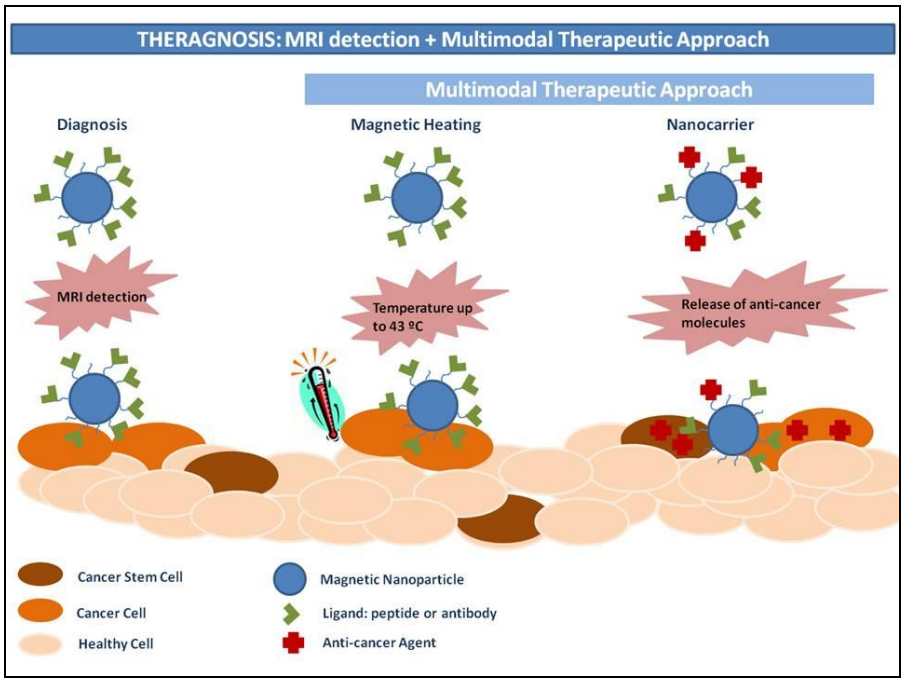

Figure 1: MULTIFUN approach.

