MEDICAL DIAGNOSTIC BREATH ANALYSIS BY CAVITY RING DOWN SPECTROSCOPY

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Certain medical conditions give rise to the presence of chemicals in the bloodstream. These chemicals — known as biomarkers — may also be present in low concentrations in human breath. Cavity ring down spectroscopy possesses the requisite selectivity and sensitivity to detect such biomarkers in the congested spectrum of a breath sample. The ulcer-causing bacterium, *Helicobacter pylori*, is a prolific producer of the enzyme urease, which catalyses the breakdown of urea ($(NH_2)_2CO$) in the stomach as follows:

$$(NH_2)_2CO + H_2O \xrightarrow{(\mathrm{urease})} CO_2 + 2NH_3$$

Currently, breath tests seeking altered carbon-isotope ratios in exhaled CO_2 after the ingestion of ^{13}C- or ^{14}C-labeled urea are used to diagnose *H. pylori* infection.[a] We present recent results from an ongoing collaboration with Tampere Area University Hospital. The study involves 100 patients (both infected and uninfected) and concerns the possible correlation between the bacterial infection and breath ammonia.

[a] D. Y. Graham, P. D. Klein, D. J. Evans, Jr, D. G. Evans, L. C. Alpert, A. R. Opekun, T. W. Boutton, *Lancet* **1**(8543), 1174-7 March 1987.