ＰＦにおける構造生物の現状と将来：
--ハイスループット構造解析のための基盤整備と
目的指向型構造ゲノム科学の展開-------

Structural Biology Program at the Photon Factory
Key technologies for high throughput structure determination and target-oriented structural genomics

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The Photon Factory (PF) is an advanced second-generation synchrotron radiation (SR) facility of the KEK in Japan where a new structural biology group was created in May 2000. The group aims to carry out a strong in-house structural biology research program, and develop and operate high-throughput X-ray protein crystallography beam lines and associated facilities. It now has a dedicated laboratory building for recombinant DNA experiments, protein purification, crystallization, structural analysis, and biological characterization. During the last 18 months, the PF and Japanese universities have been proposing a network of structural biology consortia to participate in the national effort of determining protein structures with emphasis on medical, pharmaceutical and other industrial applications. There are already several large scale structural genomics projects funded by the MEXT, METI, and MAFF in Japan. Notably the RIKEN is making a major effort to determination 2500 representative structures in the protein structure space. In contrast, the proposal of the university consortia aims at target-oriented structural genomics with a strong emphasis on structure-function relationships. Each consortium will consist of X-ray protein crystallography, NMR, and bioinformatics groups tightly coupled with those specialized in medical, pharmaceutical and biological sciences that share the same biological interests in their pursuit of structure-function relationships as well as high-throughput R&D.

Together with five universities and four institutes, the PF group is proposing a SG project on protein transport and post-translational modification of proteins, as one of the consortia mentioned above. The project includes systematic structural analyses of proteins and complexes involved in the transport and oligosaccharide modification processes, as well as development of key high-throughput techniques using SR. The final goal is to develop a technology to produce medically and/or biologically active human glycoproteins using lower organisms such as yeast. Some examples of the protein structures involved in protein transport will be used to demonstrate the approach of our proposal. At the end of the talk, a next generation synchrotron radiation using the energy recovery linac will be briefly discussed as a future direction of structural biology research.