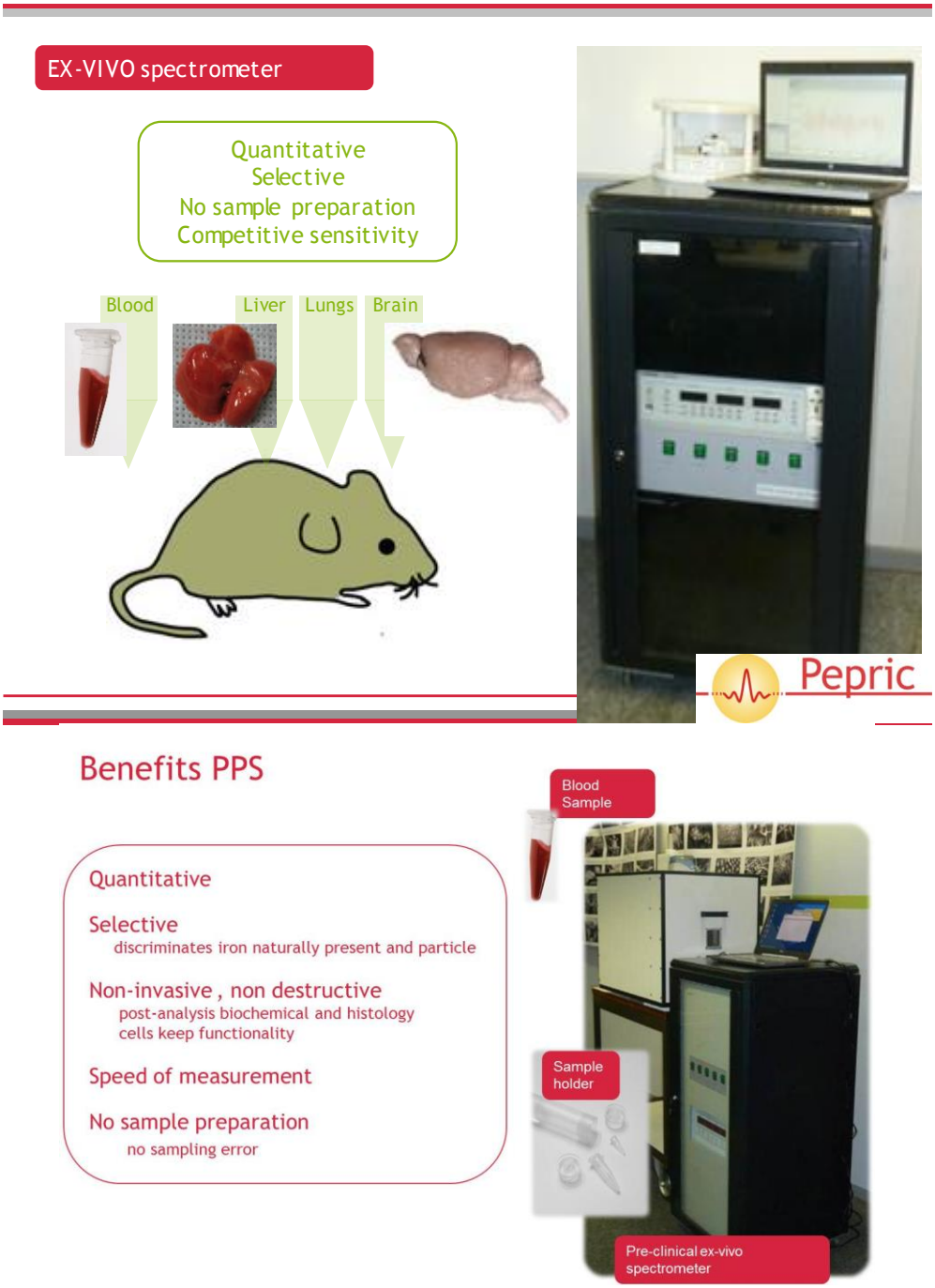

Figure 2: New detection equipment for quantitative analysis of MNP's in blood and tissue samples

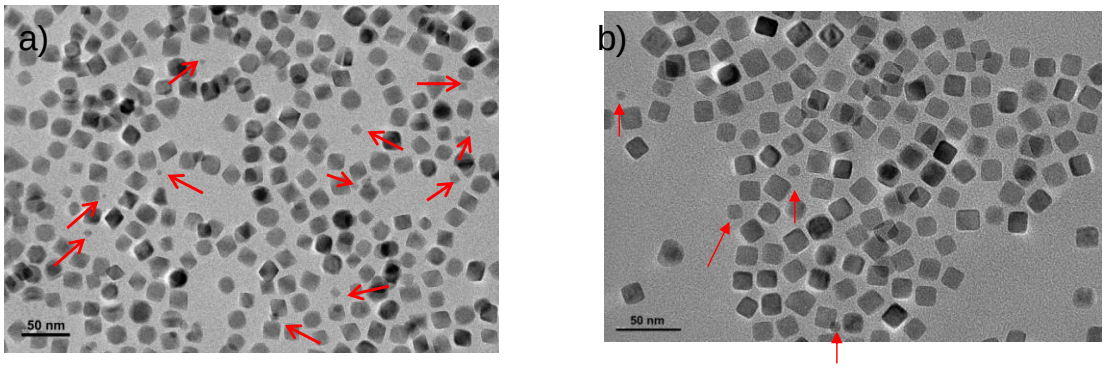

Figure 3: a) Transmission Electronic Microscopy micrographs of 18 nm size magnetite nanoparticles synthesized a) without, b) with stirring the reaction at the beginning of the heat Ramp. Arrows indicate smaller size nanoparticles. Images kindly provided by G. Salas and M.P. Morales.

