**Regional Project Concept Template – version en inglés**

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| **Region:** | Latinoamerica |
| **Regional/Cooperative agreement** (if applicable) |  | **Priority no. given by regional/cooperative agreement** (for concepts proposed under the auspices of regional cooperative agreements) |  |
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| **Title** | Optimization of SPECT / PET & Cyclotron technology in the early diagnosis of chronic-degenerative diseases in developing countries |
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| **Field of activity** | Human Health |
| **Names and contact details of project counterparts and counterpart institutions****(starting with the main counterpart)** | Francisco Osvaldo Garcia Perez Instituto Nacional de Cancerología |
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| **Analysis of regional Gap/problems/needs** | In Mexico and Latin America, the main causes of death are related to chronic degenerative diseases such as cardiological ischemic disease, oncological and neurogenenerative.One of the problems we face in this type of pathologies is that they are mostly identified in advanced stages, the delay in studies extension, inappropriate assessment of response to therapy, an inadequate infrastructure for equipment PET and overload the only research in the radiopharmacy area has slowed scientific development allow cover the needs of the country.The installation of the first cyclotron at the governmental level will allow not only the increase in the attention in the number of patients that could be treated, it also allow to the neighboring institutions get this type of technology, it would also represent the creation of a network composed of national institutes in the field of molecular imaging.The creation of a project of this type goes hand in hand with national policies in relation to the fight against cancer and early detection of chronic degenerative diseases.We do not have precedents in the promotion of nuclear techniques for the early diagnosis of oncological, cardiological and neurological diseases, but due to the worldwide increase of this tool as a cornerstone of decision-making, we consider an imperative need the implementation of a project that promotes its development. |
| **Why should it be a regional project?** | Currently the Institute has the infrastructure that enables support a large population of the country and part of Central America in the field of PET studies and therapies with radionuclides, as well the exchange of knowledge among states members of the region, will optimize resources, accelerate technological development and the creation of human talent.  |
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| **Stakeholder analysis and partnerships** | Instituto Nacional de Cancerología - Equipment – PatientsUniversidad Nacional Autónoma de México-(Cyclotron Unit - Radiopharmacy) – TrainingInstituto Nacional de Investigaciones Nucleares – Molecules developmentInstituto Nacional de Cardiología – Patients.Instituto Nacional de Neurología y Neurociencias - Patients |
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| **Overall objective (or developmental objective)** | Promote and develop the production and use of PET radiopharmaceuticals and biomolecules for diagnostic and therapeutic purposes.This project will contribute to a wider coverage in the care of patients who require this type of study.It will also allow the personalization of the therapy through the use of specific radiopharmaceuticals that evaluate of the biological behavior of a neoplasm.The development of specific biomolecules also help to use radionuclides emitting beta or alpha particles in order to have a therapeutic effect.In addition, this project has the purpose of training human resources to acquire competences that allow the resolution of problems focused on potential risks in a cyclotron-radiopharmacy unit. |
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| **Analysis of objectives** | 1. Training of personnel for the optimization in the handling of cyclotron and radiopharmacy.
2. Creation of new radiopharmaceuticals for diagnostic and therapeutic purposes.
3. Training in the use of therapeutic radiopharmaceuticals for clinical use.
4. Development of research projects that allow the expansion of new applications of radiopharmaceuticals.
5. Production of radioisotopes obtained in solid targets.
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| **Role of nuclear technology and the IAEA** | The technique used would be the cyclotron-type particle accelerator as well as PET / CT and myco PET / SPECT / CT equipment with which INCan already has.The first phase of the project estimates the development of at least 4 radiopharmaceuticals for oncological use, 2 Cardiological and 2 Neurological, these radiopharmaceuticals obtained by the Radiopharmacy and cyclotron will allow an early detection of responding patients and not responding to chemotherapy schemes, patients with ischemic heart disease early that could be intervened early delimiting the disease and avoiding cardiac incapacitating events, and in the neurological field biomolecules able to detect neurodenerative disease in incipient phases.Unlike other technologies such as SPECT (single photon emission tomography) or conventional gammagraphy, radioisotopes for PET have physical characteristics that provide better spatial resolution.Other non-nuclear techniques, such as magnetic resonance imaging, do not allow the evaluation of specific metabolic pathways and the expression of receptors that could also serve as a support to administer radiopharmaceuticals for therapeutic purposes.Before carrying out clinical trials in humans, the development of these molecules would be evaluated in animal models for which we would use a microSPECT / PT / CT, this allows to evaluate biodistribution, evaluate the kinetics of radiotracers and even evaluate the therapeutic effects of some radionuclides.We hope that the IAEA will support, through training, the personnel in charge of the operation through scientific visits, scholarships, workshops and, if possible, the infrastructure to carry out the synthesis of new molecules. |
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| **Project duration** | 4 yearsStart date January 1, 2020Completion date December 31, 2023 |
| **Requirements for participation** | *PET/CT**SPECT/CT*  Radiopharmacy UnitCyclotron |
| **Participating Member States** | *List the Member States expected to participate in this project that meet the requirements established above. Indicate the role of each Member State in the project.**Country: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Role:*

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| *Chile*  | *X* Resource (provides knowledgespecialized.*X* Recipient (receives knowledgespecialized |
| *Colombia*  | *X* Resource (provides knowledgespecialized.*X* Recipient (receives knowledgespecialized |
| *Costa Rica* | *X* Resource (provides knowledgespecialized.*X* Recipient (receives knowledgespecialized |
| *México* | *X* Resource (provides knowledgespecialized.*X* Recipient (receives knowledgespecialized |
| *Uruguay*  | *X* Resource (provides knowledgespecialized.*X* Recipient (receives knowledgespecialized |

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| **Funding and project budget** | Four years (Cycles 2020-2021 and 2022-2023):• 8 scholarships (4 years) 86,400• 4 Scientific visits (2 years) 33,600• 2 expert mission (1 year) 10,000•2 workshops (1 per year) \* 5000• 150,000 equipment (synthesis modules) |
|  | Euro | Comment |
| *Government cost-sharing* | 1,500,000 | (to be sent to the IAEA) |
| *Counterpart institution(s)* |  |  |
| *Other partners* |  | Who?: |
| *IAEA Technical Cooperation Fund (TCF):* | *Fellowships / Scientific visits / Training courses/ Workshops* | 86,40033,6005000 |  |
| *Experts* | *10,000* |  |
| *Equipment* | *150,000* |  |
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| *TOTAL* | *285,000* |  |