Docket #: S17-024

Device for Monitoring Environmental Exposures

Researchers at Stanford have developed a device to monitor environmental exposure in personal (wearable) or public (stationary) settings. Human health can be viewed as the interactive outcome between inherited traits and environmental risks. The exposome is a measure of all the exposures- both biotic (bacteria, viruses, pollen, etc.) and abiotic chemicals (smog, pesticides, etc.)- an individual has during his/her lifetime and how they relate to health. Understanding an individual's exposome in addition to his or her genetic predispositions would help make precision medicine more effective. Currently, accurate portable devices to monitor the exposome are lacking. To overcome this limitation, the inventors have developed this device for collecting and monitoring environmental exposure in personal and public settings. The device couples a proprietary advanced genomic analysis pipeline (see Stanford Docket S16-445) with chemical analysis technologies to detect a diverse variety of environmental agents. By combining personal exposome and genomic analysis, this device could determine the cause of a disease and enable personalized treatment with unprecedented precision.

Stage of research
Prototypes have been developed and validation studies show great promise. Additional development is ongoing.

Applications

- Wearable device to monitor personal exposure
    - Monitor allergy or asthma triggers
- Stationary device to monitor public health
    - Monitor workplace exposures
    - Surveillance system for epidemic diseases

Advantages

- Solves an unmet need- provides a straightforward device to monitor the exposome
- Device features:
    - Active sampling- ensures unbiased monitoring on a temporal scale
    - Comprehensive sampling- collects both particulate matter and solvent compounds
    - Flexible application settings- can be a wearable or stationary device
    - Integrates data handling and sample analysis
    - Flexible size- size of the device can be adjusted to suit the application
    - Flexible design- design can be tailored for market appeal
- Device has unparalleled versatility
- Can be used to prevent and control disease
- Can be used on personal or public scales

Publications

- Published PCT Patent Application
- Chao Jiang, Xin Wang, Xiyan Li, Jingga Inlora, Ting Wang, Qing Liu, and Michael Snyder, Dynamic Human Exposome Revealed by Longitudinal Personal Monitoring, Cell, Vol. 175, Issue 1, September 20, 2018.

Patents

- Published Application: WO2018195401
- Published Application: 20200377927
- Published Application: 20230067927
- Issued: 11,485,969 (USA)
- Issued: 12,474,242 (USA)

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