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## *Recalling My Experiences with Grants-in-Aid*

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It was 10 years after I graduated from the university that I changed my specialty from virus to cancer research. After taking a year for discussion on new research field, I decided to find possible oncogenic gene(s) in Rous sarcoma virus genome. At that time, however, there were hardly any resources suitable for my research objectives in Japan. The most applicable research materials were available in Dr. P.K. Vogt's lab in the US, so I introduced my project to him and received permission to work in his lab. In about two years, I succeeded in isolating temperature-sensitive (ts) mutants of an avian sarcoma virus and also transformation-defective (td) mutants, although many preceding researchers failed. Indeed, that success owed to the knowledge and experiences accumulated during my first 10 years of pathogenic virus research. Upon returning to Japan, I continued my work on viral oncogenes in the 1970s. Despite the fact that I was a relative newcomer to the cancer research, I applied for and received a Grant-in-Aid for Special Cancer Research to cover my research costs including buying equipment and materials. What had gave me a chance for successful application was that my research results to date had been recognized. This grant provided generous funding to me, though only 1/10 of similar grant support available in the US. Though the amount caused me to struggle to make ends meet, I was very appreciative to receive that Grant-in-Aid as it allowed me to make steady progress in preparing my lab.

Entering the 1980s, my viral oncogenic research advanced and bore fruit. It was just at the time when Japan's prime minister Nakasone established the government's "Comprehensive 10-Year Strategy for Cancer Control." Under it, priority was placed on advancing cancer research. Nevertheless, the Grant-in-Aid provided for this purpose was smaller than grants under the Specially Promoted Research category, but it still provided a goodly amount of funding, which enabled me to conduct genetic research on human carcinomas while pursuing my viral oncogenic work. I am deeply grateful to

Grant-in-Aid program for giving me the opportunity to advance my research and compile a body of results.

Reaching retirement age, I left the university and no longer applied for Grants-in-Aid. As the next step, I became a member of the Science Council of Japan, where I had deeply involved in the administration of Grants-in-Aid, particularly the specialized categories and sub-categories of basic research.

Funding for basic research is the most fundamental component of a research grant system, including the Grants-in-Aid for Scientific Research. This program is most heavily relied upon by Japanese researchers who carry out research based on their own free ideas. While these grants are awarded to advance the work of mid-career researchers, they are also used to support novel, high-risk research initiatives based on completely new concepts. The aim of this grant may also be to seed the next generation of scientific milestones, while many other grants support capable researchers to continue advancing their works or to give their results innovative applications. Precisely because such research is novel, it's often the case that no Grant-in-Aid sub-categories are provided to cover it. In my own experience, when I began my research on viruses, I had difficulty finding a Grant-in-Aid category to apply for. Even after a sub-category for virus research had been established, there was still none for cancer research. Cancer research funding started under the category special research and moved through Grant-in-Aid for Scientific Research on Important Areas and on Priority Areas en route to becoming an independent research domain. Generally, this is characteristic of how research evolves. Taking neuroscience for another example, it started in the medical area and later moved to a general, comprehensive area. This transition appeared to be natural for neuroscience researchers outside of those in the medical domain. Currently, genomic research is going through the similar kind of transition.

Turning to peer review, I believe it indispensable to the effective operation of the Grant-in-Aid program. In fact, it would not be an exaggeration to say that, within the context of the Grant-in-Aid system, it is peer review that guarantees the advancement of science. This notwithstanding, among the applications submitted under the Exploratory Research and Grants for

Young Scientists categories, there are those that are out-of-box but might make new breakthroughs. When reviewing such applications, their potential for making entirely new advances should be weighed heavier than their risk of failure. Funding such research should also be viewed from the perspective of fostering new generations of highly creative researchers.

Another essential thing that cannot be overlooked in advancing research is securing needed resources and materials. Besides mouse strains, cultured cells and bacterial strains, which were once hard to get, there was a large disparity between Japan and Western countries in the ready availability of isotopes, cell culture serum and experimental devices, even of those sold on the open market. To close this gap even marginally, cooperation among researchers with Grants-in-Aid for Scientific Research on Priority Areas could be very constructive. Now, the types of research resources needed are expanding to include genomic materials, genetic polymorphisms, protein structures, embryonic stem cells, and induced pluripotent stem (iPS) cells. As the recognition and need for such resources grows, organizations that handle and provide them are gradually being established. However, I'd like to see a greater domestic increase in such organizations. Furthermore, there is an ongoing need to pioneer new resources. In the future, projects conducted under the grant category Scientific Research on Priority Areas will need to play a role in supplementing the demand for developing new resources.

Finally, there are currently too many applications being submitted for Grants-in-Aid. Accordingly, too much effort is not only being put into preparing the applications but also into evaluating and screening them. I'm wondering if it is not possible to reduce the number of applications in favor of a little more money being awarded per project. I also wonder if it wouldn't be possible to use Grants-in-Aid is such a way as to create an environment conducive to allowing postdoctoral researchers and research associates to concentrate on their work. In my opinion, they shouldn't be allowed to apply for grants until they are ready to apply for principal investigators. And once they succeed in grant application, they should be recognized as being independent investigators.