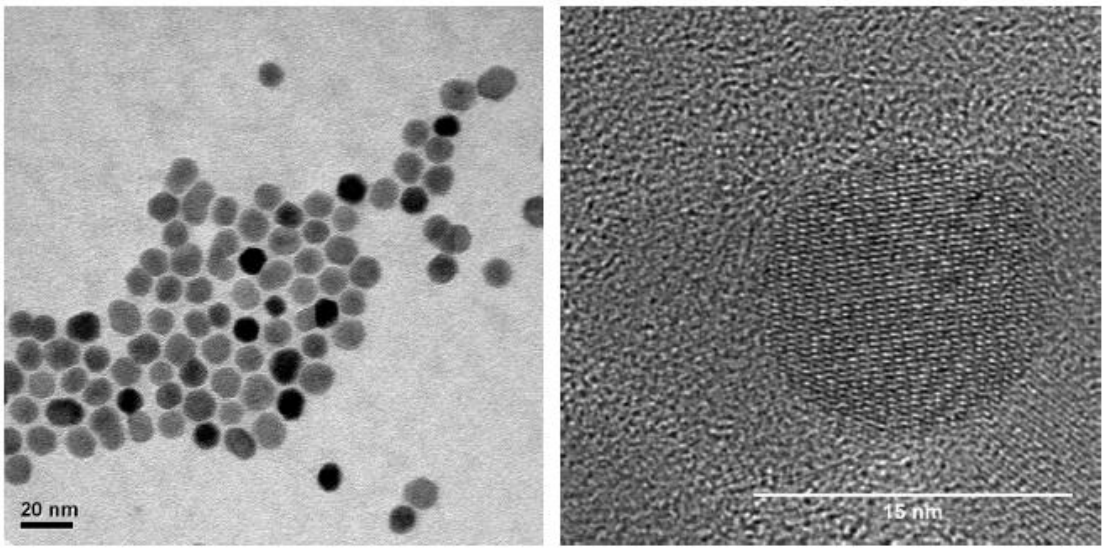

Figure 4: a) Transmission Electron Microscopy micrographs of particles produced by the Controlled Growth Process. b) High Resolution TEM (HRTEM) image showing the high crystallinity of the particles produced by the controlled Growth Process. Images kindly provided by Liquids Research Ltd.

