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Reflexión

USE OF 22-NaCl AS A THERANOSTIC TOOL FOR CANCER : A PROPOSAL

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The diagnosis and treatment of cancer has been one of the most important challenges in the field of health-related sciences. So far diagnostic imaging (CT, MRI, PET) has been of great help; however, although treatments with Radio and Chemotherapy (not excluding surgery) have advanced a lot in recent years, there are still obstacles for early diagnosis and treatment, in addition to difficulties in follow-up due to the damage suffered by the tissues. More recently, with the development of Nanomedicine, progress has been made in the treatment of some cancers with good results. In this aspect, one of the most exploited phenomena of nanomedicine is the so-called Enhanced Permeation and Retention (EPR), which causes some nanoparticles to be captured by the cell via endocytosis, with a long intracellular permanence due in part to poor lymphatic drainage. In addition, among the most striking features of the cancer cell is its high metabolic rate, in part due to an unusual synthesis of insulin-independent transmembrane glucose transporters (GLUT-1 and GLUT-8, as well as SGLT 1-2).Among the recently developed nanoparticles (NPs), the mesophoric SiO2 capable of transporting in its pores inert or biological material to the cell, escaping spontaneous agglutination by means of ether-crown functionalization, interior of thewhich allows its loading with 22-NaCl, presents several virtues: a) Its binding to a functionalized SiO2-NP allows it to escape plasma agglutination. b) When conjugated to a SiO2-NP it increases the possibility of being endocytosed. c) Once released into the cell it can exert a dual effect: on the one hand the radiant action, and on the other hand the osmotic effect. d) SiO2-NP loaded with 22NaCl, allows the half-life of the metal to persist for two weeks; in comparison with the native 22 NaCl whose half-life is 2.6 years. Thus, it can be said that SiO2/22NaCl NP can be used as a diagnostic tracer in PET, as well as therapy due to its dual effect, in addition to allowing a follow-up of at least one month without the use of a new tracer, using the same equipment employed with 18-FDG. Other advantages include its commercialization by prestigious laboratories, easy functionalization by mechanical means, it does not require the use of cyclotron, stability at room temperature for 2 years and preparation of the dose on demand, with minimum tracer waste. On the other hand, following the appearance of COVID-19, a Chitosan nanoparticle loaded with Digoxin was created, whose best known effect is the blocking of the Na/K pump, with the same characteristics as EPR and which would prevent the escape of 22-Na by transcytosis, increasing the permanence of the metal inside the lysosome. Thus, once cell death is achieved, the rest of the SiO2/22NaCl complex would be excreted via urine (according to data in mice) in 91% after 2 weeks and its total elimination in 1 month. In this sense, the initial plan would be aimed at patients with little or no therapeutic response as "compassionate therapy (International Bioethics Committee). Thus, the use of nanoparticulated 22-NaCl/SiO2-NP as a

theranostic tool in cancer is proposed.

References

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