Metabolic Profiling at the Oregon Institute of Science and Medicine

Scientists at the Oregon Institute of Science and Medicine, a nonprofit research institute near Cave Junction in Josephine County, have been working for more than 30 years to improve diagnostic, therapeutic, and preventive medicine. Now, they need your help. They need to calibrate very advanced diagnostic and predictive health measurement technology with urine samples from the public.

As we live, our bodies produce thousands of different chemical substances required for life. Also produced are many substances that are discarded as by-products. These substances – which make their way into our urine and breath – contain a wealth of information about our current and future health.

For example, consider the scourge of breast cancer. This disease develops slowly and eventually leads to detectable symptoms. It is of great importance to detect breast cancer as early as possible, take steps to prevent it, and – if it occurs – to monitor it very carefully during medical therapy.

It would be best to detect breast cancer so early that the increased probability of the disease could be fought therapeutically instead of the disease itself.

Modern urine analysis techniques can measure thousands of metabolic substances simultaneously and have potential to detect diseases long before symptoms appear. They can do so, however, only if they are calibrated with urine samples from people prior to the time that disease symptoms are evident.

So, in the case of breast cancer, it is necessary to build a bank of cryogenically stored urine samples from women who have breast cancer, women who later develop the disease, and women who do not. With these samples, modern urine analysis technology can be calibrated to provide the most useful information to stop breast cancer in the future.

An Appeal from Art Robinson

My name is Art Robinson. I am a scientist who has lived and worked in Josephine County for 34 years. My colleagues and I are developing improved methods for the measurement of human health. Please consider giving us – a sample of your urine.

In 1968 my coworkers and I, including Linus Pauling and 20 other scientists and engineers from Caltech, Stanford, and UCSD, originated a new and powerful method for the measurement and optimization of human health.

Between 1968 and 1978, we built the finest laboratory in the world for the quantitative analysis of metabolic substances in urine and

We need samples of your urine in order to calibrate analytical procedures that can revolutionize the evaluation of personal chemistry – and thereby improve our health, our happiness and prosperity, and even the academic performance of our children in school.
breath, and we measured between 50 and 200 biochemi-
cals in the urine of about 15,000 people. These measure-
ments and the mathematical methods we developed to uti-
lize them gave far more information about personal health
than is possible with traditional medical procedures.

This work established a medical science now known as
“metabolic profiling” and proved the utility of our ideas,
but the methods we developed were then so far at the lead-
ing edge of science that they did not become a part of med-
ical practice.

Since then, analytical and computer technology has
greatly advanced. We now have methods that can measure
and evaluate more than 2,000 metabolic substances in a
urine or breath sample – quickly and inexpensively. As you
can imagine, this is far superior to the 20 or so substances
usually measured today in an ordinary medical examina-
tion.

This technique will, however, become useful for preven-
tive and diagnostic medicine only after it is calibrated by
measurement of samples of urine from a large number of
people covering the full spectrum of good and ill, current
and future health.

The Oregon Institute of Science and Medicine has built
the analytical and cryogenic storage infrastructure re-
quired to do this calibration. All that remains is to collect
the needed urine samples and analyze and evaluate them.

Please consider helping us with this. For you and I, this
involves the contribution of a few drops of urine. Depending
upon our age and future events, we may not personally
benefit from participating in this work. Our fellow citi-
zens, our children, and our grandchildren, however, are
more likely to live longer, better, and more healthful lives
because we did so.

We are calibrating these techniques for medical use. We
are not engaged in medical practice. You may benefit from
participation in this project when these techniques are of-
fered by doctors in the future – but not by us. The only
direct personal benefit you may expect from helping us is
the satisfaction of knowing that you aided in an important
medical advance.

Living Longer, Better Lives

The figure here summarizes the objective of this research.
Frame (a) illustrates the current situation with respect to
human lifespan. While some people live long lives, most
die earlier. They succumb to all sorts of diseases. More-
over, this is not just a question of long life – it is a question
of quality of life. Early deaths involve much suffering, and
they reflect poorer health that should come only late, not
early in life.

The goal is to prevent these early deaths and suffering, so
that the curve becomes similar to that in Frame (b). This
can be achieved if modern technology is abundantly avail-
able to all people at very low cost. Medical research at the
Oregon Institute of Science and Medicine has this objec-
tive.

The goal of extending the intrinsic human life span, as
illustrated in Frame (c), is different. It involves discovering
and altering the fundamental biochemical clocks that time
the aging process. Other basic biochemistry research car-

The Oregon Institute of Science and Medicine is a non-
profit public foundation. Our work is supported by do-
nations from private individuals and organizations. Our
findings are published in the research literature and free
to be used by everyone.

Our goal in this work is to calibrate metabolic profiles,
so that they can be used in preventive, diagnostic, and
therapeutic medicine. The actual delivery of this tech-
nology to the public will be made by the usual medical
ried out at the Oregon Institute of Science and Medicine has this objective.

