LETTERS

Edited by **Jennifer Sills**

After Fukushima: Collaboration model

THE MARCH 2011 accident at the Fukushima Daiichi Nuclear Power Plant caused extensive human suffering and revealed the need for more effective means of communicating health risks to the public ("Epidemic of fear," D. Normile, News Feature, 4 March, p. 1022). The rehabilitation of Kawauchi, one of the villages affected by the nuclear accident, provides a model for future responses.

In March 2012, after tedious decontamination work in the village, radiation doses were found to be safe for residents of Kawauchi to return home, and schools and public offices were reopened. In 2013, the public authorities of Kawauchi village and Nagasaki University, which has helped with the reconstruction work since 2011, established a collaboration known as the "Nagasaki University–Kawauchi Village Reconstruction Promotion Base" (*1*). As part of the program, a permanent public health nurse from Nagasaki University with expertise in radiation provides health consultations to the villagers (*2*). The university also provides health radiation consultation services and monitors radiation levels in food and soil samples (*3*, *4*). Regular meetings are held in the village to foster greater dialogue between the radiation experts, physicians, radiation nurses, and community leaders of Kawauchi village and its population.

Almost 100,000 residents of Fukushima have yet to return to their hometowns, with 40,000 of them living outside the prefecture (*5*). The village-university collaboration provides a model for a multidisciplinary approach to public policy during the recovery phase of a nuclear accident.

Noboru Takamura,[1]* Makiko Orita,[1] Shunichi Yamashita,[1] Rethy Chhem[1,2]

[1]Atomic Bomb Disease Institute, Nagasaki University, Nagasaki, 852-8523 Japan. [2]Cambodia Development Resource Institute, Phnom Penh 622, Cambodia.

*Corresponding author. Email: takamura@nagasaki-u.ac.jp

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Holding a bonsai plant grown while evacuated, a Kawauchi resident returns to his home.

After Fukushima: Creating a dialogue

FIVE YEARS HAVE passed since the accident at the Fukushima Daiichi Nuclear Power Plant. Although the additional exposure doses resulting from the accident were extremely low (*1*), it was difficult to dispel residents' fear of radiation exposure ("Epidemic of fear," D. Normile, News Feature, 4 March, p. 1022) and other health issues. To address their concerns, we and others have provided a variety of services to increase understanding between residents and medical professionals.

We have held more than 500 general health consultations, which connect Fukushima residents with health experts from universities. The experts discuss individual residents' health concerns and symptoms privately and then help coordinate integrated care to promote health and prevent disease. Through these social services, we aim to help dispel apprehensions among the evacuees and residents (*2*).

Other local medical professionals and experts have held a series of seminars to open and sustain a dialogue with residents (*3*). The municipality of Date City, which has various levels of contaminated areas, has used feedback about the experiences shared in these seminars to modify their administrative measures and policies and assign staff to explain the personal dosimeter measurement results to individual residents. They also carried out multiple projects to provide mental and physical care for small groups of residents. These activities were implemented based on advice of experts who were by the side of the residents. By putting a liaison in place, medical professionals and experts have transformed a unilateral communication about the risk of radiation into an actively bilateral communication to address the various needs for residents after the accident.

Evacuees have been gradually returning to their homes since the designation of evacuation areas was lifted in Fukushima. At this time, they feel anxious about radiation exposure and life in their new environment. Integrated health systems and community dialogues should continue to provide the returning residents with the support they need.

Makoto Miyazaki,[1] Koichi Tanigawa,[2]* Michio Murakami[3]

[1]Department of Radiation Health Management, Fukushima Medical University, Fukushima, 960-1295, Japan. [2]Fukushima Global Medical Science Center, Fukushima Medical University, Fukushima, 960-1295, Japan. [3]Department of Risk Communication, Fukushima Medical University, Fukushima, 960-1295, Japan.

*Corresponding author. Email: tanigawa@fmu.ac.jp

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After Fukushima: Addressing anxiety

IN HIS NEWS Feature "Epidemic of fear" (4 March, p. 1022), D. Normile described the thyroid ultrasound examination program that launched in the aftermath of the Fukushima accident. He discussed the unexpected number of positive results and the potential for overtreatment, given that the natural history of thyroid cancer in children is unclear.

Despite these uncertainties, residents from Fukushima tend to directly associate examination results to their radiation exposure (*1*). They often associate their own decisions immediately after the accident (such as whether or when to evacuate, where to permit children to play, and what to permit children to eat or drink) with the appearance of nodules on the ultrasound.

PHOTO: KYODO

In particular, mothers have developed new anxieties and feelings of self-condemnation (*2*). We highlight two strategies that could help to minimize these reactions.

