

Figure 1 NBs applied to tumors.

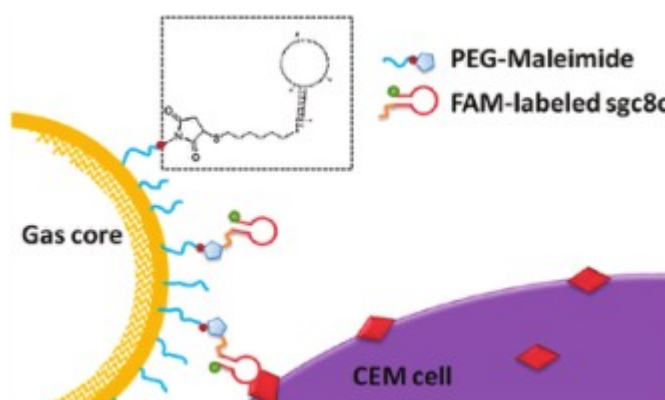


Figure 2 Covalently aptamer-conjugated NBs for targeted ultrasound imaging [37].

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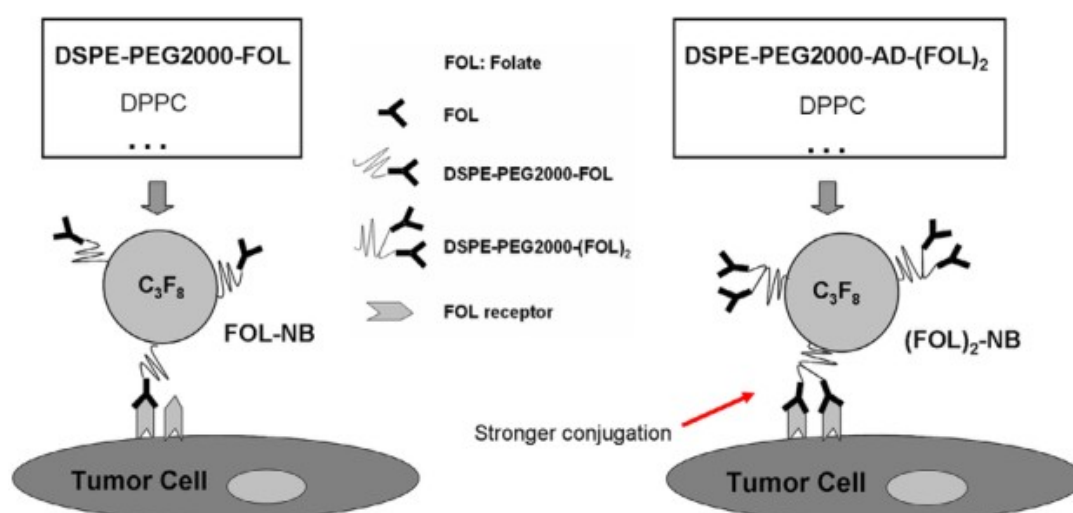


Figure 3 When each DSPE-PEG2000 chain is connected to two FOL molecules, its binding

ability to tumor cells is enhanced [52]. Copyright © 2017, Elsevier.

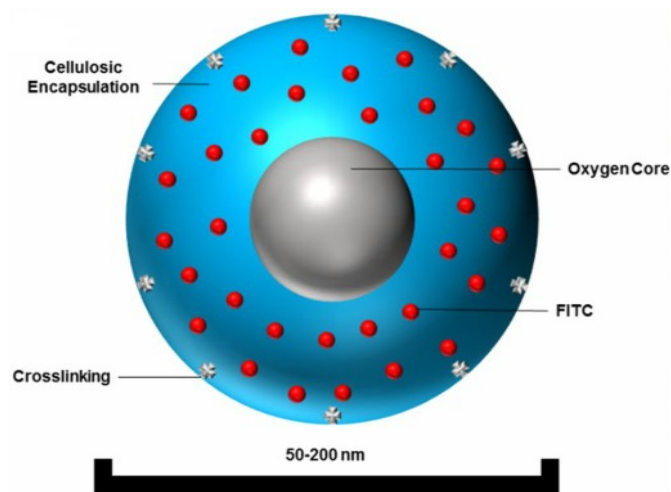


Figure 4 Schematic representation of oxygen nanobubble [71]. Copyright © 2017, Springer Nature.

