Comparative biomolecular and genetic characterization of human and animal bone tumors. Animal and human models compared for the identification of new innovative diagnostic and therapeutic aids also with the support of the natio animal and human cancer registry system

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Área: Ciências da Vida
Linhas de Pesquisa: Applied Genetics and Biomolecular Comparative Veterinary; Human and Biotechnology Group

Breve descrição das atividades de pesquisa

Our ambitious and innovative goal will be to try to identify genomic mutations, biomolecular properties and "immune response pathways" already known for this form of cancer that affects humans and animals with similar frequency. This project combines comparative genetic expertise, proteomics, immunology, and computational biology to try to investigate the biological aspects of this neoplasm, in order to arrive at a more complete biomolecular characterization of the same. The project will involve the use of cuCng-edge instruments for the study of animal and human bone tumors.
Most of the sophisticated equipment necessary for the realization of this proposal is already available in the UNIPG laboratories, laboratories that are fully equipped with the necessary equipment for genetic and biomolecular investigations, as well as for those of an immunological and anatomical-histomorphological type (Ion Torrent sequencing, Illumina, Real Time PCR Viia 7, TMA Master system, optical and fluorescence microscopy, multifunctional microplate readers, static and flow cytometry, array techniques (i.e. a-CGH), computers and software dedicated to each specific application). On the basis of one of the latest reports on cancer by the European Commission in which cancer is set as one of the primary objectives of the new Horizon protocols, to the question "Why cancer?", it is reported: because it represents one of the five major social challenges that the Europe is facing; because it is predicted that by 2035 the number of new cancer cases in Europe will increase by 25%; because Europe must act so that prevention and diagnosis, treatment and cure, survival rates and quality of life after cancer are better and fairer. This certainly innovative and multidisciplinary proposal (veterinary medicine, human medicine, biotechnology) fits perfectly, sometimes anticipating them, the five areas of Community intervention between now and 2030 in terms of understanding, prevention, diagnosis and treatment, quality of life, fair access it could help develop the basis for developing EU-wide research programs that identify (poly)genic risk scores and promote innovative human and animal medicine approaches towards these frequent

forms of bone cancer.

Impacto das pesquisas desenvolvidas para a sociedade e ciência

The proposed comparative study will allow to obtain new genetic and biomolecular profiles of these neoplastic diseases, simultaneously comparing the scientific data obtainable using the animal and human model in the immunological, biological, genetic, and biomolecular comparison of the various bone tumors and the related metastatic diffusion processes. The potentially obtainable results could make it possible to achieve unique scientific results that can also be used for the determination of new international guidelines for the early and specific diagnosis of bone tumors and of human and animal osteosarcoma (e.g., liquid biopsy, etc.), as well as for the identification of new highly specific and effective therapeutic protocols.
We will thus be able to obtain new knowledge on the somatic mutations typical of Osteosarcoma and other bone tumors, including those characterizing the frequent metastatic processes (expression of the mutational evolution of the related genes, correlation between exosomes and pre-metastatic niches) useful for the identification of new markers to discover new, more effective treatments and, in the meantime, verify whether the same mutations are also detectable in circulating tumor DNA (ctDNA), a potential non-invasive prognostic marker.
The genetic and proteomic studies we propose could therefore identify sensitive and specific markers that would allow for an early diagnosis, increasing the possibilities of controlling and curing bone neoplastic disease.