AGENCE NATIONALE DE LA RECHERCHE

Presentation of the funded projects in 2010 for the « Finalised Research on Stem Cells RFCS » Programme

Programme RFCS

Edition 2010

Project title	**CAPSULE** – Encapsulation of paracrine factors from gingiva-derived mesenchymal stem cells for therapeutic use
Résumé	Mesenchymal Stromal Stem Cells (MSCs) have been studied in many clinical trials in regenerative medicine, due to their multipotency and, more importantly, to their stromal properties. They are indeed able to release a large array of growth factors, cytokines, and chemokines with multiple trophic, anti-inflammatory, antiseptic and analgesic effects. Due to the role of these factors with an essentially paracrine action, these cells are now often viewed as drug-equivalents. Most MSCs currently used in clinical trials are derived from bone marrow or from adipose tissue. A new source of MSCs was only recently discovered and is just undergoing early exploration. Gingiva-derived MSCs (gMSCs) have indeed progenitor capabilities, which provide the gingiva with unique embryonic-like wound healing properties, namely without scarring nor fibrosis. Those properties may be explained by a specific ability to produce key factors involved in extracellular matrix remodeling. In view of the growing interest in the potential application of MSCs including gMSCs and their secretions for tissue repair, current challenges are their production in sufficient quantity and quality suited to their therapeutic use, and their delivery mode. Our project is aimed at: 1. optimizing the secretion of paracrine factors by gMSCs through culture under low oxygen concentration (hypoxia) 2. designing and validating a standardized production protocol based on the establishment of an immortalized gMSC line 3. proposing an original galenic presentation allowing for cutaneous administration and for controlled release of gMSC-derived paracrine factors. The project involves groups with complementary technical, scientific and industrial expertise: specialists of cell biology, physical chemistry and cell therapy, from three academic laboratories (Paris Descartes University ; INSERM ; Collège de France) and one bio-therapy corporation (ScarCell Therapeutics). It combines fundamental research with industrial development, likely to allow for the commercialization of a biologically active

	product aimed at improving the wound healing process through manipulation of tissue remodeling pathways.
Partners	Université Paris Descartes (UPD) Laboratoire Chimie de la Matière de Paris - UMR7574 - N. NASSIF Inserm U972 – J.J. LATAILLADE ScarCell Therapeutics – L. LALLEMENT
Coordinator	Bernard COULOMB - Université Paris Descartes (UPD) bernard.coulomb@parisdescartes.fr
ANR funding	500 397€
Starting date and duration	March 2011 - 24 months
Cluster label	Medicen

Programme RFCS

Edition 2010

Project title	**GERMPLAST** – Germinal stem cells and progenitors: characterization and reprogramming
Résumé	Germinal stem cells (GSC) maintain spermatogenesis in testis throughout the reproductive life of adult mammals. In vitro, GSC/progenitors can reprogram spontaneously to a pluripotent state, and we have shown in mouse model that germinal progenitors can be reprogrammed in vivo in functional stem cell. The present project aims to characterize germinal stem cell and progenitor from adult male, which could constitute a new source of stem cells for cell therapy. Our topics are to (i) identity phenotypic markers allowing in human to purify populations highly enriched in GSC and populations of spermatogonial progenitors (ii) to develop methods of culture in order to amplify human GSC in vitro, (iii) to study the reprogramming events occurring in GSC and their progenitors in human and mouse models. We will seek to improve the efficiency of the reprogramming in vitro using small chemical molecules, and to study whether the tumor suppressor gene p53 and p21WAF1/CIP1 can act as roadblocks to the reprogramming of the germinal progenitors and GSC. This project deals with the topics 1 (Improvement of purification amplification and conservation of stem cells) and 2 (Reprogramming of somatic and germinal stem cells) of the present grant call. The major novelty and force of our proposition is the choice to combine inside a same project human and mice models and approaches at biochemical, cellular and genetic levels to the unravelling of the reprogramming of the stem cells and progenitors in the germinal lineage. Our project represents a joint effort gathering research and clinical teams from different institutions (CEA-INSERM-APHP-University Paris V) in Paris. One of the major aims of this project is to create strong interactions between these research teams, and to allow connections with french clinical departements of reproduction like the Centre d'Etude et de Conservation des Oeufs et du Sperme from Cochin Hospital in order to translate basic research from the laboratory bench to the clinic for cell therapy development. Those studies should

