

MWPCs in Medicine

At Leeds General Infirmary, Dr Tony Horsman is about to complete a year's successful clinical trials on the measurement of bone mass, using a new technique in densitometry developed and refined in collaboration with Dr Eddie Bateman here at the Rutherford Laboratory.

Why

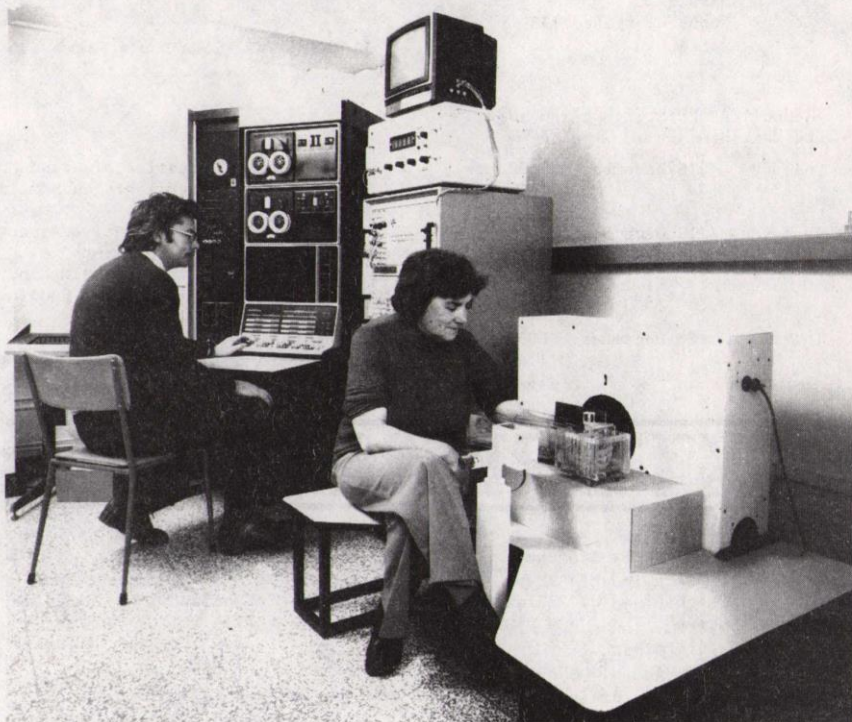
Loss of bone occurs in all adults, but the rate of loss differs from person to person and in females the loss generally starts earlier in life and progresses at a higher rate than in males. In women the bone loss starts at about the time of the menopause, being quite rapid at first, then tailing off into a more gradual loss after a few years. However in some cases the rate of loss remains relatively high, due to disease or severe hormone imbalance, and as a result their bones become weakened to the point where spontaneous fractures are likely to occur. It is with these patients that Dr Horsman is primarily concerned.

Where

Bone loss tends to be most rapid at the ends of the long bones and in the spine where the bone tissue has a sponge-like structure. Breakages occurring at the wrist, neck of the femur (hip) and crush fractures of the spine (in which the vertebral bodies collapse) are due to excessive loss of this "trabecular" bone, and are usually the first clinical sign of the disorder. An accurate method of measuring the amount of bone and of pinpointing the same site easily and reproducibly is therefore essential in the diagnosis and consequent treatment of this condition, where the rate of loss is only about 2 to 3% per annum in extreme cases.

How

The Densitometer developed here at the Rutherford Laboratory is one of the most sensitive instruments of its kind in use at present. At the heart of the system is a Multiwire Proportional Counter (MWPC) initially developed for particle physics research, and later re-designed for imaging the limbs using an X-ray source. In practice, the wrist is placed between a radioactive



With the assistance of a 'control', Tony Horsman demonstrates the measurement of the wrist for bone loss. In normal use the patient is shielded.

gadolinium source and the MWPC. The X-rays from the source are absorbed in differing degrees by different bone thicknesses. The MWPC in effect detects the spatial patterns of X-rays passing through the wrist and data from the MWPC is fed into a PDP-12 computer which generates a colour coded image (resembling a coloured radiograph) on a TV screen.