While these curves illustrate lifespan, it is important to realize that good health – good physical health, good emotional health, and even the intellectual performance of children in school are similarly affected. Biochemical health, as measurable in urine and breath, affects everything we strive to do.

Whether the objective is to optimize the health, prosperity and longevity of your children, other loved ones, or yourself, the goals and means of meeting those goals through biochemical research, including metabolic profiling, are similar.

Metabolic Profiling

This figure shows an analysis we made in 1972 of the volatile biochemicals in a human urine sample. The machine simply “smelled” the air over the sample and separated some of its chemical constituents from each other. Each peak is a different chemical. The area of the peak gives the amount present. Similar analyses were made with human breath.

The machine we built to do this is shown in the picture below. It could measure about 200 substances – already far beyond the approximately 20 substances usually measured in a medical examination – in 4 samples during a period of 6 hours and required two ounces of each urine sample.

The picture at upper right shows Laurelee Robinson computing the results of an experiment where profiles for human diseases were discovered in urine samples in this way.

The thin light-colored object on the right side of Laurelee's computer was the most advanced minicomputer disk storage drive at Stanford University when we acquired it. It cost $20,000 and had a capacity of one megabyte, Mb.

The picture on the lower right shows the analytical device we use today. This specially adapted mass spectrometer can measure more than 2,000 biochemicals in a tiny drop (1/3000th of an ounce) of human urine in less than a minute.

In the 1970s, we could already detect metabolic profiles for breast cancer, multiple sclerosis, muscular dystrophy, and the degenerative processes of aging.

With current technology, the profiling of existing conditions is much better. We expect (but need the urine samples we hope you will help us to obtain to do this) that we will be able to see many degenerative diseases with this technology before disease symptoms are evident.

Most importantly, this technology is so fast and potentially inexpensive that it could be made available at very
low cost – so low that ordinary people could have access to it as easily as they buy a soft drink from a vending machine.

I will never forget my wife Laurelee’s last words before she went to sleep for the last time. She had a stomach ache. I asked her if she wanted to go to the emergency room. That room, however, was a long drive away for a sick woman in the middle of the night. She said she preferred to wait until morning.

Morning, for her, never came. She died that night at age 43 from a rare pancreatic disease that could have been detected much earlier and treated successfully – detected by the analytical techniques that had been, in addition to her children, her life’s work for more than 15 years.

Millions of such stories could be told about the unnecessary deaths that have occurred since that time. It is time to bring this technology to ordinary people. It is time to stop these deaths.

Goals

The purpose of this project is to measure and calibrate the more than 2,000 biochemicals that can be analyzed quickly and inexpensively in an individual human urine sample and thereby correlate the patterns in them with personal health:

1. To measure health quantitatively. All human performance, including academic excellence in school, athletic ability, interpersonal relations, work effectiveness, and many other abilities, depends upon optimum health. This technique can aid in optimizing each person’s health.

2. To measure physiological or biochemical aging. This tells us the overall chance of a fatal condition arising. If this is quantitatively measured, then life style and medical steps to reduce it can be taken and objectively evaluated.

3. To measure the chance of specific illnesses, thus allowing treatment of the probability of illness rather than illness itself – early, when the chance of success is higher.

4. To detect, diagnose, and monitor the severity and progress of overt disease, thereby facilitating therapeutic treatment.

These goals are shown diagrammatically in the figure to the right. The quantitative patterns found in urine are mathematically converted to the positions of the X marks shown on the linear axes. Once this is done – conveniently and inexpensively – then the positions of the X marks for each person can be adjusted to improve his or her life, by means of changes in lifestyle or by medical therapy.

This is analogous to controlling one’s personal weight. If no scale were available to measure your weight, it would be difficult to follow your progress. Of course, weight can be seen qualitatively by looking in a mirror. Biochemical health cannot be viewed in this way, and, in both cases, numerical measurements are better.

Medical science, like all other sciences, depends on careful quantitative measurement. This is especially difficult in the complex biochemical systems upon which human life depends. Now, modern technology is solving this problem.

Please Help Us With This Research

In order to carry out this research, we need a small urine sample from you. Please mail the attached card to the Oregon Institute of Science and Medicine. We will send to you, by return mail, a sample container and box with which to mail the sample to the Oregon Institute of Science and Medicine laboratory. Your sample will be stored in special cryogenic freezers that we have installed for this purpose.

You will also receive a brief questionnaire asking your age, sex, and some simple health questions. About six months later, we will contact you again and ask for another sample. While you are under no obligation to continue, a series of samples at six-month intervals makes possible longitudinal experiments that are of increased value.

We and our colleagues, over a period of more than 40 years, have worked to improve the quality, quantity, and length of human life. Please help us with this.