First, examination results are normally provided to the examinees in written form, but we individually explained the results immediately after each examination. Our objectives were to relieve the anxieties regarding the results; to address vague concerns regarding radiation health risks; and to explain the meaning of the thyroid screening.

Second, we provided classes on thyroid examinations to the school children (from 10 to 18 years old) who were examined. We explained the associations between radiation and thyroid cancer and helped the children interpret the examination results. The decision-making about examinations often reflected the concerns of the parents rather than those of the children. Through these classes, we tried to provide the children with opportunities to think about the benefits and limitations of the screening and to prepare them for discussions with their parents about radiation health risks.

Sanae Midorikawa,[1,2]* Satoru Suzuki,[1,3] Akira Ohtsuru[1,2]

[1]Radiation Medical Science Center, Fukushima Medical University, Fukushima, 960-1295, Japan. [2]Department of Radiation Health Management, Fukushima Medical University, Fukushima, 960-1295, Japan. [3]Department of Thyroid and Endocrinology, Fukushima Medical University, Fukushima, 960-1295, Japan.

*Corresponding author. Email: hana@fmu.ac.jp

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TECHNICAL COMMENT ABSTRACTS

Comment on "Cycling Li-O_2 batteries via LiOH formation and decomposition"

Yue Shen, Wang Zhang, Shu-Lei Chou, Shi-Xue Dou

Liu *et al*. (Research Article, 30 October 2015, p. 530) described a lithium-oxygen (Li-O_2) battery based on lithium iodide (LiI)–assisted lithium hydroxide (LiOH) formation and decomposition. We argue that LiOH cannot be oxidized by tri-iodide (I_3^-). The charge capacity is from the oxidation of I^- instead of LiOH. The limited-capacity cycling test is misleading when the electrolyte contributes considerable parasitic reaction capacity. Full text at http://dx.doi.org/10.1126/science.aaf1399

Response to Comment on "Cycling Li-O_2 batteries via LiOH formation and decomposition"

Tao Liu, Gunwoo Kim, Javier Carretero-González, Elizabeth Castillo-Martínez, Clare P. Grey

We described a lithium-oxygen (Li-O_2) battery comprising a graphene electrode, a dimethoxyethane-based electrolyte, and H_2O and lithium iodide (LiI) additives, lithium hydroxide (LiOH) being the predominant discharge product. We demonstrate, in contrast to the work of Shen et al., that the chemical reactivity between LiOH and the triiodide ion (I_3^-) to form IO_3^- indicates that LiOH can be removed on charging; the electrodes do not clog, even after multiple cycles, confirming that solid products are reversibly removed. Full text at http://dx.doi.org/10.1126/science.aaf1652

Comment on "Cycling Li-O_2 batteries via LiOH formation and decomposition"

Venkatasubramanian Viswanathan, Vikram Pande, K. M. Abraham, Alan C. Luntz, Bryan D. McCloskey, Dan Addison

Based on a simple thermodynamic analysis, we show that iodide-mediated electrochemical decomposition of lithium hydroxide (LiOH) likely occurs through a different mechanism than that proposed by Liu *et al*. (Research Article, 30 October 2015, p. 530). The mismatch in thermodynamic potentials for iodide/triiodide (I^-/I_3^-) redox and O_2 evolution from LiOH implies a different active iodine/oxygen electrochemistry on battery charge. It is therefore possible that the system described in Liu *et al*. may not form the basis for a rechargeable lithium-oxygen (Li-O_2) battery. Full text at http://dx.doi.org/10.1126/science.aad8689

Response to Comment on "Cycling Li-O_2 batteries via LiOH formation and decomposition"

Tao Liu, Gunwoo Kim, Javier Carretero-González, Elizabeth Castillo-Martínez, Paul M. Bayley, Zigeng Liu, Clare P. Grey

Lithium-oxygen (Li-O_2) batteries cycle reversibly with lithium iodide (LiI) additives in dimethoxyethane (DME) to form lithium hydroxide (LiOH). Viswanathan *et al*. argue that because the standard redox potential of the four-electron (e^-) reaction, $4OH^- \leftrightarrow 2H_2O + O_2 + 4e^-$, is at 3.34 V versus Li^+/Li, LiOH cannot be removed by the triiodide ion (I_3^-). However, under nonaqueous conditions, this reaction will occur at a different potential. LiOH also reacts chemically with I_3^- to form IO_3^-, further studies being required to determine the relative rates of the two reactions on electrochemical charge. Full text at http://dx.doi.org/10.1126/science.aad8843