By making reference to the image, sections of bone are then chosen for measurement, and the bone mass within several pre-defined zones is evaluated.

Then

Because the radiation dosage is low, pictures can be taken at fairly frequent intervals (typically every 3 months) to assess the changes occurring in the patient. This method of measurement therefore enables the effectiveness of treatment to be monitored with high precision. Treatments currently under investigation include oestrogens or calcium supplements with or without vitamin D.

Clinical trials have confirmed that this new densitometer is a highly accurate instrument for measuring the amount of bone in patients with metabolic bone disease. Plans are now in hand for the building of another similar unit for monitoring the spinal column.

NEWS FLASH

Professor Allan Cormack of Tufts University Massachusetts, joint winner of the NOBEL PRIZE for MEDICINE, will be visiting the Laboratories on 17 December. It is hoped that he will give a talk in the Lecture Theatre at 1400 hrs, for all Laboratory staff.

Together, he and Dr G Hounsfield, pioneered computer-assisted X-ray tomography (body section radiography) which has led to remarkable progress in medical diagnostics over the past few years.

Please watch for TODAY NOTICE!

INTERNAL Events

RUTHERFORD LABORATORY LECTURE LECTURE THEATRE - 1515 hrs

13 Dec: Mr R J H Beverton CBE FRS/NERC
"The Work of the Natural
Environment Research Council"

SPECIAL LECTURE LECTURE THEATRE

17 Dec: Prof Allan Cormack/Tufts Univ.
Mass.
Nobel Laureate 1979

THEORETICAL PHYSICS MEETING 1979 LECTURE THEATRE

Tuesday 18 December 1400 hrs
1600 hrs

Wednesday 19 December 0950 hrs
1145 hrs
1415 hrs
1605 hrs

Thursday 20 December 0950 hrs
1145 hrs
1415 hrs

HEP LECTURES CONFERENCE ROOM R61 - 1100 hrs

12 Dec: Dr G Thompson/QMC
"Diffractively Produced
Resonances at High Energies
in ($\Lambda \Lambda \Lambda$) Final State"

9 Jan: Dr P V Landshoff/Cambridge
"Large-t Elastic Scattering"

SAFETY FILM SHOW LECTURE THEATRE - 1230, 1315 & 1400 hrs

11 Dec: "All in a Day's Work"

NIMROD LECTURE LECTURE THEATRE - 1400 hrs

10 Dec: Dr R Tripp/CERN & Berkeley
"In Search of Baryonium"

CAROL SERVICE LECTURE THEATRE - 1230 hrs

14 Dec: "Christmas Carols"
Everyone Welcome

G G Ross/Oxford - "Theories of Grand Unification"
W G Scott/CERN - "Experiments on Scaling in D.I.S. and Drell-Yan"

R Petronzio/CERN - "Perturbative Aspects of QCD"
S Orito/DESY - "e⁺e⁻ Experiments"
M Rees/Cambridge - "Stellar Evolution, Cosmology and Elementary Particle Physics"
S Mandelstam/Berkeley & Paris - "Confinement"

P di Vecchia/CERN - "Recent Results in Non-Perturbative QCD"
N Cabibbo/Rome - "Charm Particle Decays"
C Itzykson/Saclay - "Lattice Calculation in Gauge Theories"

