during the third (Mann–Whitney, p <0.0001). Some of the third-trimester values have otherwise only been detected in certain pathological conditions, such as in non-pregnant diabetic patients (2). Similar patterns were found when results were expressed as RBP/creatinine ratios. We have found no significant increases in RBP concentrations in serum throughout pregnancy, in agreement with a previous study (5).

We now intend to measure RBP excretion ratios in pathological pregnancies and to compare these results with albumin excretion rates and creatinine ratios, to assess their clinical value during pregnancy.

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More on In Situ Monitoring

To the Editor:

In her interesting review paper (1) Hicks does not mention pulse oximetry and near-infrared spectroscopy as recent promising methodologies for non-invasive monitoring.

Pulse oximeters are now commercially available, based on the techniques of spectrophotometric oximetry (2) and photoelectric plethysmography. They work on the principle of positioning any pulsating arterial vascular bed, typically the ear lobe or finger tip, between a light source—i.e., a light-emitting diode—and a detector—i.e., a photodiode (3). Light-absorbance changes depend upon (a) the size of the arterial pulse, (b) the wavelengths used, and (c) the oxygen saturation of the arterial hemoglobin (S_{O_2}), defined as the ratio of oxyhemoglobin to the sum of oxyhemoglobin and reduced hemoglobin.

The pulsatile waveform being produced only by the arterial blood, the microprocessor-controlled instrument completely eliminates spurious effects from light absorption by tissue and venous blood and provides an exact, beat-to-beat, continuous calculation of pulse rate and S_{O_2}. Calibration is completely automatic and requires no blood- or gas-sampling.

Estimates of S_{O_2}, empirically based on data obtained for healthy volunteers, are less reliable under conditions in which the activity of the sympathet-ic system is strongly enhanced (hypo-thermia, hypovolemic shock, adminis-tration of sympathomimetic agents). Nevertheless, pulse oximetry provides a rapid and reasonably accurate evalua-tion of oxygenation for clinical purposes over a wide range of physiopathological conditions in newborns and adults (4, 5).

Near-infrared spectroscopy was recently proposed as a noninvasive diagnostic tool for analysis of in vivo brain metabolism (6). Infrared light in the 750–950 nm region is transmitted fairly well through both soft and hard tissues of the head to provide adequate signals, upon transcranial illumination, for spectrophotometric purposes. The tissue transparency varies with wavelength and scattering effects. It depends on the absorption of the most abundant chromophores: the heme of hemoglobin and visible copper band of cytochrome-c oxidase.

Near-infrared spectroscopy performed on the brain in animal models confirmed the feasibility of realizing an on-line, noninvasive continuous monitoring of (a) hemoglobin content, which is strictly correlated with blood volume, (b) hemoglobin oxygenation, and (c) the redox level of cytochrome-c oxidase (7).

Although the physiopathological meaning of visible copper redox fluctuations is still unknown (8), measurements carried out on volunteers gave typical and reproducible responses to changes either in respiratory activity or in the composition of the inhaled gas mixture.

After several years of basic research, a few commercial companies are involved in near-infrared spectroscopy development. Up to now, newborn brain monitoring (9, 10) and adult brain surveillance during anesthesia (11) are the most attractive clinical applications of this methodology.

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