	contribute to determine whether germinal stem cell and progenitors could be an alternative source (i) for the generation of patient-specific histocompatible pluripotent stem cells, but also (ii) for the treatment of infertility by testicular transplantation Deciphering the mechanisms regulating the germinal plasticity could also benefit to the improvement of the reprogramming of other models like the iPS and determine whether the different reprogramming processes share some common molecular pathways.
Partners	CEA/DSV/IRCM/SCSR/LGAG SHEBR/APHP – J.P. Wolf
Coordinator	Pierre FOUCHET - CEA/DSV/IRCM/SCSR/LGAG pierre.fouchet@cea.fr
ANR funding	495 304€
Starting date and duration	March 2011 - 36 months
Cluster label	

Project title	**GPiPS** – Generation of induced-pluripotent stem (iPS) cells from normal and retinitis pigmentosa patients for phenotype screening of photoreceptor differentiation and studying photoreceptor disease mechanisms.
Résumé	The retina contains specialized neurons, photoreceptors that convert light signals into electric signals, further transmitted to the brain by different neurons. Any defect involved in these processes of phototransduction and transmission in the retina lead to visual impairment. Inherited retinal degenerations, particularly retinitis pigmentosa (RP) associated with the loss of photoreceptors is the leading cause of blindness or visual impairment in the young- adult population. While clinical trials based on gene therapy are imminent for few genetically characterized sub-groups of patients, the overall genetic heterogeneity implies that diverse therapeutic approaches need to be developed. An alternative approach would be to transplant replacement cells thereby returning visual function to the retina. In this context, the recent discovery of direct reprogrammation of somatic cells to an embryonic stem (ES) cell-like pluripotent state, known as induced pluripotent stem (iPS) cells, offer a great potential use in regenerative medicine. Furthermore, the generation of iPS cells from an individual RP patient would enable the large-scale production of the cell types affected by the patient's disease. This derivation of patient-specific iPS cells might be equally useful for disease-related research, such as disease modelling and drug discovery. The objective of this proposal will be to develop pre-clinical studies required for the development of an iPS cell-derived cellular therapy for the treatment of a number of retinal diseases. We will attempt (i) to reprogram keratinocytes of healthy and RP patients into iPS cells, (ii) to develop specific iPS reporter cell lines allowing the efficient generation and isolation of photoreceptor precursors from iPS cells and (iii) to study photoreceptor dystrophy mechanisms using mutated iPS cells from RP patients. To reach this goal, we will take advantage of the combined expertise of partner 1 (Institut de la Vision / INSERM) in photoreceptor differentiation, and of partner 2 (ISTEM / INSERM) in human ES cells field to identify means to direct pluripotent stem cells to photoreceptor fates. In addition, we shall

attempt to generate new retinal models of RP, with the participation of partner 3 (CIC 503 of the CHNO des Quinze-Vingts), which specifically focuses on retinal diseases and set up phenotypically and genetically well characterized cohort of RP patients. The use of iPS cells offers the possibility to create customized iPS cell lines to monitor the efficiency of any retinal differentiation protocol. We will construct iPS reporter cell lines that fluoresce depending on commitment into the general lineage of neural retina and into photoreceptor lineage. This cell line will express a "fluorescent reporter cassette" that consists of eCFP, eYFP and Cherry fluorescent reporter respectively under the control of promoter specific for neural retinal progenitor identity (Chx10), for post-mitotic photoreceptor precursors (Nrl) and for differentiating rod photoreceptors (rhodopsin). These [Chx10p-eCFP / Nrlp-eYFP / Rhop-Cherry]-iPS cell lines will be also extremely useful to purify by FACS the cells of the desired phenotype and therefore to obtain a homogenous cell population for subsequent molecular characterization and in vitro retinal integration studies. We will generate iPS cell lines from keratinocytes from healthy and RP patients (two identified RHO and CRX mutations in our proposal). The use of customized iPS cell lines from RP patients, will allow us to decipher cellular and molecular mechanisms underlying photoreceptor dystrophy in specific RP diseases. We aim to identify relevant cellular biomarkers for photoreceptors dystrophies by comparing native and mutant iPS cell lines by different approaches (transcriptomic analysis, FACS sorting,).