EXTERNAL Events

THEO.PHYS.SEMINARS T.P.D.CONF.RM.AERE - 1400 hrs

11 Dec: Dr R Bullough/AERE
"Mechanisms of Radiation
Creep"

ASTROPHYSICS SEMINARS F5 CONF.RM.CULHAM - 1400 hrs

12 Dec: Dr Duncan Bryant/Appleton
"Plasma Physics in the
Magnetosphere: the Aurora
and 'Firewheel' "

THEO.PHYS.SEMINARS MANCHESTER - 1430 hrs

12 Dec: Dr J C Owen/Manchester
"A Variation (hypernetted-
chain) Theory for the Ground
States of Quantum Liquids"

PHYSICS COLLOQUIA H H Wills Lab BRISTOL - 1630 hrs

10 Dec: Prof J Dutton/Swansea
"Electrical Breakdown of
Gases at High Voltage"

THEO.ELEM.PART.PHYS.SEMINARS NPD OXFORD - 1430 hrs

14 Dec: Dr L Tyburski/Oxford
"Gauge-fixing Conditions and
Constraint Equations"

SHEP SEMINARS SOUTHAMPTON - 1430 hrs

14 Dec: Prof D J Wallace/Edinburgh
"Field Theories of Surfaces"

Training

COURSES

LOUGHBOROUGH UNIV OF TECHNOLOGY
20-25 Jan: "The Organisation and
Control of Research and
Development Projects"

27-30 Jan: "Industrial Noise
Measurement Assessment
and Control"

24-29 Feb: "Project Organisation
and Control"

20-25 April: "Engineering Noise Control"

UNIVERSITY OF SHEFFIELD

14-18 Jan: "Metal Rolling"

4-8 Feb: "Finite Elements for
Mechanical Engineering
Design"

25-29 Feb: "Gear Design"

UNIVERSITY OF SOUTHAMPTON

7-11 Jan: "Microprocessor Application"

AERE

4-8 Feb: "High Vacuum Technology"

25-29 Feb: "Magnet Systems Design"

CONFERENCES

12-14 April: COMPUTER GRAPHICS
(Birmingham)

2-4 July: INTERNATIONAL CONFERENCE
ON DATA BASE
(Aberdeen)

Further information may be obtained
from the Training Section R20
Ext 6285/266.

Found

Would the owner of a bunch of keys
with a metal tag bearing the legend
"Subway Key to R1 Stores", please
contact M E Fry Ext 495.

OVERSEAS Visits

W M Evans to CERN from 9-21 Dec -
shift running on ISR Jet.
M H Key and C J Webb to Leipzig from
9-15 Dec to attend Laser Conference.
L P Baldwin to Amsterdam from 10-11
Dec to attend SIC-IGO interface
meeting.
J J Thresher to CERN from 10-12 Dec
to work on hyperon experiment.
S A Ballard to CERN from 10-14 Dec to
work on Experiment 223.
J Hoskins to DESY from 10-14 Dec to
work on TASSO.
J Jenkins to DESY from 10-12 Dec for
financial discussions.
D Clarke to DESY from 11-19 Dec to
work on JADE.
E A Buck to Hengelo from 11-12 Dec to
attend IRAS telemetry meeting.
L C W Hobbs to Karlsruhe from 11-12
Dec to attend ILL Steering Committee
meeting.
J Litt to ILL and CERN from 12-19 Dec
for Open Day discussions and to liaise
with laboratory film crew.
R L Roberts and N H Cunliffe to Zurich
from 13-14 Dec for progress meeting.
J C Hart to CERN from 16-19 Dec -
Open Days discussions.
A Astbury to CERN from 17-19 Dec to
attend CERN UAI meeting.

