Tracking people by means of vaccination:

Domina Petric, MD

Researchers from MIT created an ink that can be safely embedded in the skin alongside the vaccine itself, and it is only visible using a special smartphone camera app and filter. These biocompatible, near-infrared intradermal quantum dots can be used to reliably encode information and can be delivered with a vaccine.

Researchers from MIT created an **ink** that can be safely embedded in the skin alongside the vaccine itself, and it is only visible using a special smartphone camera app and filter[1].

The work was funded by the Bill & Melinda Gates Foundation[2].

Researchers present an approach to encode medical history on a patient using the spatial distribution of biocompatible, near-infrared quantum dots (NIR QDs) in the dermis. QDs are invisible to the naked eye yet detectable when exposed to NIR light. QDs with a copper indium selenide core and aluminum-doped zinc sulfide shell were tuned to emit in the NIR spectrum by controlling stoichiometry and shelling time. The formulation showing the greatest resistance to photobleaching after simulated sunlight exposure (5-year equivalence) through pigmented human skin was encapsulated in microparticles for use *in vivo*. In parallel, microneedle geometry was optimized in silico and validate *ex vivo* using porcine and synthetic human skin. QD-containing microparticles were then embedded in dissolvable microneedles and administered to rats with or without a vaccine. Longitudinal *in vivo* imaging using a smartphone adapted to detect NIR light demonstrated that microneedle-delivered QD patterns remained bright and could be accurately identified using a machine learning algorithm 9 months after application. In addition, co-delivery with inactivated poliovirus vaccine produced neutralizing antibody titers above the threshold considered protective. These findings suggest that **intradermal QDs can be used to reliably encode information and can be delivered with a vaccine,** which may be particularly valuable in the developing world and open up new avenues for decentralized **data storage and biosensing[3].**

Storing information about a patient in a form of biocompatible ink (QD), or RFID microchips, or in the future nanochips, opens many questions about how are these data going to be used and are there going to be any misuse of this very powerful technology.

Problems associated with human microchipping[4] by any means (vaccination or other) are:

1. Person´s privacy could be severely infringed upon.
2. Person´s movements, both physically and financially, could be tracked.
3. Personal data about a person could be sold or hacked into.
4. Who would have access to the information, and who stores the information?
5. Potential physical health[5] problems and negative psychological effects (anxiety, depression).

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