Silica dioxide nanoparticles (Nano-SiO₂) are inducers of the NLRP3 inflammasome, a large intracellular multiprotein complex that plays a central role in innate immunity [1, 2]. NLRP3 inflammasome activation requires an initial signal ('priming'), provided by microbial molecules, such as lipopolysaccharide (LPS), and a secondary signal, provided by a wide array of stimuli including bacterial toxins, endogenous molecules, crystals or nanoparticles such as Nano-SiO₂. This triggers the multimerization of the NLRP3 inflammasome and caspase-1 activation with the subsequent maturation and secretion of IL-1β and IL-18.

The ability of Nano-SiO₂ to induce the NLRP3 inflammasome has been validated using THP1-Null cells. The production of IL-1β by THP1-Null cells was measured using HEK-Blue™ IL-1β cells. Treatment with Nano-SiO₂ induced IL-1β secretion, an indicator of NLRP3 inflammasome activation, in a dose-dependent manner.


**Evaluation of NLRP3 inflammasome activation**

**IL-1β production in THP1-Null cells.** THP1-Null cells, primed with LPS (1 µg/ml for 3h), were stimulated with increasing concentrations of Nano-SiO₂. After overnight incubation, IL-1β secretion was analyzed by adding 50 µl of supernatant from treated THP1-Null cells to HEK-Blue™ IL-1β cells. IL-1β-induced activation of NF-κB was assessed by measuring the levels of SEAP in the supernatant of HEK-Blue™ IL-1β cells using QUANTI-Blue™ Solution, a SEAP detection reagent, and by reading the optical density (OD) at 630 nm.