STELLA

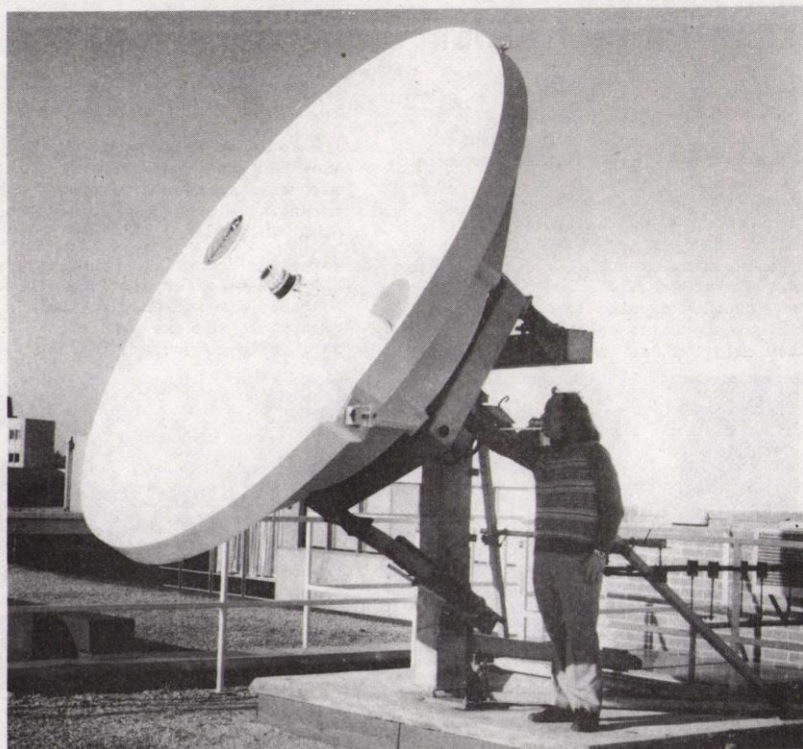
Another beautiful dish has arrived on site. The small intruder has not come to rival its big sister across the way, but is the Chilton end of a fast data transmission facility STELLA (Satellite Transmission Experiment Linking Laboratories). Mounted on the roof of R27, the 3m antenna is the visible half of a small ground station, supplied by Marconi, which was handed over to the Laboratory on Friday 16 November.

Successful Tests

On Saturday morning 17 November the first blocks of data were sent at 1 megabit/sec through the earth station on the 48,000 mile round trip to the orbital test satellite (OTS) and back testing the whole system involved in moving data, accurately over long distances at very high speed. This highly successful exercise has shown that in all respects the earth-station is performing even better than its specification. The experiment aims eventually for very low bit error rates in the 10^{-9} to 10^{-10} region and there is every reason for confidence that these error rates will be achieved. One of the early objectives of the experiment will be to measure the bit error rates in a variety of weather conditions.

Earth Stations

The experiment STELLA involves linking together five high energy physics laboratories, CERN, DESY, Rutherford, Saclay and INFN Pisa. Laboratories at Dublin and Graz (Austria) will also take part in the experiment, their interest being in transmission studies. The earth stations are simple, small and relatively low cost. They can be installed on a customer's premises and normally operate unattended. The 3m dishes are small enough for roof mounting and produce sufficiently broad beams to make automatic tracking unnecessary. Transmission in the higher frequency bands 11 - 14 gigahertz allows the use of small antenna whilst only just entering the wavelength region where signal attenuation by rain becomes a problem. The transmitters produce an output of about 100 watts.



The 3m dish antenna on the roof of R27.

Data sent to the OTS from each of these centres is broadcast back to earth over a wide geographical area of Western Europe, and can be received by any suitable earth station in this area. The Rutherford Laboratory earth station is on loan from the Department of Industry for the four year duration of the experiment.

Soon Ready

CERN's earth station has been physically installed by Marconi and will be fully commissioned in a few weeks time. The electronics of the station will then be taken to the test laboratories of the Swiss Post Office for frequency stability and safety checks. If all goes to plan, it should be possible for the first tests of data transmission from CERN to Chilton to take place early in January 1980. The earth station at Pisa is due for delivery in January 1980 and that at DESY in April.

International Links

In the early months of 1980 the aim of the experiment will be to develop a reliable and easy-to-use service to transmit large blocks of data at high speed from the international accelerator centres back to the home bases. Once the service is in operation, investigations of the benefits in terms of faster analysis of data, reduced programming effort and reduced need for travel, will be carried out.

The experience gained via STELLA and from many other experiments using the OTS will provide information useful for the planning of Europe's communications in the 1980s.

(We thank John Burren for the information contained in this article).

Export Arrangements

The last dates for delivery of consignments to R & D R56 for EXPORT prior to Christmas by normal arrangements are as follows:-

By AIR - Midday MON 17 DECEMBER
By ROAD - Midday TUES 11 DECEMBER

Normal services will be resumed the week beginning 7 JANUARY 1980.