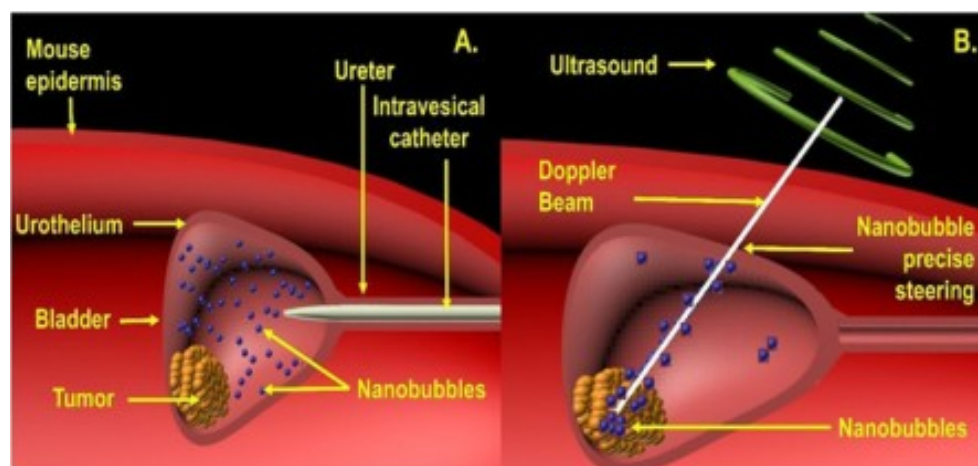


Figure 5 Schematic of intravesical treatment in mice bladder cancer. (A): Therapy introduced into the bladder by intravesical catheter. (B): Precise localization of mitomycin-C loaded ONBs (in blue color) to the hypoxic tumor microenvironment using Doppler ultrasound steering with simultaneous B-mode US imaging [29]. Copyright © 2018, Springer Nature.