Partners	U 968 INSERM U 861 - ISTEM – C. Monville CIC 503 – I. Audo
Coordinator	Olivier Goureau - U 968 olivier.goureau@inserm.fr
ANR funding	450 580€
Starting date and duration	March 2011 - 36 months
Cluster label	

Project title	**HD-SCT** – Pre-clinical assessment of pluripotent stem cell therapy for Huntington's disease
Résumé	Huntington's disease (HD) is a devastating monogenic disease. There is no known treatment for this pathology whose symptoms include progressive motor, psychiatric and cognitive dysfunctions, associated with a massive degeneration of the striatal medium size spiny GABA neurons. Most of HD patients die within 15-18 years after the onset of symptoms. Recent clinical findings have shown that HD would partially respond to treatment by substitutive cell therapy using grafts of fetal origin. However, this grafting technique is limited by logistic and ethical problems that restrict considerably the number of patients that may benefit from it. Potent alternative sources of cells that would be easily accessible to surgeons are therefore urgently needed. Finding such cells is a crucial step towards the development and validation of an efficient clinical application in patients. Because of their extended differentiation potential and their unlimited capacity to self-renew, human pluripotent stem cells are in theory the best candidate cells to be grafted. In fact, we have recently demonstrated that human and monkey embryonic stem cell differentiation can be directed towards striatal neurons both in vitro and in vivo after transplantation in HD rats. This suggests a possible therapeutic potential of hESC for HD. However, a thourough pre-clinical assessment of such pluripotent stem cell-derived grafts is required to ascertain the applicability of this therapeutic strategy in HD patients. The goal of the HD-SCT (HD-Stem Cell Therapy) proposal is to build on recent achievements in stem cell biology and clinical trials using fetal neural cells in HD patients to evaluate the therapeutic potential of pluripotent stem cells in a pre-clinical setup (allograft) and to develop the protocols needed for the establishment of banks of clinical-grade, ready-to-use, and safe batch striatal progenitor cells. Fetal graft therapy currently used in HD clinical trials across Europe has greatly benefitted from the results obtained using primate models of HD. Since human striatal grafts mature too slowly to be appropriately assessed in rats, allografts in HD monkeys were the model of choice. Moreover, motor and cognitive behavioral tests are more relevant in primate models than in rodents. In addition, allografting better mimics "clinical transplantation" scenario

	with regard to immune response of the host to the graft. Accordingly, the first aim of HD-SCT is to assess the therapeutic potential of striatal cells derived from monkey-ESs and iPSCs in a monkey model of HD. Neuro-imaging will be used to monitor graft survival and cell maturation and the potential correction of cortical hypometabolism through striatal repopulation. Behavioral tests aimed at quantifying motor and cognitive deficits reminiscent HD pathology will be used to measure the potential benefit associated with stem cell transplantation. Current differentiation protocols that rely on mouse feeder cells or serum containing media are not compatible with future clinical application. Consequently, HD-SCT's second aim is to adapt current research-grade differentiation protocols to clinical-grade standard and address the issue of the banking of stem cell derived striatal graft. Furthermore, HD-SCT will address the issue of the generation of safe transgenic pluripotent stem cell lines. Accordingly, HD-SCT's third aim is to test "meganuclease-driven homologous recombination" technology as a way to produce safer transgenic pluripotent stem cell lines for human use. HD-SCT expected impact is ultimately to accelerate the development of clinical applications of human pluripotent stem cells for the treatment of Huntington's disease. To achieve this, HD-SCT relies on a small consortium of three experienced partners in the field of stem cell biology and its pre-clinical/ clinical application, with balanced and complementary skills highly relevant to the subject of the proposal.
Partners	Inserm/UEVE UMR861, I-STEM CEA/CNRS URA2210, MIRCEN – P. HANTRAYE Cellectis SA – D. Sourdive
Coordinator	Anselme Perrier - I-STEM aperrier@istem.fr
ANR funding	617 340€
Starting date and duration	March 2011 - 36 months
Cluster label	Medicen

