

# Prof. Jun Hatazawa: boron neutron capture therapy (BNCT)—a star that needs the joint of multi-discipline knowledge

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## Expert introduction

Prof. Jun Hatazawa (*Figure 1*) is the Chairman of Department of Nuclear Medicine and Tracer Kinetics in Osaka University Graduate School of Medicine, Director of Department of Nuclear Medicine in Osaka University Hospital and Director of Osaka University positron emission tomography (PET) Molecular Imaging Center. His research interest is in the field of nuclear medicine, focusing on the development of integrated PET/MRI systems and other new neuroimaging technologies. He is appointed the President of Asia Oceania Federation of Nuclear Medicine and Biology (AOFNMB) from 2017 to 2020 and is engaged in the “Atoms for Medicine” project where nuclear energy is used for diagnostic imaging and radionuclide therapy for patients.



**Figure 1** Photo of Prof. Jun Hatazawa.

## Interview

**TRO:** *Why did you devote yourself into boron neutron capture therapy (BNCT)?*

**Prof. Hatazawa:** I'm fundamentally a nuclear medicine physician, working in the field of nuclear medicine diagnosis and therapy. BNCT includes external radiation oncology and radionuclide therapy. Usually in nuclear medicine therapy, radioisotope is given orally and intravenously. But in BNCT, the radioisotope is produced within the body, which is a bit different from the traditional nuclear medicine therapy. However, the important point is how to deliver the compound to the target tissue, which is a part of nuclear medicine and one of the reasons why I am involved in this work. Though radiation oncologists are mainly involved in the external radiation, I think BNCT needs knowledge and experience of radionuclide therapy as well.

**TRO:** *Were there any unforgettable moments or frustrations you have had while doing research on BNCT?*

**Prof. Hatazawa:** One of the major frustrations for me

is that BNCT itself needs big facilities and we need big budget to install facilities. It is not an easy investment for any medical centers.

Another big issue is that BNCT is a kind of integration of all science fields, containing not only biology, but also nuclear physics, chemistry and pharmacy. Wide range of aspects should be integrated to apply BNCT. Consequently, we have to work together with many scientists from different fields. Sometimes, the diversity of culture and background of different scientists may lead to opposite answers for one question. For example, nuclear physics and scientists would have different opinions from physicians on the amount of neutron. We as physicians need to consider the risk and safety issue from many angles, including the neutron production and specific boron carrier compound. It is our mission to watch out the risk during the therapy for patients.

Moreover, people may ask why the experiments could not go faster or why the improvement could not be seen in recent schedule. Maybe some experiments can be done very fast; nevertheless, we think carefully about the application to patients. The safety is our priority and we are not going to sacrifice safety in order to speed up the research progress.

After all, the therapy is still innovative and at high-risk in the meantime. We need the cooperation of experts from different fields and organizations and find the perfect balance.

**TRO:** *Could you briefly share the main points of your speech today?*

**Prof. Hatazawa:** My speech is mainly focusing on the estimation of boron-tin in the cancer as well as the normal surrounding tissue. We first developed the fluoroboronophenylalanine (FBPA) PET tracer for imaging of BPA distribution in the body almost 25 years ago. After that, with accumulation of knowledge, experiences and experiments, we succeeded to apply this technique to the patients. Recently, we had some major progresses in the production of FBPA. We have also proved the pharmacokinetics of FBPA and the correlation between FBPA PET tracer and BPA anti-therapeutic drug. And then we need to look out two major influential factors of BNCT. One is the side effect and the other is the selection of patients. De facto, it is not easy to strike the balance. It's important for us to apply BNCT to the appropriate patients and try to avoid the side effects at the same time. We need more and more appropriate imaging drug tracer and more innovative compound to deliver boron-tin in the cancer tumors or tissues specifically.

**TRO:** *As we know you were appointed the President of Asia Oceania Federation of Nuclear Medicine and Biology (AOFNMB), could you share with us its vision and development?*

**Prof. Hatazawa:** The primary aim of this organization is to promote the nuclear medicine practice in all over Asian and Oceania countries. In the current situation, the education and training of the human resources of nuclear medicine professionals are the most important part. Maybe the government of each country can provide budget to install nuclear medicine facilities in the hospital and maybe even better, the company of PET-computed tomography (PET/CT) or single photon emission computed tomography (SPECT) can install their products in the hospital. And then it left only one question: Who are responsible for the clinical daily practice?

One is nuclear medicine physicians and the others are nuclear medicine technologists, nurses and scientists who are specialized in analyzing data. All these human resources

are the most important and AOFNMB is responsible for the training and building the networking. We have launched Asian School of Nuclear Medicine Campus (ASNMCampus), which is a regional training center for general nuclear medicine all over Asia and Oceania countries.

For example, in Osaka, Japan, we have built up a center and invited young physicians, technologists, chemists, and nurses to Osaka. Forty physicians have finished the program. By looking into those successful cases, we understand the limitation of knowledge and experience that we are able to pass on in such a short period. And the term for the program ranges from one month to three months, but this is just the beginning of networking. After the program, attendees return to their home countries, and they can contact me or the center if they have some difficulties solving the problem. This kind of communication is important. This is one of the crucial reasons why we are spreading, training and creating resources in the field of nuclear medicine in Asia Oceania Region. Now, some of the international academic agencies are starting to support us to expand and promote the activities, such as the atomic energy use for medicine.

These activities, like BNCT, started from Japan and Taiwan. We are the leading countries of this very sophisticated and very science-integrated technology. But we will definitely need more such kinds of organizations for BNCT in the near future. It is good to promote nuclear medicine and BNCT to Asia and Oceania and build the networking. I didn't know any Chinese doctors before joining this project. Now we are all friends and work together. I believe what we are doing for human resources networking in AOFNMB is the most important.

**TRO:** *Do you have any suggestions for young physicians who would like to devote into BNCT?*

**Prof. Hatazawa:** For becoming doctors, we learnt very hard during high school period, especially in subjects like physics, chemistry and biology. After becoming a physician, our main duty has become clinical practice. However, we need to remind ourselves about those high school days, a period we had learnt many subjects. Those subjects are all scientific medicine, which are evidence-based knowledge. Both nuclear medicine and BNCT are good examples and that is the way we should go and follow.

I am a nuclear medicine physician and facing numerous kinds of diseases and numbers of patients every day. What keeps me standing is science (physics, chemistry,



**Figure 2** Photo with Prof. Jun Hatazawa after the interview.



**Figure 3** Prof. Jun Hatazawa: boron neutron capture therapy (BNCT)—a star that needs the joint of multi-discipline knowledge (1). Available online: <http://www.asvide.com/article/view/24043>

mathematics, computer science, etc.). This is very important. In some ways, we are physicians for patients. In the other hand, we are scientists. Therefore, I would like to ask young doctors to work not only as a good doctor but a good scientist as well (*Figure 2*).

### Interview questions

- (I) Why did you devote yourself into BNCT?
- (II) Were there any unforgettable moments or frustrations you have had while doing research on BNCT?

- (III) Could you briefly share the main points of your speech today?
- (IV) As we know you were appointed the President of Asia Oceania Federation of Nuclear Medicine and Biology (AOFNMB), could you share with us its vision and development?
- (V) Do you have any suggestions for young physicians who would like to devote into BNCT?

For more information, please check the interview video (*Figure 3*).

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