The kidney is receiving more attention nowadays. Prolongation of life in the patients with chronic renal failure by repeated hemodialyses and the partial success of renal transplantation have intensely stimulated the activity of those working in this field. Can chronic renal disease problems be readily solved by renal transplantation? How long can life be maintained by chronic dialysis? I do not think there is a real solution to these questions at the present time.

For many years, since I was a medical student, I have been fascinated by the work the kidney does in maintaining the internal environment of the body. The term "internal environment" was originated by Claude Bernard. He pointed out nearly a century ago that the true medium in which we live in is not air, water or the external surrounding, but the plasma or tissue fluid that bathes all the tissue elements. It is from this that the term "internal environment" arose. The constancy of the internal environment, as operated upon by the kidney, is an extremely remarkable phenomenon. Homer Smith, our pioneer in renal physiology, at one time said, "Bones can break, muscles can atrophy, glands can loaf, even brain can go to sleep without immediate danger to survival. But should the kidneys fail...neither bones, muscles, glands nor brain could carry on." This statement, although disagreed by the other medical specialists, is quite agreeable to the nephrologists including myself.

For those who have been working in the hospital for years life seems to be monotonous, and it would be boring to read anything pertaining to mankind. I think the animals and their ways of living are far more interesting to study. Do you ever ask yourself how fishes live in water? How do animals survive in the hot desert? These simple questions are still open for the extensive research. I certainly believe

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that the better knowledge on animals especially the ways they live may some day lead to the better understanding of human diseases, and may even have some therapeutic application.

Let us begin from the sea. The composition of the ancient sea in Cambrian period in regard to electrolytes was very much like that of the body water of the animals that lived in it. One should not be surprised to see in most of the textbooks on fluid and electrolytes a table comparing the electrolyte concentrations of body fluid with sea water. This is simply to give credit to the sea as the mother of life.

Since the earth was subjected to continuous changes, mutation of lives continuously went on. The varieties that were unfitted to survive were pruned away by natural selection, leaving the better adaptable ones to get along as best they could. In biology mutation is fundamental to evolution. I would like to bring up a sonnet written by Dr. Maurice B. Strauss to the attention as a prelude to the discussion.

In the beginning the abundance of the sea
Let to profligacy
The ascent through the brackish waters of the estuary
To the salt-poor lakes and ponds
Made immense demands
Upon the glands
Salt must be saved, water is free
In the never-ending struggle for security
Man's chiefest enemy
According to the bard of Stratford on the Avon
The banks were climbed and life established on dry land
Making the incredible demand
Upon another gland
That water, too, be saved.

The problem of origin of the first chordate in the sea remains in a sadly unsatisfactory state. Whatever it may be, it is reasonable to state that the body fluid
of the sea animal was iso-osmotic to the sea water. The excretion of the waste product
was by way of coelomic cavity, which was finally eliminated from the body. During
the period of mountain formation they migrated to the fresh water. Because of the
hypotonicity of the fresh water there was an osmotic shift into the animals. The ostracoderms
and the early fishes had to compensate for this excessive influx by increasing
the excretion of water. Evolution frequently works by adapting old things to new uses,
and it seems that no better way could be devised to get the surplus water out of the
body than to have the heart to pump it out; and the easiest way to do this was to
prepare a filtering device by bringing the preexisting arteries into close juxtaposition
with the preexisting coelomic tubule to form the glomerulus. By this mean the
excessive water was eliminated, the threshold substances were reabsorbed by the tubule,
and the constancy of the internal environment was maintained. In addition, in the
ostracoderms the water influx was partly reduced by the covering bony structure.

Toward the end of Silurian period the restless earth began to heave again.
The fishes found themselves forced to choose between the invading sea water and the
isolated fresh-water pools which periodically contracted into stagnant swamps or hard
mud flats. Among the group that chose the sea water were the teleosts and the
elasmobranchs. Those escaped to the stagnant water started to invent lungs and
prepared the way for the evolution of the terrestrial vertebrates. Some of the fresh
water fishes learned to use their fins for feet to crawl from one pool to another. Were
they the ancestors of the Carboniferous and Pennsylvanian amphibians? The teleosts
would have suffered osmotic dehydration and ultimate desication after their migration
had it not been for the gills that could actively transport salt. Hypotonic urine was
no longer needed when water had to be conserved. The glomeruli seemed unnecessary.
With the passing years the glomeruli grew smaller, smaller and finally to almost
degeneration. The elasmobranchs which include sharks, rays and skates accomplished
the same goal by developing a state called "physiological uremia". The high blood
urea keeps the body fluid iso-osmotic to the sea water, and there is no osmotic fluid
shift. The shark blood urea nitrogen is found to be around 1009 mg/100 ml!
My trip to Roi-et with the mobile medical unit has further encouraged me to say a few words about the life in the desert. I have always been curious about the numbers and varieties of animals inhabiting in deserts, which are actually hostile places. One would wonder at the ability of these animals to survive without drinking water for a long period of time. The paucity of knowledge in this field has given the opportunity for research in this particular subject. All kinds of animals in the desert have the same water problems: the usual lack of drinking water and the environmental conditions that accentuate water loss by evaporation. They, however, have the solutions to the problems in different ways.

