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## Polyamidoamine nanoparticles: From drug nanocarriers to vaccine adjuvants in Malaria

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Malaria is arguably one of the main medical concerns worldwide because of the numbers of people affected, the severity of the disease and the complexity of the life cycle of its causative agent, the protist *Plasmodium* spp. With the advent of nanoscience, renewed hopes have appeared of finally obtaining the long sought-after 'magic bullet' against malaria in the form of a nanovector for the targeted delivery of antimalarial compounds exclusively to *Plasmodium*-infected Red Blood Cells (pRBCs), thus increasing drug efficacy and minimizing the induction of resistance to newly developed therapeutic agents. We have developed poly(amidoamine)-derived nanovectors that combine into a single chemical structure drug encapsulating capacity, antimalarial activity, low unspecific toxicity, specific pRBC targeting, optimal *in vivo* activity, and affordable synthesis cost. Our recent data suggests that the antiparasitic mechanism of PAAs can be based on blocking the erythrocyte invasion of egressed parasites. The ensuing prolonged exposure of the pathogens to the immunitary system might be applied to the design of new malaria vaccination approaches where PAAs could play a dual role as carriers of antimalarial drugs and as vaccination adjuvants. This unexpected synergistic effect combining therapeutics and prophylaxis represents a radically new approach to the treatment of malaria for which we propose the new term 'theralaxis'. This research was supported by grants BIO2011-25039 (Ministerio de Economía y Competitividad, Spain) and 2013-0584 (Fondazione Cariplo, Italy).

### Biography

Xavier Fernández-Busquets started his career as a Trainee Student at the CIBA-GEIGY Zentrale Forschungs Laboratorien in Basel. He graduated in Biochemistry at the Universitat Autònoma de Barcelona, where he obtained his PhD in Molecular Biology. Between 1992 and 2001, he held several Postdoctoral positions, among which were those at the Friedrich Miescher Institut (Novartis AG, Basel) and at the Woods Hole Marine Biological Laboratory. In 2001, he obtained a 5-year tenure track Ramón y Cajal position at the Universitat de Barcelona. In 2006, he became Senior Researcher at the IBEC and since 2010 he has been the Head of the Nanomalaria Joint Unit (IBEC/ISGlobal).

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