

## ***in vivo* Imaging Using Nanoparticles**

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Nanoparticles can be used as *in vivo* imaging agents or a drug delivery system. Some of them are now approved for commercial use. The nanoparticles introduced into the body should be eliminated from the body, either by degradation or by excretion. While many inorganic nano-carriers are very stable and difficult to metabolize, many of organic nanoparticles are biodegradable. Radiolabeling of biomolecules enables tracing these molecules *in vivo*. Biodistribution and autoradiography studies validate tissue distribution of the nanoparticles in animals. Nuclear medicine imaging such as single photon emission computed tomography (SPECT) or positron emission tomography (PET) allows non-invasive longitudinal monitoring of the *in vivo* pharmacokinetics and tissue distribution of the nanoparticles even in human subjects. On the other hands, *ex vivo* tissue imaging of fluorescently labeled nanoparticles reveals their patterns of microscopic distribution. *In vivo* tracking of nano-carriers using radionuclide imaging techniques enables a theranostic approach as well, not just being a drug carrier. The combination of diagnostic and therapeutic capabilities in a single drug delivery system can be used for precision personalized therapies.