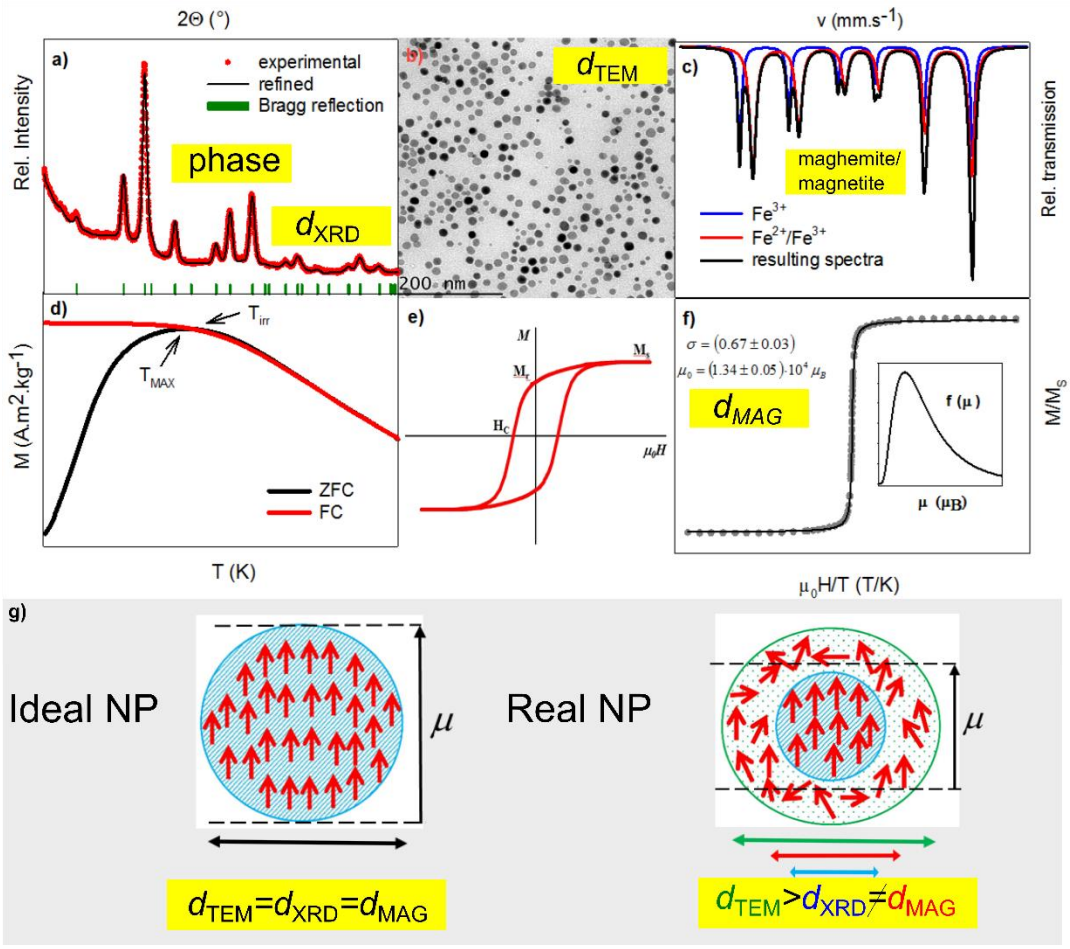

Figure 5: The example of typical experiments for determination of the properties of magnetic nanoparticles: a) Powder X-ray Diffraction pattern from which the phase composition and the particle diameter (dXRD) are determined. b) Transmission Electron Microscopy, which is used for direct observation of the apparent particle size (dTEM) and its distribution. c) Example of Mössbauer spectra. Refinement of spectra can easily distinguished between the presence of the Fe2+ and Fe3+ ions, thus method serves for precise determination of the maghemite/magnetite phase content within the examined sample. Bottom panel: Magnetic property measurements: d) example of the ZFC-FC curve from which the blocking temperatures, TMAX and Tirr can be determined. e) Example of the M(H) curve and f) the fit of the unhysteretic M(H) curve in Langevin scaling from which the mean and meadian magnetic moments of the particles can be obtained together with the distributions of magnetic moment, □ and median particle diameter (dMAG). g) Illustration of the internal particle structure for the ideal and real particles and relation of individual particle diameters.

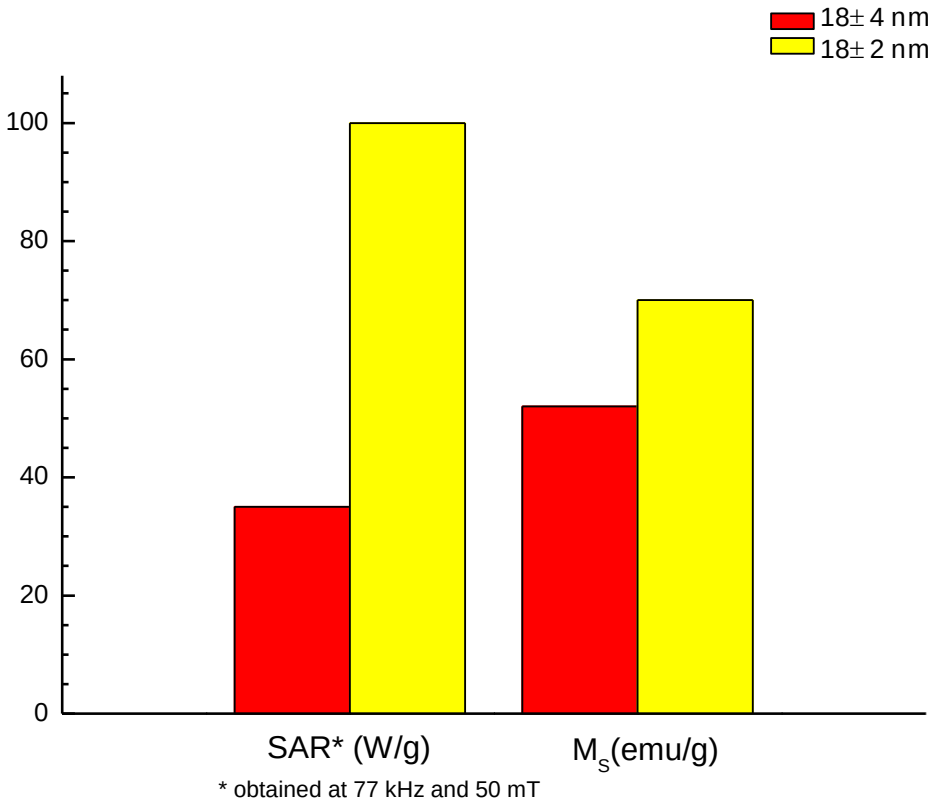

Figure 6: SAR values obtained for 18nm size nanoparticles with different size distributions (yellow ±2 nm, red ±4 nm) when exposed to the same H_{AC} conditions (50 mT and 77 kHz). Images kindly provided by G. Salas, M.P. Morales and F.J. Teran.

Figure 7: a) Time evolution of SPION temperature when subjected to H_{AC} (78 kHz and 25 mT) (a) at T_{eq}= 30ºC, b) Numerical derivative curves of data shown in previous graph. Solid circles indicate the maximun and minimun dT/dt values. C) Comparison of numerical simulations and experimental data. Shadow and white time zones are exposed to H_{AC} on and off, respectively. Red and blue lines correspond to temperature rise and decay. Images kindly provided by F.J. Teran.