There will also be some restriction of IMPORT movements.

Missing

It must be endemic - another bicycle has gone missing! This time its Ladies bicycle No SRC2, serial number 10578P, from R27. Please notify Mr J Bellis Ext 6393 if you know of its whereabouts.

Would anyone knowing the whereabouts of the following items, please contact Mr D Gibbings R2 Ext 6230.

2 ATP Power Units
Type SSU 1050
Serial Nos 41 & 99

3

All in a Day's Work

This film shows some of the Health & Safety Executive's Inspectors at work.

This site is visited by Inspectors from a specialist branch of the Inspectorate called FI10. The film clearly demonstrates the responsibilities and powers of these Inspectors.

The Safety Officer will give a brief introduction to the film before each showing.

More Power to Their Elbows

Security Warden, Fred Robins, appears to be a very persuasive man. Not only did he organise a badminton marathon in August to raise funds to provide new two-way radios for the two medical group practices in Wantage - but also provided a surprise guest celebrity, Pam Ayres, to make the presentation of a cheque for £1300 to Drs George Greenhalg and John Hawkey on Saturday evening 17 November. The presentation celebration, a thank you to all those involved in the event,

was of course also organised by Fred.

Jim Denly of R56 Stores and Andy Ferryman from the Atlas Centre were also sponsored to play in the marathon, alongside Fred and two other local men.

We at the Rutherford Laboratory would all like to offer our congratulations to Fred, Jim and Andy on their remarkable success with such a worthwhile community project.



Fred Robins (front left) Jim Denly (centre back) and Andy Ferryman (back right) with co-players and a young helper, after their marathon game.

On - Site Filming

During the week of 19 November you may have seen a film crew around the Chilton Site - you may have even been immortalised during the shooting! Mr Michael Hall, of Bristol University, is producing a new colour film of the activities of the Rutherford and Appleton Laboratories at Chilton. The film will be ready in time for a series of Open Days at the Chilton site from 8-12 July 1980.

The film will be used as an introduction for visitors to the site and, because of its scientific content, will also be interesting to science students, teachers, etc. The crew will be filming at Grenoble and Geneva for one week in December and plan to be back on site for some closing shots early next year.



Christmas in the Restaurant

The Restaurant Committee has decided that the Traditional Christmas Lunch should be cancelled this year, and that instead Celebrations are to be held in the week preceding Christmas.

The Restaurant will be decorated in the usual seasonal way, and throughout the week a more elaborate menu will be available with extra facilities for wines and spirits.

As Christmas approaches full publicity will be given to the menus so that everyone will be able to choose a day in comfort and make eating in the Restaurant at Christmas more enjoyable.

Christian Fellowship

This years Christmas Carol Service will be held in the main Lecture Theatre at 12.30 p.m. on 14 December. It will be led by the Rev R Thomas of Abingdon. The AERE Choir conducted by Mr Ernest Harding will lead the singing and the organist will be Mr Terence Carter, F.R.C.O. On 20 December, we are having an informal discussion "Why Christmas" at our usual venue the R2 Conference Room also at 12.30 p.m.

"Why not come and join in?"

Ever Wanted to Write to

Your Computer?

Quest Automation will be demonstrating how to do this, using their new "Micropad", in the Colloquium of the Atlas Centre at 2pm on 11 December 1979

An ordinary ball-point pen is used to write on the pad and into a computer at the same time. Mistakes can be erased merely by writing the correct letter over the error.

The demonstration should be of interest to anyone concerned with entering data into a computer, particularly those who need to use staff to enter information who are trained neither in typing nor computing, eg for maintaining staff records, inventories, or catalogues of one sort or another.

For further information, contact K M Crennell Ext 6397.

Calling all Cars

Now's the time to join the CSMA (Civil Service Motoring Association) and NBCD ("National Breakdown") - for all information, please phone Ron Hogan Ext. 284.



RUTHERFORD LABORATORY

BULLETIN

Deadline for Insertions

1000 hrs. Monday 7 January 1980.

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