Amphibians are of particular interest in a consideration of adjustment to the desert condition. Because of poikilothermism certain anurans persist in arid regions by burrowing into the soil and remain quiescent for a long period of time. By this way the evaporation by skin is greatly reduced (1). At least four mechanisms play the role in physiological adaptation to terrestrial existence: 1. retardation of evaporation from the skin, 2. enhancement of water uptake through the skin when water is available under the influence of the antidiuretic hormone (2), 3. antidiuresis by the reduction of the glomerular filtration rate (3), and 4. reabsorption of water in the bladder, also under the action of antidiuretic hormone (4).

Reptiles adapt themselves in a different fashion. A relatively water impermeable skin provides a good protection against water loss from the skin although the loss from the lung by expiration still continues. The urinary wastes are eliminated in a solid or pulpy mass, mainly in the form of uric acid, with only little accompanying water. This is accomplished by uricotelism. The glomerular filtration rate which is already low in reptile due to limited vascularity (5) is further decreased by dehydration. It is interesting that in dry season the serum sodium of one kind of lizards (Trachysaurus rugorus) may go up to an average level of 196 mEq/L, the condition that usually is incompatible with human life. A concentration of 233 mEq/L can be tolerated for days without ill effect! Finally the reabsorption of water in the
cloaca from the hypotonic urine also helps in maintaining water balance since the nephrons apparently cannot from hypertonic urine. uric acid, because of its low solubility, is easily precipitated in the cloaca, and this enhances further reabsorption of water (7).

Because of homeothermism and non-fossorial habits of birds an obligatory evaporation cannot be avoided. Unlike some desert rodents metabolic water production in birds hardly balances the loss. The great evaporative loss is quite possibly due to the high expiratory rate at a high temperature. Although birds utilizes shade for protection they are still exposed to much more radiant heat than burrowing rodents. Hyperthermia is a regular feature of birds and is well tolerated. It is by this means that birds save the amount of water otherwise needed to dissipate the accumulated heat. The ability of the kidney to form concentrated urine by the presence of the loop of Henle and the operation of the countercurrent mechanism (8) is one step of evolution of the kidney above the reptiles. However, the concentration mechanism by itself is not effective, and uricotelism is still necessary for water economy of birds. Water balance in birds is therefore maintained by drinking mechanism, fruit eating habit, uricotelism and partly by the ability to concentrate urine.

The conservation of water by urine concentrating mechanism is highly effective in desert mammals. The kangaroo rat (Dipodomys merriami), because of the presence of long loops of Henle, is able to concentrate the urine as much as 5600 mOsm/L (9), the world highest urinary osmolarity! Kangaroo rats can maintain water balance on only their metabolic water production, while numerous seed-eating rodents can survive on metabolic water plus the free water in the air-dry seeds. Pulmonary water loss is probably reduced by condensation of moisture from the expired air on the cool nasal mucosa.

The camels are highly adapted to store heat in their bodies during the period of high temperature and dehydration. Furthermore, the utilization of urea in the lumen by the bacteria greatly decreases the osmotic load in the urine, and thus diminishes the urinary output during the period of dehydration (10). This mechanism is also operative in sheep. I often wonder whether it would be possible to decrease the blood urea in uremic patients if they are fed with this kind of bacteria. This might be a new approach to decrease the blood urea in kidney patients when the conservative treatment fails and dialysis facility is not available.
While our world of confusion is fighting for the so-called "peace", every life on earth, whatever it is, continues to struggle for existence by various ways of physiological adaptation. No matter what happens to the external environment, the internal environment must be kept constant. I shall bring this to a close with the saying of the great French Physiologist of the nineteenth century, whose contribution to the medical science is to the greatest of my respect and admiration. Again Claude Bernard. "All the vital mechanisms, varied as they are, have only one object: that of preserving constant the condition of life in the internal environment."

References

Complication of Cleft-lip Surgery

จาก THE CLEFT PALATE JOURNAL VOL 3. JULY 1966
โดย HANS R. WILHELMSEN, D.D.S. M.D.
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ผู้รายงานได้รายงานถึงโรคแทรกซ้อนที่เกิดภายหลังการผ่าตัดแก่ Cleft lip ในคนใช้ 585ราย ตั้งแต่ ค.ศ. 1950 - 1964 ที่ University of Pittsburgh’s Children’s Hospital. ว่ามีประมาณ 13.2% ดังรายละเอียดคือไปนี้: —

1. Major Complication 4.3% ได้แก่ — Pneumonia, — Breakdown of lip repair, — Postoperative hemorrhage

2. Minor Complication 8.9% ได้แก่ — Diarrhea — Otitis Media — Mild Upper Respiration Tract Infection — Partial Separation of the suture line.