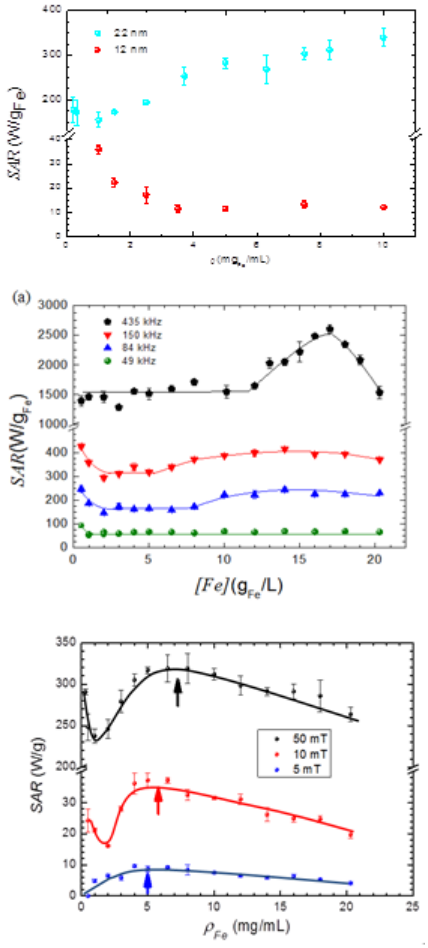

Figure 8: ***Concentration dependence of SAR for different particle sizes, field frequency and amplitude.*** **Figures kindly provided by D. Cabrera and F.J. Teran**

