



Laser technology (BuBble Gun)

Fear of syringes and needles is a widespread phobia worldwide, also known as „trypanophobia“. Half of children and one in four adults suffer from the phenomenon and are exposed to traumatic sensations and anxiety as soon as health-related injections are necessary.

The laser technology called „BuBbleGun“, which is still being developed, should make injections possible without the use of needles in the future. These should not only be almost painless and quick to administer, but as a result lower the threshold for vaccinations.

The needle-free procedure is based on liquid jet injections performed by low laser energy as well as microfluidic devices and thermocavitation. By using a laser, tiny droplets of the fluid to be injected are forced through the outer layer of the skin.

For this to be possible, the liquid is in a special glass that is heated by the laser within a millisecond and a bubble then forms in the liquid. This bubble shoots the liquid, e.g. the vaccine, out of the microfluidic device through the patient's skin at a speed of 100 km/h. No nerve endings in the skin are damaged, which means that the liquid is not injected. No nerve endings in the skin are injured in the process, which means there is no pain and no entry site is visible.

The main focus of the research is on light-generated ultrafast bubble dynamics in a microfluidic device, as well as achieving reproducible jetting with minimal beam break-up.

Innovative technological approaches

- ◇ **Research institute:**
Universität Twente & Massachusetts Institute of Technology
- ◇ **Contact person:**
Prof. Dr. David Fernández Rivas
- ◇ **Technological basis:**
BubbleGun – Laser technology
- ◇ **Research status:**
In development - expected widespread use in 1-3 years
- ◇ **Advantages:**
painless

Suitable for syringes and needle phobias

Fast injection without visible penetration point

Prevention of contamination by contaminated needles

Reduction of medical waste

Bubble formation - what is cavitation?

The term cavitation describes the formation and collapse of bubbles by ultrasound or laser. A vapour cavity is created in a liquid. Thermocavitation - as used in BuBbleGun technology - uses energy from a continuous wave laser to enable the chemical transition of liquid into gas bubbles.

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