Nanoparticles specific for Slan+ monocytes as potential therapeutic tools in systemic lupus erythematosus.

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Background and aims

6-sulfoLacNAc+ monocytes (slanMos) are a subset of nonclassical monocytes, which are considered pro-inflammatory cells in different diseases, including the autoimmune ones, such as systemic lupus erythematosus (SLE). Reduction and dysfunction of circulating nonclassical monocytes and recruitment of these cells to inflammation sites in SLE patients have been previously reported by our Group. We proposed encapsulating Itacitinib into nanoparticles to inhibit the JAK-STAT pathway in SlanMo from SLE patients and other chronic inflammatory diseases.

Methods

Monocyte subpopulations were evaluated in SLE patients (n=10, from ARTMEDICA) and healthy controls (n=10) by flow cytometry markers (CD14, CD16, HLA-DR, and Slan). SlanMos were isolated using a commercial kit. Inhibition of the JAK-STAT pathway was evaluated with Baricitinib or Itacitinib and stimulated with IFN-ɣ. HLA-DR, CD64, and CD69, p-STAT-1, and TNF-α accumulation were determined by flow cytometry. We evaluated the specific binding of Poly-lactic-co-glycolic acid (PLGA), galactosamine-PLGA, and wheat germ agglutinin (WGA)-PLGA nanoparticles by leukocytes.

Results

Patients had a significantly lower number of circulating SlanMo. Itactinib had the highest inhibitory effect on the JAK-STAT pathway. Then, we will design an Itacitinib encapsulated nanoparticle to target the SlanMo. We had established that PLGA-WGA nanoparticles were uptook efficiently by monocytes compared with other leukocytes. Suggesting the potential role of these nanoparticles to target monocytes and possibly more specifically SlanMos for the treatment of SLE.

Conclusions

The uptake of PLGA-WGA nanoparticles by monocytes suggests the potential role of these nanoparticles to target these cells and possibly more specifically SlanMo for the treatment of SLE.