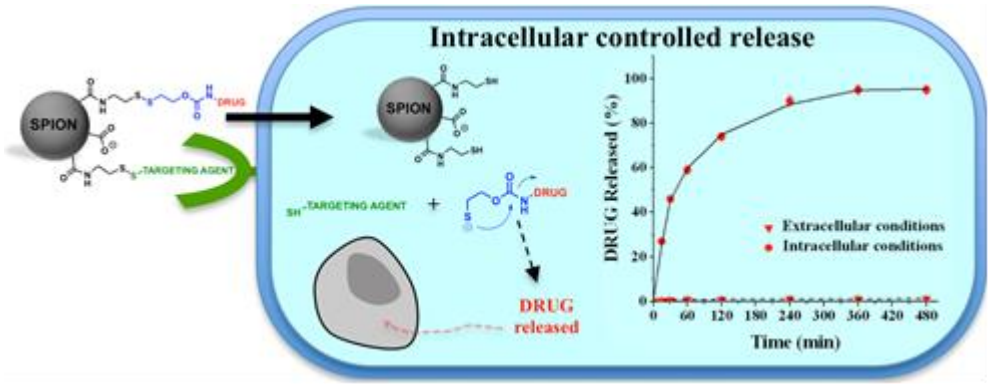

Figure 9: Intracellular controlled release

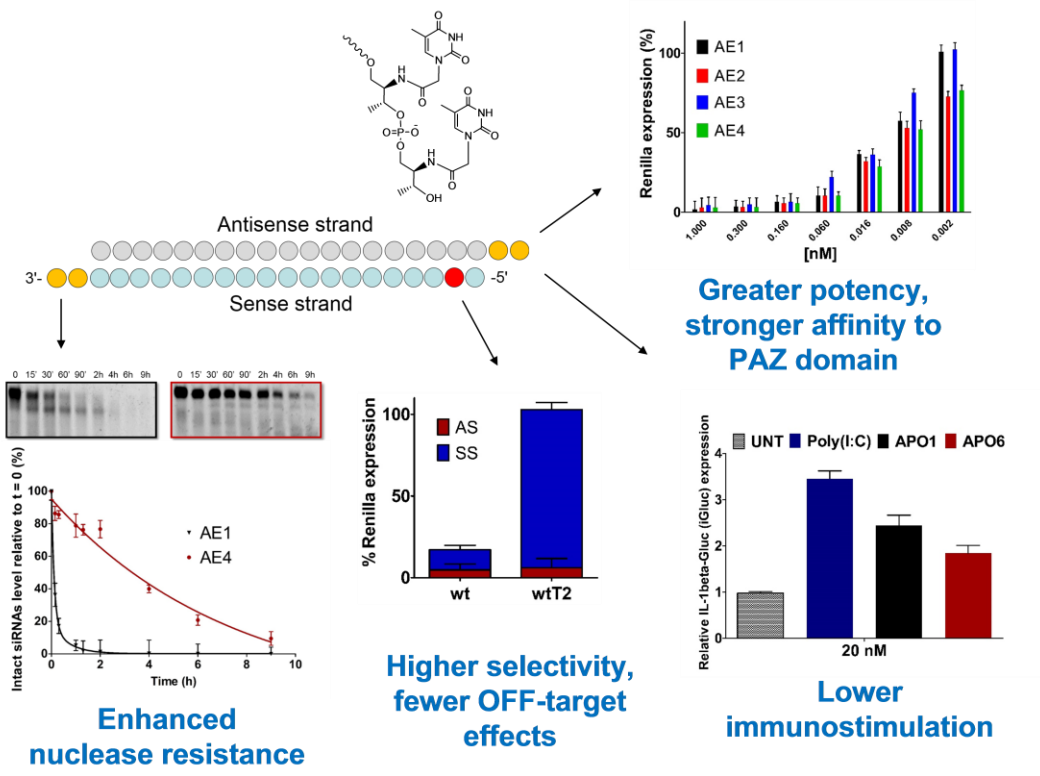

Figure 10: Beneficial effects of the substitution of natural nucleobases by L-threoninol derivatives in siRNAs.

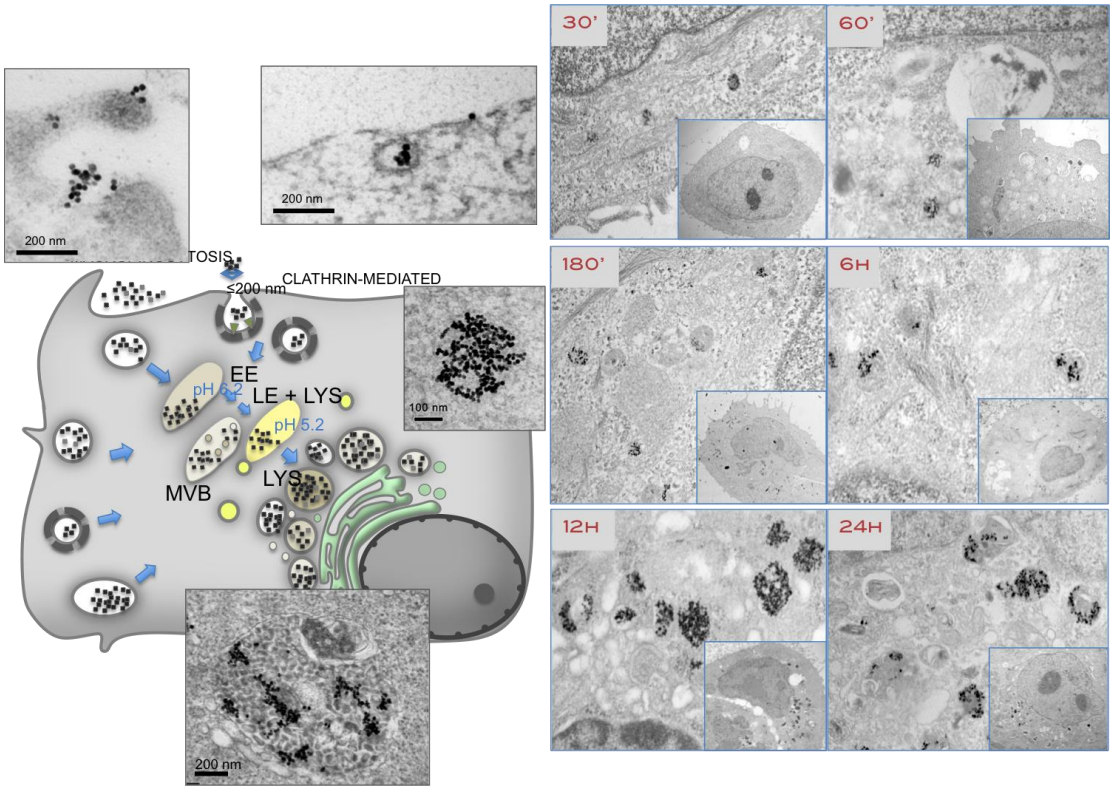

Figure 11: Internalization of OD15 by MCF-7 cells. Cells incubated at different times with MNPs were studied by electron microsopy. Clathrin-mediated endocytosis was observed for MNP aggregates <200 nm, while macropinocytosis was found for larger aggregates. Cargo vesicles were fused in early endosomes (EE). Multivesicular bodies (MVD) and late endosomes (LE)containing intraluminar vesicles (ILVs) fuse together with Lysosomes (LYS) for final degradation vesicles (Journal of Nanobiotechnology 2015, 13:16. doi:10.1186/s12951-015-0073-9).