Project title	**hiPS-DC-testing** – human iPS-derived dendritic cell models for the development of in vitro based alternatives for sensitization testing
Résumé	The development of « in-vitro based alternatives for sensitization testing » is becoming of primary importance since all the tests currently realized on the animals will be prohibited in 2013. Therefore, it is essential to develop new alternative of animal model tests. Especially regarding allergic, irritative and inflammatory reactions in context of the use of perfumes and cosmetics taking into account frequency of use of these products. For companies, the absence of a viable alternative will greatly jeopardise the future development and testing of new substances, penalising their arrival on the market. Dentritic cells (DCs) are the best cellular model for testing inflammatory reactions, in particular concerning skin inflammation. The usual source for generating human DCs are blood monocytes that can be differentiated in vitro into DCs using cocktails cytokines. However, there are several critical limitations to the use of monocytes as the source for human DCs for in vitro industrial drug testing: the need to use blood-derived products from individual donors that introduces variability, the number of available monocytes, which are in small quantities and with a limited lifetime, and their potential to differentiate into DCs that depends on the blood donor. We propose the differentiation of human induced pluripotent stem cells (hiPS) as a reproducible source to generate high quality and functional DCs suitable for in vitro toxicity testing (hiPS-DC) and industrial applications. This need is well illustrated by private and institutional initiatives that encourage the establishment of international research programs focused on setting up in vitro models. It is important to note that so far, none of these in vitro models use the advantages of human stem cells as the reproducible source of cells of interest. Main advantages will be to dispose of a reproducible and unlimited source of stem cells to generate DC models in a standardized manner for industry. The presence in the consortium of 3 well experimented teams in stem cells differentiation (UMR CNRS) and DC manipulation for clinical use (UTCG CHU) and industrial applications (ImmunoSearch) makes this proposal highly attainable. Our preliminary results establish the feasibility of DCs

generation from human iPS. Human iPS clones have been generated by reprogramming human adipose-derived stem cells and we have recently shown that these cells have the potential to differentiate into DCs and of particular interest DC with epidermal-like phenotype. Concurrently, human DC from blood-derived monocytes are routinely generated at the UTCG platform with suitable quality controls to assess for DC functionality. Main goals will be to optimize generation of hDCs from hiPS cells and to set up a standardized production process towards a first industrial application already found through partnership with the ImmunoSearch company. Main steps of the program will be: i) Selection of a hiPS clones (from different genders and HLA genotypes) displaying the highest DC differentiation capability and optimization of the skin-like DC differentiation protocol, ii) Establishment of a standardized production prototype with suitable quality controls of iPS-DCs, iii) Validation of production process for industrial use. Regarding the scientific knowledge, this cell model will be a powerful in vitro model to investigate the early steps of dentritic cell development in human. Regarding the exploitation of project results, ImmunoSearch will be in charge to validate the hiPS-DC prototype at the industrial level. Then, to valorise the exploitation of project result. The Consortium agreement will take into account the relative contribution of each partner for a future exploitation by ImmunoSearch company and by other companies interested in a such model. Taken together these items are perfectly fitted with main objectives of the present ANR call for project and particularly with the axis 4.

Partners	UMR6543 -Cellules souches et differenciation Unité de Thérapie Cellulaire et Génique – A. DOGLIO ImmunoSearch – H. Groux
Coordinator	Christian DANI - CNRS-IBDC dani@unice.fr
ANR funding	347 724€
Starting date and duration	March 2011- 24 months
Cluster label	

Project title	**Liv-iPS** – Modeling and therapeutic approaches of liver inherited disorders with patient-specific iPS cells
Résumé	La transplantation d'hépatocytes est maintenant une alternative à la greffe orthotopique du foie pour le traitement des maladies métaboliques sévères. Cependant la pénurie d'organes transplantables s'aggrave et les hépatocytes ne peuvent être amplifiés in vitro. Il y a donc un réel besoin de trouver des sources alternatives de cellules telles que les cellules souches qui pourraient être amplifiées puis différenciées en hépatocytes in vitro. Les cellules souches humaines pluripotentes induites (iPS) par reprogrammation de cellules somatiques sont une source attractive de cellules souches puisqu'elles sont capables à la fois de proliférer indéfiniment in vitro et de se différencier en un grand nombre de tissus adultes. De plus ces cellules sont faciles d'accès, ne posent pas de problèmes éthiques et peuvent être dérivées de patients. Deux types d'applications distinctes peuvent être envisagées selon l'origine des cellules iPS. - Les hépatocytes dérivés d'iPS d'individus normaux peuvent être utilisés pour des banques de cellules en vue d'applications en médecine régénérative. La génération d'hépatocytes à partir d'iPS d'individus adultes sélectionnés faciliterait la constitution de banques de lignées cellulaires de génotypes connus, offrant aux patients une relative compatibilité génétique et impliquant une immunosuppression minimale lors de la transplantation. Ces cellules pourraient aussi être utilisées dans des foies bioartificiels pour le traitement transitoire des insuffisances hépatiques aiguës. - Les hépatocytes dérivés d'iPS d'individus atteints de maladies monogéniques : la thérapie génique/cellulaire spécifique par patient est la thérapie idéale pour éviter un rejet cellulaire et la nécessité d'une immunosuppression lorsque l'expression à long terme du transgène est requise, ce qui est le cas pour la correction génétique des maladies métaboliques du foie. Ainsi, outre la différenciation en hépatocytes normaux, nous nous focaliserons sur deux maladies métaboliques pour lesquelles nous développons des approches de thérapie génique/cellulaire ex vivo :l'hypercholestérolémie familiale de type IIa, due à une mutation dans le récepteur des

