Nanotechnology offers many potential benefits which are of interest to Unilever in developing new innovations. To support the safety of nanotechnologies we have put together a risk assessment framework to identify the key risks across consumer, environmental and occupational safety. There are still a number of scientific challenges in identifying these risks and we are actively involved in developing the capabilities required to define the exposure and hazards related to specific nanomaterials to enable risk-based rather than hazard-based approaches.

One of the key areas we are interested in is the safety assessment of inhalable biopersistent materials which have traditionally relied upon the estimation of consumer lung exposure coupled with generation of in vivo inhalation toxicity data. Our aim is to replace the need for in vivo studies using a combination of exposure-based waiving and an understanding of the Adverse Outcome Pathways (AOP) for key events in lung responses to fibrosis.

Adverse Outcome Pathway (AOP) for lung disease (fibrosis/cancer)

Cell systems selected based on responses in levels of known biomarkers of pro-fibrotic effect (i.e. collagen, osteopontin, αSMA, and specific genes). Transcriptomic studies of in vitro cell lines and of relevant human disease states in vivo furthered our understanding of the pathways involved. Sensitivity and specifically were tested using previously characterised substances followed by use of relevant fibrosis BioMap systems (at BioSeek, DiscoverRX) to identify the key events which are consistently activated in response to known fibrosis-inducing materials. Next steps are to use relevant in vitro lung exposure models using air/liquid interfaces – Vitrocell.