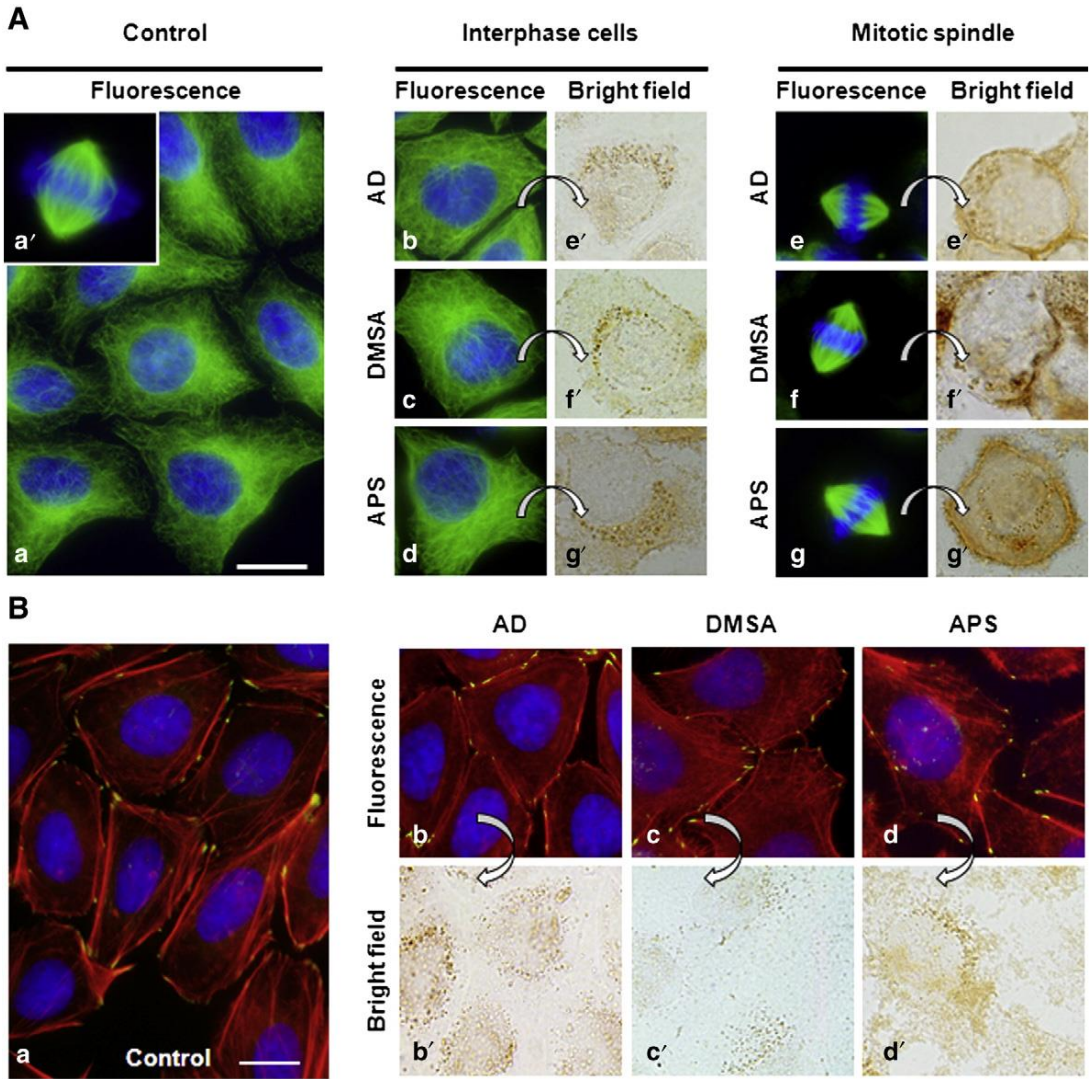

Figure 12: Analysis of cytoskeleton. (A) Representative images of cells immunostained for tubulin (green) and DNA counterstained with Hoechst-33258 (blue). Left panel: (a) Interphase control cells. (a′) Metaphase control cell. Middle panel: (b-b′) Interphase cells incubated for 24 h with 0.5 mg ml−1 AD and observed by fluorescence and bright-field microscopy, respectively; (c-c′) Cells treated with DMSA; (d-d′) Cells incubated with APS. Right panel: (e-e′) Mitotic spindle of cells incubated with AD; (f-f′) DMSA or (g-g′) APS. (B) Merged images of F-actin labeled with Phalloidin-TRICT (red), vinculin immunostaining (green) and DNA counterstained with Hoechst-33258 (blue). (a) Control cells. (b-b′) Cells treated with AD and observed by fluorescence and bright-field microscopy, respectively. (c-c′) Cells treated with DMSA. (d-d′) Cells incubated with APS. Scale bars = 10 µm.