lipoprotéines de faible densité (LDLR), résulte en l'élévation anormale du taux de cholestérol conjugué aux LDL (LDLc). En effet, seuls les hépatocytes peuvent endocyter et dégrader les LDLc, via le LDLR. Les patients hétérozygotes (1/500) sont traités, avec une efficacité variable, par une combinaison de médicaments, dont les statines, et ont des accidents cardiovasculaires dès 40 ans. Les patients FH homozygotes (1/106) ont des problèmes cardiovasculaires sévères dès l'enfance. Seule l'aphérèse est efficace, mais agressive, pour diminuer leur taux de cholestérol mais, en dépit du traitement, ces patients décèdent d'accidents cardiovasculaires dès 50 ans. L'hémophilie B, due à des mutations du gène codant le facteur IX (FIX) de la coagulation, situé sur le chromosome X, est une maladie hémorragique de prévalence 1/60 000 chez les garçons. La gravité de la maladie est inversement corrélée à l'activité résiduelle du FIX. Une augmentation de 5% de cette activité résiduelle suffit à transformer une hémophilie sévère très invalidante en hémophilie modérée avec une qualité de vie bien meilleure. Un traitement substitutif avec du FIX recombinant ou purifié du plasma est disponible, mais très couteux et contraignant. De plus ce traitement peut entrainer l'apparition d'anticorps anti-FIX neutralisants. Nos objectifs scientifiques sont d'établir la validité 1) de nos conditions de différenciation des cellules iPS humaines et simiennes en hépatocytes différenciés. 2) de leur utilisation dans notre approche de thérapie génique ex vivo évaluée dans un modèle primate proche de l'homme. Les objectifs économiques sont de proposer aux Partners industriels des hépatocytes différenciés dérivés de cellules iPS normales et pathologiques pour le criblage de médicaments.

Partners	InsermU972 Cambridge University – L. Vallier CEA/IMETI - InsermU962 – P. Leboulch
Coordinator	Anne Weber-Benarous - InsermU972 anne.weber@inserm.fr
ANR funding	699 996€
Starting date and duration	January 2011 - 36 months
Cluster label	

Project title	**MobiNiCSH** – Mobilization and homing of hematopoietic stem cells : contribution of heparan sulfate mimes
Résumé	Autologous hematopoietic stem cells (HSCs) transplantation (auto-HSCT) is the standard of care for patients supporting high-dose chemotherapy (see for example Villanueva et al., 2006). The success of auto-HSCT depends on the dose of reinfused hematopoietic stem cells and of their homing and engraftment capacities (Jillella et al., 2004). Presently, auto-HSCT is performed after hematopoietic stem cells mobilization but the optimal strategy to mobilize, manipulate and transplant hematopoietic stem cells into peripheral blood has not been defined. Progresses in auto-HSCT exploit the knowledge of the interactions between hematopoietic stem cells and their bone marrow microenvironment but very few methods are currently available to study these processes in vivo in real time and without interference. Among these methods, imaging strategies that can reveal the development of few hematopoietic stem cells in the context of a living body are the most promising approaches for tracking hematopoietic stem cells regulation by microenvironment in vivo. We recently developed a fibered confocal fluorescence imaging system that can navigate inside the femoral cavity from the knee to the femoral head and track fluorescent cells in deep tissues of living animals. Using this imaging system we can visualize, in the femurs of living mice, the hematopoietic reconstitution, starting with observations a few hours after transplantation of a small number of purified hematopoietic stem cells and monitoring the hematopoietic reconstitution several days or weeks later using the same animal (Lewandowski et al., 2010). Employing and developing this imaging system, we will address the role of several regulator molecules in homing/engraftment of mobilized hematopoietic stem cells in normal or perturbed microenvironments in vivo and evaluate (i) HSCs mobilization by mimes of heparan sulfate (ENDOTIS Pharma products) designed to enhance hematopoietic reconstitution starting with a limited number of donor cells, (ii) screen in vivo effects of molecules that can enhance homing and/or engraftment of mobilized HSCs by acting on the mobilized

