

From experimental research to clinical trial in the treatment of complications of radiotherapy by stem cells

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Abstract

During radiotherapy, the radiation beam can affect healthy tissues in the field of irradiation, even if it specifically targets the tumor, causing sequelae in 10% of patients that can occur up to 20 years after treatment. In the abdominal-pelvic area, this results in severe pain and extremely disabling functional disorders of the bladder and bowel. Current treatments are mainly symptomatic, and some patients do not respond. For several years, Institut de Radioprotection ET Surete Nuclearie has been conducting research on cell therapy strategies using Mesenchymal Stromal Cells to repair radiation-damaged tissue. This experimental research, which is currently being carried out on different animal models, indicates that in the abdominal-pelvic area, Mesenchymal Stromal Cells stimulate the repair process after irradiation. They have thus made it possible to offer this treatment in a compassionate setting to human victims of the radiotherapy accident that occurred at the Jean Monnet Hospital in Epinal (Vosges, France). Four patients suffering from severe pelvic side effects due to excessive radiation dose after conformal radiotherapy for prostate adenocarcinoma received intravenous injections of allogeneic mesenchymal stromal cells. For treated patients, mesenchymal Stromal Cell therapy was effective on pain, diarrhea, hemorrhage, inflammation, fibrosis and limited fistulization. No toxicity was observed. We are now starting inclusion in a clinical research protocol of phase 2, for patients with post-radiation abdominal and pelvic complications who have not seen their symptoms improve after conventional treatments (NCT 02814864, PRISME). Patients included in this trial will receive injections of allogeneic Mesenchymal Stromal Cell (from intra-family donors) and will be followed for 12 months at Hospital St-Antoine (Paris, France). At the end of this period, if the efficacy of the treatment is proven, a phase III trial including a larger number of patients over a longer period will be used to confirm the therapeutic properties of this treatment.

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Biography

For 25 years, A Chapel has been developing gene and cell therapy using non-human primates, immune-tolerant mice and rats to protect against the side effects of radiation. He collaborates with clinicians to develop strategies for treatment of patients after radiotherapy overexposures. He has participated in the first establishment of proof of concept of the therapeutic efficacy of Mesenchymal stem cells (MSCs) for

the treatment of hematopoietic deficit, radiodermatitis and over dosages of radiotherapy. He has contributed to the first reported correction of deficient hematopoiesis in patients (graft failure and aplastic anemia) thanks to intravenous injection of MSCs restoring the bone marrow microenvironment, mandatory to sustain hematopoiesis after total body irradiation.