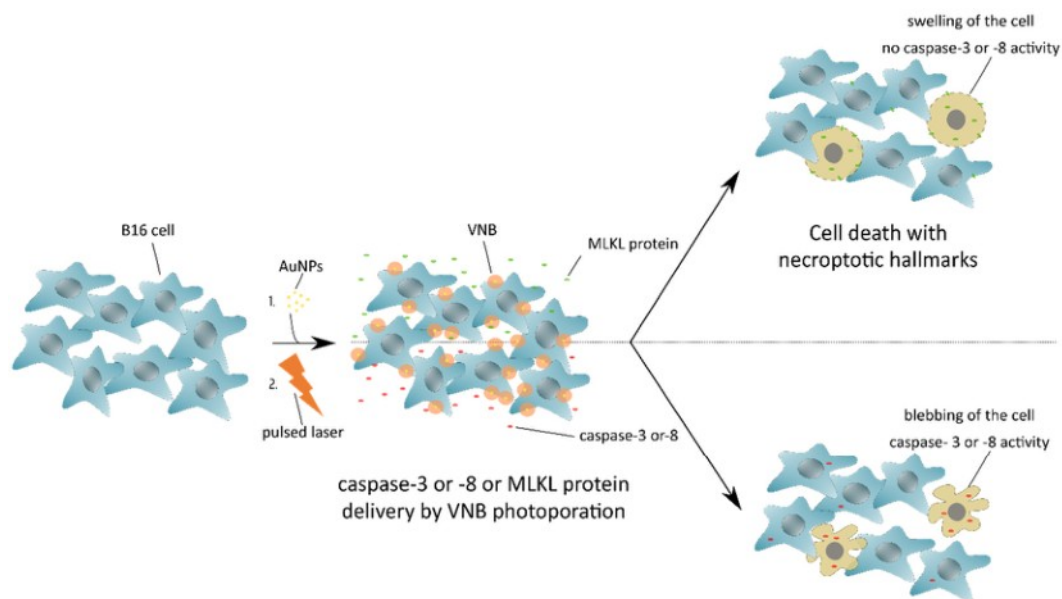


Figure 6 Induction of cell death with necroptotic or apoptotic hallmarks after mixed-lineage kinase domain-like (MLKL) protein or caspase-3/-8 delivery by VNB photoporation, respectively. B16 cells are first incubated with AuNPs that adsorb onto the plasma membrane, followed by a nanosecond pulsed laser treatment that results in the formation of VNBs. Collapse of the expanding VNBs leads to membrane pore formation and allows the extracellular MLKL or caspase -3/-8 protein to diffuse into the cell cytoplasm. After a short period of incubation, the MLKL protein has evoked cell death with necroptotic hallmarks, whereas transduced caspase-3/-8 protein results in apoptosis [92]. Copyright © 2019, Multidisciplinary Digital Publishing Institute (MDPI).

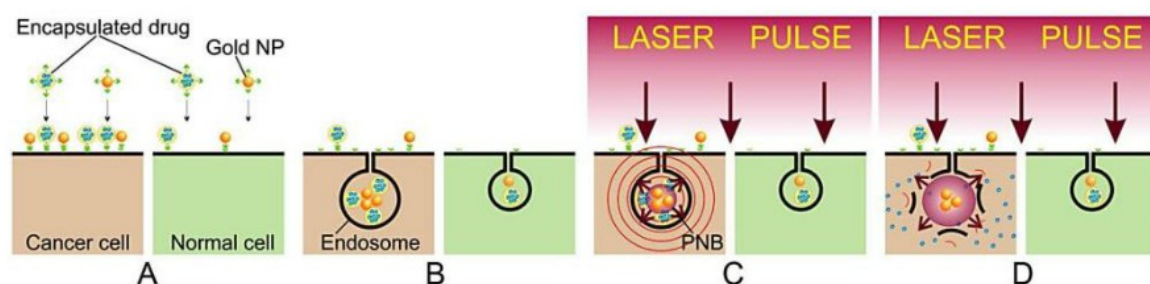


Figure 7 (A): Separate administration of gold NPs conjugates and encapsulated drug; (B): cancer cell self-assembles mixed clusters of the drug carriers and gold NPs during receptor-mediated endocytosis; (C): diagnostic function is provided by the selective generation of PNB around the cluster of gold NPs with a single laser pulse and remote real-time detection of the acoustic response of the PNB; single gold NPs in normal (green) cells have a higher threshold of PNB

generation and thus do not produce a PNB under a low level of laser pulse fluence; (D): selective therapeutic effect is provided by explosive localized disruption of drug carrier and endosome by PNB and the ejection of the drug (blue dots) into cytoplasm [94]. Copyright © 2012, Ivyspring International Publisher.

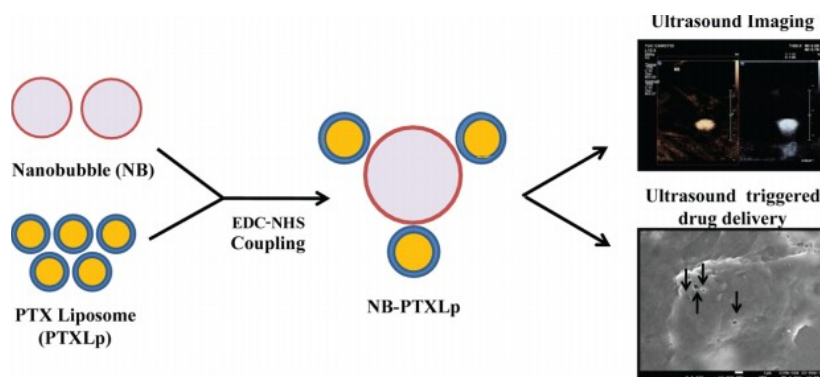


Figure 8 NB-PTXLPS is used for ultrasound imaging and drug delivery [103]. Copyright © 2019, American Chemical Society.