

Report 14: Wireless technologies to assess environmental exposures

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Brief History: NIH initiatives such as the Exposure Biology Program have demonstrated that portable devices and widespread technologies such as cell phones worn or carried by a person can capture chemicals in the environment, portion sizes of meals, stress, and cravings for cigarettes among other data. There are limitations to the existing devices. One problem is that many devices are not sufficiently miniaturized. Another is that they be able to capture substances in the environment, but they do not collect biological specimens so biologically relevant dose levels of exposures cannot be assessed. It should be possible to collect biospecimens using miniature personal portable devices, analyze them inside the device for particular chemical substances in those biospecimens using a miniature mass spectroscopy type of technology, and transmit the results wirelessly.

Discussion Highlights: The group thought that it should be possible to collect perspiration, saliva, exhaled air from persons and other specimens or dust, ambient air, etc. into a device which would analyze it using mass spectroscopy, geocode the location, and then send the geospatial data and exposure and biological dose data to a central location. Currently the types of devices available for measuring exposure typically have to be mailed or given to the study participant who is instructed on how to use it, the participant wears or uses it for a period of time, and then the device has to be sent back and the environmental analytes measured in a central laboratory, which is expensive, requires extra effort on the part of the study participant and study staff, and, if the sample was not correctly collected or analyzed, there may be no way to re-capture the data. The obvious challenge to this idea is in miniaturizing the device to collect the air, saliva, etc. and analyze the specimens. It would work best if this new device could be built into an existing cell phone or whatever other device is currently popular (i.e., the device has to be “cool” and in vogue), which would likely enhance the likelihood that people carry the devices and would comply with providing the specimens. Efforts would have to be made to assess and minimize selection bias due to certain types of demographic groups being more or less likely to have the device, be able to, and actually use the device. Other challenges are privacy concerns people have about being tracked and making the device simple enough to help ensure high acceptability to users. It is interesting to speculate on whether one could do genotyping this way.

Recommendations: Set a goal of creating and deploying a device that would be inside a cell phone or ipod type of device which could capture saliva, perspiration, ambient, air, etc.; analyze it using mass spectroscopy; geocode the location; and then send the geospatial data and exposure data to a central location. Develop some strategies such SBIR or industry partnerships, etc. to make it happen.

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