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## Health data acquisition methods: From totally invasive, through minimally invasive, to completely discreet approaches?

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At the beginning of the modern medicine, the most part of the effective adopted measuring systems were merely based upon hardly invasive methods. We can mention the biopsy, the venipuncture for blood sampling, the percussion or deep palpation of abdominal or pelvic cavity, the digital rectal examination, the surgery procedures, and so on. Invasiveness of these methods results in discomforts, pains and, sometimes, scars and bad side effects. Over time, different methodologies have been adopted, capable to maintain or even increase the effectiveness but reducing, or even avoiding, the invasiveness. We can report the medical imaging technology, the bioimpedance analysis, the ecography, the urine tests, and so on. Currently, health data acquisition methods seem to be oriented to achieve completely discrete approaches, with absence of pain, no discomfort and no kind of even the most insignificant bad side effect, but still maintaining high effectiveness. The most interesting update methods are surprisingly based on the odor and the voice of the patients. Electronic olfactory systems have been adopted for *in vivo* measurements of skin and breath odors, demonstrating to discriminate diseases and pathologies, among which cancer, schizophrenia and melanoma. Acoustic analyses of sustained and running voices have been initially applied to laryngeal disease categorization, but a recent study performed demonstrated their effectiveness in the screening of some diseases and pathologies. Can these new painless, simple, low-cost and quick procedures represent future in healthcare knowledge management and decision support?

### Biography

Giovanni Saggio completed his PhD from University of Rome "Tor Vergata" (Italy), and Postdoctoral studies from the Cavendish Laboratory, University of Cambridge (England), and from the Rutherford Appleton Laboratory, Oxford (England). His current research interests are related to the fields of biosensors, sensor's characterization, human kinematics' measurements and brain computer interface. He has published more than 100 papers on international journals and four books about electronics (in Italian and in English). He is member of Italian Space BioMedical Society and promoter and coordinator of the HITEG group (Health Involved Technical Engineering Group).

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