	HSCs or on the recipient and (iii) study the effects of molecules that mobilize HSCs on the chemosensitization of leukemic cells. We believe results from these experiments will expand existing knowledge on hematopoietic stem cells/microenvironmental interactions and have clinical implications in transplantation outcomes and leukemia treatment. Villanueva ML, Vose JM. The role of hematopoietic stem cell transplantation in non-Hodgkin lymphoma. Clin Adv Hematol Oncol. 2006;4(7):521-30. Jillella AP, Ustun C. What is the optimum number of CD34+ peripheral blood stem cells for an autologous transplant?. Stem Cells Dev. 2004;13(6):598-606. Lewandowski D, Barroca V, Ducongé F et al. In vivo cellular imaging pinpoints the role of reactive oxygen species in the early steps of adult hematopoietic reconstitution. Blood. 2010;115(3):443-52.
Partners	CEA/DSV/IRCM/SCSR/LRTS - Laboratoire de recherche sur la Réparation et la Transcription dans les Cellules Souches
Coordinator	Paul- Henri Romeo - CEA/DSV/IRCM/SCSR/LRTS paul-henri.romeo@cea.fr
ANR funding	530 650€
Starting date and duration	March 2011 - 48 months
Cluster label	

Project title	**STREAM** – hematopoietic STem cell REtention upon Affinity and Mechanical properties
Résumé	The frame of the STREAM project is focused on the most achieved field of cell therapy: Hematopoietic Stem Cells (HSC) Transplantation for bone marrow reconstitution in patients with malignant hemopathies (acute leukemias, lymphomas, myelomas) and other types of cancers. This project intends to bring an innovative, efficient and less expensive method for improvement of graft products preparation. The targeted step is the selection of HSC and progenitors from heterogeneous cell population sources: (i) in vivo : peripheral blood mobilized with G-CSF or not, bone marrow or Umbilical Cord Blood (UCB), (ii) ex vivo : after various expansion processes. Today, clinical grade selection can only be achieved using Magnetic Assisted Cell Sorting (MACS). The STREAM proposal aims to overcome the limitations of this technology and to improve the cell selection – yield, purity, accessibility and cost – by: 1) Developing an alternative principle: the differential retention of cells in controlled flow on optimized surfaces. Selectivity will be obtained trough biological ligands (antibodies, lectines…) and/or differential mechanical properties; 2) Automating the process with an appropriate device and consumable to ensure potential clinical grade and reproducibility; 3) Optimizing the quality of the purified cell product – cell viability, purity, functionality – as a main objective. The selected cells will undergo several in vitro (phenotyping, functionnal assays) as well as in vivo (using the NOD/SCID mouse model) quality control tests. The efficacy of the cell selection process will also be tested on in vitro expanded cells, which, if demonstrated, would highly facilitate their subsequent clinical use. Such a goal can only be achieved through the multidisciplinary skills of the STREAM consortium. Each of the three axis mentioned above relies on the expertise of particular members of the consortium, respectively composed of: 1) Physicists, with expertise in physical chemistry of cell adhesion: the UMR 7195 PECSA/ Laboratoire des Colloïdes et Matériaux Divisés (LCMD) , 2) Specialists in biotech process automation: Bertin Technologies; 3) Stem cell & Cell therapy specialists: the UMR_S 938 Proliferation and differentiation of stem cells-Application to Cell Therapy & the private non-profit research institute IRHT, which also represents the

	end-user of the developed process. The members of the consortium have already worked together on several R&D projects, one of them leading to a mature product commercialized by Bertin (KIM analyzer). This positive collaborative background will ensure maximal synergy during the STREAM project. The STREAM project aims at setting the basis for a new technology that could be launched by the industrial partner of the consortium.
Partners	Laboratoire des Colloïdes et Matériaux Divisés LCMD - PECSA Bertin Technologies – E. Brient-Litzler UMR-S 938 Prolifération et différenciation des cellules souches- L.Douay Institut de Recherche en Hématologie et Transplantation -P.HENON
Coordinator	Jean Baudry - PECSA - LCMD jean.baudry@espci.fr
ANR funding	741 155€
Starting date and duration **Cluster label**	March 2011 - 36 months