Premium car research & cow dung point to new high tech disease diagnosis

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(PhysOrg.com) -- Research at the University of Warwick have taken high tech gas sensors normally used to test components for premium cars and applied the same techniques to human blood, human urine, and even cow dung samples from local cow pats. The results could lead to a new high tech medical tool that could provide a fast diagnosis for some of the most difficult gastrointestinal illnesses and metabolic diseases

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Fermentation of undigested foods in the colon by its resident bacteria affects not only colonic health (protection against inflammation and tumour formation) but also influences metabolic health. Studying fermentation and the volatile organic compounds (VOCs) it generates directly is difficult due to lack of easy access to the colon.

Researchers from the University of Warwick's innovation specialists WMG have devised a solution to this problem using a special suite of equipment normally used to test car components for premium cars. The equipment heats car material samples to see what range of "volatile chemicals" (essentially gases) are emitted from car components to understand what implications that would have for air quality in the car

and how it might affect the future recycling of the component. The car researchers wondered if this high tech equipment for studying volatile chemicals in premium cars would also assist their medical colleagues seeking to study volatile organic compounds from the human colon.

The University of Warwick WMG researchers Dr Mark Pharaoh and Dr Geraint J. Williams invited medical consultant Dr Ramesh P Arasaradnam (a Clinician Scientist and Lecturer in Gastroenterology in Warwick Medical School and a Gastroenterologist at University Hospitals Coventry & Warwick) to work with them to advise on how they could test their equipment on organic matter. Professors Sudesh Kumar, Chuka Nwokolo and K D Bardhan, from Warwick Medical School, also joined the team.

The gas products of fermentation include various volatile organic compounds, the relative proportions of which may change in disease. The research team have coined the term ‘fermentome’ to describe the complex interplay between diet, symbiont bacteria and volatile gases The clinical researchers in the team believed that the research engineer’s equipment could help them study such a ‘fermentome’ which could then be used for diagnosis and disease characterisation. Measurement of VOCs through non-invasive methods could then have an important application as a hypothesis-generating tool and could even have clinical applications.

The joint clinician and engineering research team have now performed tests using the car analysis equipment on human blood, human urine, and even cow and horse dung harvested from locality. The results so far suggest that the equipment could indeed be used to obtain a useful picture of the range of fermentation gases produced by this organic matter. Knowing what those mix of gases are could therefore provide a useful analogue understanding of what gastrointestinal illness or metabolic diseases are afflicting patient.

The team have just published that research in a paper entitled “Colonic fermentation - More than meets the nose” in the journal Med Hypotheses. The research team are now exploring funding options that would allow them to take this new technique into a larger scale studies including clinical trials.

Dr Mark Pharaoh said:

“These early results suggest that we could indeed use this automotive technology to give medical consultants a very precise understanding of the mix of gasses being produced within the human gut. An understanding of the precise mix of gasses is a very valuable clue to understanding any problem with the balance and mix of bacteria that are generating those gases.”

Dr Ramesh P Arasaradnam said:

“This is could be a vital new tool in the diagnosis of gastrointestinal as well as metabolic diseases. Gaining first hand information of what is going on in the gut would require very invasive procedures. Even simply culturing the bacteria from a patient’s urine or faeces takes a considerable amount of time. This technique could give medical consultants such as myself valuable information about what is causing a patient’s condition long before the data from a standard bacterial culture would be available.”

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Provided by University of Warwick (news : web)