ผลจากโรคแทรกซ้อนเหล่านี้ทำให้เกิดดังอยู่โรงพยาบาลเกิน 10 วันขึ้นไป เพื่อคลี่ดามโรคแทรกซ้อนผู้รายงานจึงได้แนะนาให้ยึดถือหลักในการเตรียมคนไข้เพื่อนำ Cleft lip คั้งต่อยไปนี้: —

หลัก 10-10-10

1. ควรทำในเด็กที่มีน้ำหนักคั้งต่อย 10 ปอนด์ ขึ้นไป

2. ควรทำในเด็กที่มี Hemoglobin เกิน 10 gm. %

3. ควรทำในเด็กที่มี W.B.C. ต่ำกว่า 10,000

โดยผู้รายงานได้เปรียบเทียบอัตราการเกิดของโรคแทรกซ้อนหลังผ่าตัดแก่ Cleft lip ใน 585 รายที่ทำผ่าตัดด้วย 0.034% ผิดคาดว่า อัตราเกิดของโรคแทรกซ้อนน้อยกว่า รายที่ทำผ่าตัดเคยในยี่เดือนหลังภูกัน 5 เท่า

สำหรับอัตรารายทางหลังผ่าตัดแก่ Cleft lip ใน 435 รายที่ทำผ่าตัดมี .034 %ในอัตราใน 435 รายหลัง ไม่มีการตาย

อนุ คิสศิรานนท์ พ.บ.
THE MORPHOLOGY OF LEVATOR ANI MUSCLE

by JOHN H. VENABLE from THE AMERICAN JOURNAL OF ANATOMY

SEPTEMBER 1966 volume 119 Number 2

การหลักเนื้อ Lavator Ani atrophy —

ความสามารถทำกาวหนูตัวผู้ผืนเกิดจาก
Myofilaments — แยกcultหรือแยก Myofibrils และทำให้มีการสูญเสียของ Sarcoplasm ไป
ประมาณ 2 ใน 3 ของเซลล์ เมื่อครบ 45 วัน

Atrophy ของ Levator Ani muscle จะหยุด

และมีการเปลียนแปลงของ Muscle fibers ซึ่งมี
ขนาดเล็กลง เฉียบซ้ายและเหนียวขึ้น แยกกัน
ไม่ออกออกจากเนื้อเดิมเท่านั้น

เมื่อฉีด Testosterone เข้ากล้ามเนื้อเท่านั้น

หลอดท่า (Neuter rats or mice) จะพบว่า Muscle
fibers จะديرส้ม jedenวาว แต่ไม่มีการเปลียน
แปลงของ Sarcoplasm จากการสังเกตพบว่า
Myofilaments เกิดสี Myo มีชัย คริสต์
ท.ฟ. fribils และ Myo fibrils จะไม่หรือ
แบ่งตัวออก มีขนาด ระหว่าง 0.5 — 1.5
Micron ลักษณะของ Cells ต่างๆ หนากิน สังคับ
เปลียนแปลงเป็น Atrophy และ Hypertrophy ก็อ
Contractile proteins หรือ Myofilaments นั้น

มีชัย คริสต์ พ.บ.
Beta-adrenergic receptor blocking drugs


The use of β-blockers may result in decreased cardiac output and consequently decreased systemic resistance. The use of β-blockers may also result in decreased oxygen delivery to the tissues, which may increase the risk of complications associated with cardiac arrhythmias.

1. Propranolol: A β-blocker that is commonly used to treat angina pectoris. It is used to reduce heart rate and blood pressure, and to prevent arrhythmias.

2. Quinidine: A β-blocker that is used to treat arrhythmias. It is also used to treat high blood pressure and to prevent the return of atrial fibrillation after a heart attack.
3. Propanolol — สามารถลดความดันใน Ventricle ใน idiopathic hypertrophic Subaortic stenosis และทำให้อ (*)(*) ตัวนิยม

4. ใน Tetralogy of Fallot — ยังผลทำให้ outflow tract obstruction ของ Ventricle — ช่วยลดคลองทำให้ Pulmonary blood flow ดีขึ้น.

5. Propanolol — ถูกนำมาใช้ร่วมกับ alpha — adrenergic receptor blocking drug เพียงจาก Cardiac arrhythmia — ใน preoperative และ Postoperative period ของผู้ป่วยเป็น Pheochromocytoma.

นอกจากนั้น beta adrenergic receptor blocking drug ได้ถูกนำมาทดสอบในผู้ป่วย Hypertension, Mitral stenosis, Hyperthyroidism และ Parkinson tremor แต่ผลที่ได้รับยังไม่ได้เป็นที่พอใจ

ส่วน Side effect — ของยานมีอยู่ได้แก่กลืนไม่ท้อง ท้องเด็ก นอนไม่หลับพี่นิวชินเบื้องต้น ความ Serious complication พบในรายโรคหัวใจที่เป็นมาก ยานจะทำการข้อง Heart failure — เนื้อหานน์

สุดท้าย อินทวัชสรศ์ ผบ.