Table 1: MULTIFUN project 48 months dissemination Outcome

2011-2012	2013-2014	2014-2015	2015-2016	Dissemination Event/Frequency
31	39	16		Poster
25	46	33		Presentation/Oral Communication
17	14	12		Seminar
7	2	3		Public event
7	23	22	11	Peer-reviewed paper
4	8	5		Trade booth
4	12	11		Invited / Keynote
3	3	0		Book Chapter
1	4	5		Event Organised
0	1	4	9	Degree Awarded
99	152	111	20	
	TOTAL	**362**		
		TOTAL	**382**	

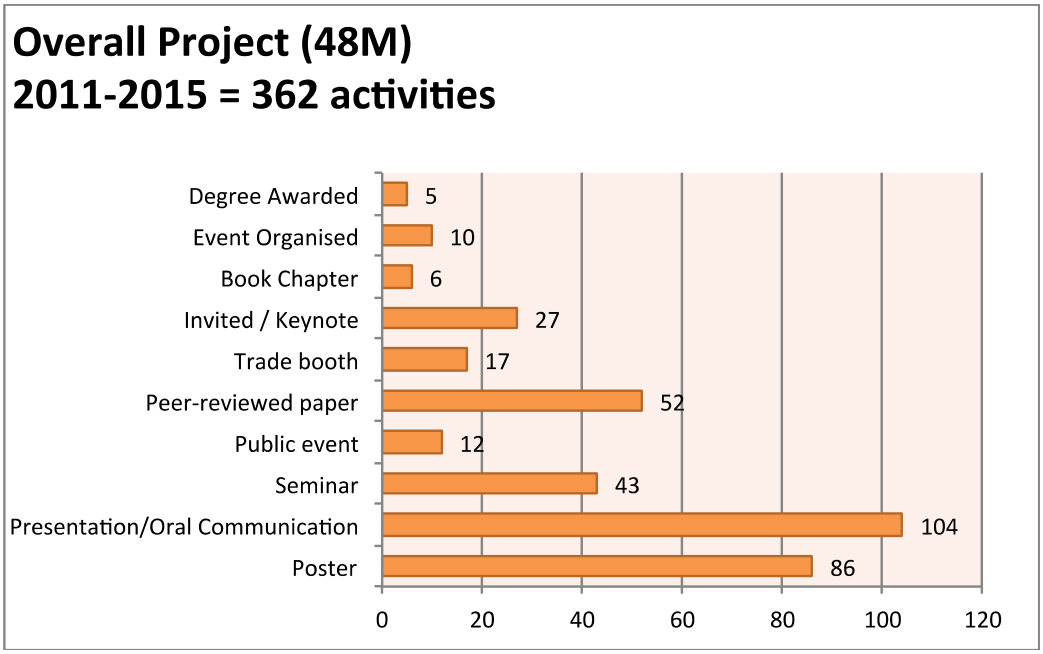

Figure 13: Overall details for MULTIFUN dissemination activity outcome (Period June 2011 – June 2015)

Other information

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Contact for Administrative Issues:	Ms. Blanca Jordan – blanca.jordan@atos.net MULTIFUN Administrative Coordinator and Health Sector Manager at Atos Research & Innovation.

List of Beneficiaries

Participant legal name	Country	Organisation type
Atos Spain S.A.	Spain	Multinational Industrial
Fundación Centro Nacional de Investigaciones Oncológicas Carlos III	Spain	Research Organisation
Laboratoire de Croissance, Répa-ration et Régénération Tissulaires	France	Research Organisation
Consejo Superior de Investigaciones científicas	Spain	Research Organisation
Institute of Physics of the Academy of Sciences of the Czech Republic	Czech Republic	University
Fundación Instituto Madrileño De Estudios Avanzados en Nanociencia	Spain	Research Organisation
Institut National des Sciences Appliquées de Toulouse	France	University
St Thomas Hospital, King's College London	U.K	University Hospital
Liquid Research Ltd.	U.K	SME
PEPRIC	Belgium	SME
PharmaMar	Spain	Industry
Trinity College Dublin	Ireland	University
University College Cork	Ireland	University
University Hospital Jena	Germany	University Hospital
Paterson Institute for Cancer Research, University of Manchester	U.K.	University
Queens Mary University of London	U.K.	University