M.D.
Assistant Director for
Medical and Health Research
Division of Biology and Medicine

Enclosure:
As stated

1026153

D - R - A - F - T

Diffusibility of I^{131} through stipulated metals.

Physical half-life of I^{131}.

I_f factor for I^{131}.

Decay scheme for I^{131}.

Yield of I^{131} per kt of fission U^{235}.

Yield of I^{131} per kt of fission Pu^{239}.

Precursor mother-daughter production of I^{131}.

Efficiency of adsorption by conventional stack techniques (state conditions).

Physical state(s) of freshly yielded I^{131} (state conditions).

Change in physical state of I^{131} under (stipulated) atmospheric conditions.

Adsorption of I^{131} on other components in fission product.

Adsorption of I^{131} on other components in fission-fusion products.

Distribution of I^{131} in atmosphere.

Special problems of transport of I^{131} in the atmosphere.

Special problems of diffusion of I^{131} in the atmosphere.

Rate of deposition of I^{131} on the surface in general in absence of precipitation.

Relation of deposition of I^{131} to precipitation.

Retention of I^{131} on plant stem and foilage.

Retention of I^{131} on root stem.

Retention of I^{131} on soils.

Leaching of I^{131} in soils.

Half-time of I^{131} once it has deposited on surface structures--rocks, earth, and/or vegetation.

Relation of concentration of I^{131} in air to concentration per unit area of ground in a given episode.

Relation of gross β and/or γ-radiation dose rate in air at some point during fallout to a subsequent dose rate from I^{131} on unit area of surface (specify conditions).

Relation of gross β and/or γ-radiation dose rate in air at some point during fallout to a subsequent concentration of I^{131} per unit mass of vegetation (specify conditions).

Relation of gross β and/or γ-radiation dose rate in air at some point during fallout to a subsequent concentration of I^{131} per liter of milk (specify conditions.)

Relation of concentration of I^{131} per unit mass of vegetation to concentration of I^{131} per liter of milk (feed to reach equilibrium).

Mass vegetation consumed per day by average cow.

Area of (stipulated) pasture grazed per day by average cow.

Relation of amount of continuously ingested I^{131} to equilibrium level of I^{131} in milk.

Fraction of ingested I^{131} per day appearing in the milk per 24 hours (assume equilibrium).

Fraction of ingested I^{131} per day appearing per liter of milk (assume equilibrium).

Interval between ingestion of I^{131} contamination and appearance of I^{131} in the milk.

On constant intake of I^{131} contamination, what is the rate of buildup of I^{131} in the average cow's thyroid?

On constant intake of I^{131} contamination, what is the rate of buildup of I^{131} in the average cow's milk?

Rate of decline of I^{131} in milk after removal from contamination.

Distribution of given dose of I^{131} between milk, thyroid, urine, feces in cow.

Total amount of aerosol I^{131} absorbed by average cow per 24 hours (state conditions).

Biological half-life of I^{131} in cow's thyroid.

Mass of average cow's thyroid.

Overall biological half-life of I^{131} in cow.

Overall biological half-life of I^{131} in other animal species (specify).

Weight of thyroids in other animal species (specify).

Biological half-life of I^{131} in thyroid of other species (specify).

Fractional retention of I^{131} by thyroid in other species (specify).

Effect of administration of stable iodine on concentration of ingested I^{131} in milk (specify species and dose of I^{127}).

Peculiarities I^{131} metabolism in other species.

Differences in distribution-metabolism-excretion of I^{131} in animal (specify) depending on source of I^{131}, chemical form, and route of administration.

Effect of green versus dry fodder contaminated with I^{131} on distribution - excretion of I^{131}, especially in milk.

Relation of chemical form of I^{131} aerosol to retention by lung.

Fraction of total inhaled aerosol I^{131} retained per 24 hours in man.

Importance of the chemical form of I^{131} in cows' milk to subsequent history of this I^{131} in man.

Weight of thyroid in average American male adult.

Weight of thyroid in average American female adult.

Weight of thyroid at different stages of fetal life; in infancy; in childhood.

Fresh milk consumption per day by "average" child.

Fresh milk consumption by "average" adult.

Fractional retention of I^{131} by adult thyroid.

Fractional retention of I^{131} by child's thyroid.

Fractional retention of I^{131} by infant's thyroid.

Relation of concentration of I^{131} in milk to concentration of I^{131} in human thyroid 24-48 hours after a single dose.

Rate of rise of I^{131} in the thyroid of a child after a single ingestion of I^{131} contaminated milk.

Rate of rise of I^{131} in the thyroid of an adult after a single ingestion of I^{131} contaminated milk.

Relation of the level of I^{131} in the thyroid of an adult (or child) receiving milk contaminated to a constant (stipulated) level with I^{131}.

Relation of the level of I^{131} in the thyroid to levels in milk that decrease as the concentration of I^{131} (in the milk) would decrease from physical decay plus leaching and volatilization, etc.

Rate of decline of I^{131} in the thyroid following abrupt withdrawal of I^{131} contaminated milk.

Overall biological half-time of I^{131} in adults.

Overall biological half-time of I^{131} in children.

Overall biological half-time of I^{131} in infants.

Thyroid half-times of I^{131} in adults.

Thyroid half-times of I^{131} in children.

Thyroid half-times of I^{131} in infants.

Ratio of I^{131} concentration per specified unit in fetal thyroids (relate to age) to the I^{131} concentrations per unit in the maternal thyroid.

Ability of stable I^{127} administered to the other to reduce the I^{131} uptake in the fetus (specify dose).

Effect of I^{127} on retention of I^{131} in adults (specify dose).

Effect of I^{127} on retention of I^{131} in children (infants?) (specify dose).

Rates of some stipulated measurement of gross β-count in the air to related measurement of concentration I^{131} in cows' milk.

Rates of some stipulated measurement of gross β-count in the air to a related concentration of I^{131} in the thyroid from ingesting contaminated food.

Ratio of a measured I^{131} concentration in the air to a related measured I^{131} concentration in milk.

Ratio of a measured I^{131} concentration on the surface (fodder, vegetables or other food) to I^{131} concentration in the human thyroid from ingesting contaminated food.

Ratio of a measured I^{131} concentration in the thyroid of cow (or other specified animal) to I^{131} concentration in human concentration.

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D - R - A - F - T

There are many miscellaneous constants and data on thyroid physiology, pathology, and I^{131} clearances in Silver's book on the thyroid and in other papers going back to 1940 (large reprint file). What constants from this mass of clinical data would be useful? Please suggest.