FOR SCIENTIFIC RESEARCH AND CONFIRMATION

PAPPAS' PHYSIOLOGY OF THE CELL AND ITS ATOMIC ENERGY

$$\text{(Electrical} + \text{ATP) Trigger Energy} + {}_{11}Na^{23} + {}_{8}O^{16} = {}_{19}K^{39} + \text{Atomic Energy}$$
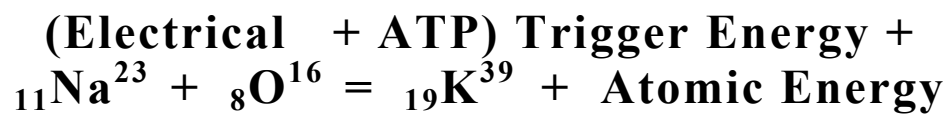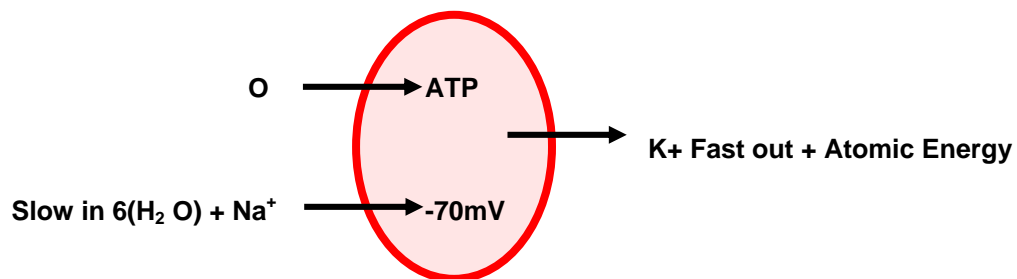
By Professor Dr. Panos T. Pappas

Athens, March 24, 2006

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CONTENTS

FOR SCIENTIFIC RESEARCH AND CONFIRMATION

PAP-IMI™
Ion Magnetic Induction System
"The   Spark   of   Life"

TOPICS OF PRESENTATION
by Prof. Dr. Panos Pappas, First presented
at **Starnberg, Germany, PAP IMI™ Conference, 2/3/02.**

*History, category of the device, other connections and existing devices
* Definitions & interpretation
* Demonstration
* Cases and suggested applications
* Protocols
* Possible working hypothesis
* Discussion

CONNECTIONS

* Lightning
* Sparks Muller 1956
* Electrotherapeutic Devices, Tesla & D'Ansorval, (also Rife's, Lakhovski's, Priore's)
* Nanopulsed Diathermies
* Surgical Diathermies - Coagulant Mode
* Surgical Lasers - Coagulant Mode
* Heart Defibrillators
* Modern Electroporators
* NMR (Nuclear Mgnetic Resonance) Generator, MRI (Magnetic Resonace Imagine) Generator
* PEMF (Nanopulsed Electromagnetic Field) Generator Device

DEFINITIONS

* PAP-IMI™,is a unique PEMF (Nanopulsed Electromagnetic Field) Generator
* It is unique because:

>   1. It has the highest instantaneous power in the range over of 1,000,000,000 Watts,
>   >1 Giga Watts, far exceeding devices of its kind.

>   2. It is the fastest device with a rise time in the range of some hundreds of
>   nanoseconds and an active period over pause period of less than .0000001
>   active time/pause time = 0.0000001.

The PAPIMI™ Device is Medically Approved for Magnetotherapy by **CE 0120** for the Member Countries of the European Union and Related Countries Directive 93/42//EEC Annex II by SGS NOTIFIED BODY, UK by **GOSSTANDART** MEDICAL CERTIFICATE for the Russian Federation and CIS Countries, and holds Licence # 0767E2003 S.S.A. by the Secretariat of Health, Mexico.

IDENTITY OF PAPIMI
MAGNETIC RESONANCE IMAGING THERAPEUTIC PARTNER
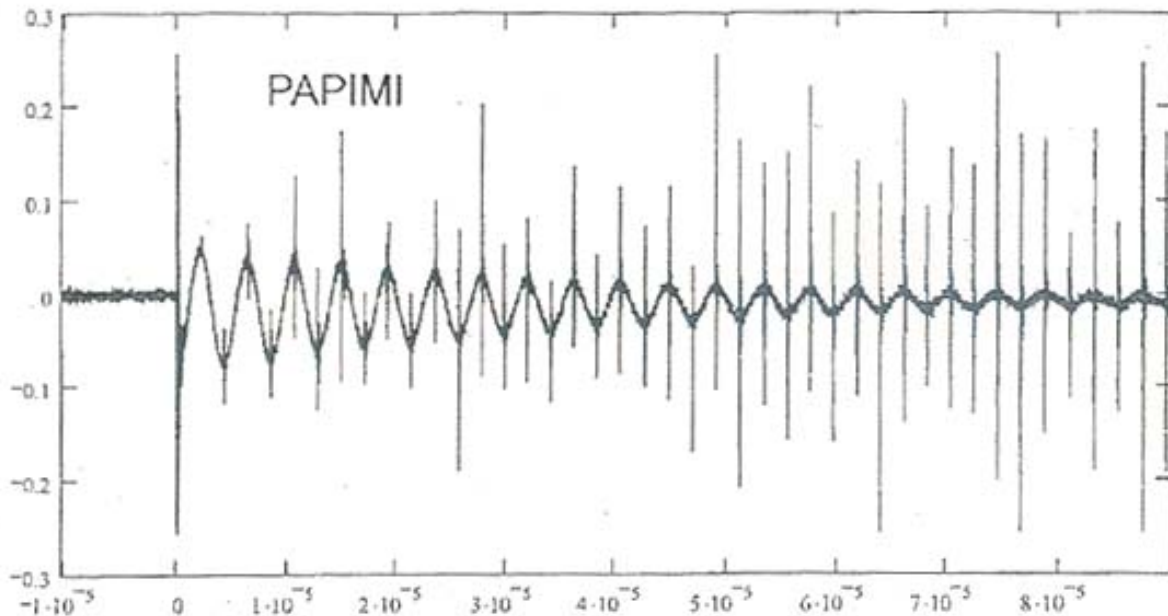
Oscillogram of the **PAPIMI**™ nanopulse

Note: The Nuclear Magnetic Resonance Emitted Echoes,
as the vertical spikes towards the end of the nanopulse
after their Relaxation,
as expected for a Nuclear Magnetic Resonance Event.
In a modern Diagnostic Magnetic Resonance Imaging (MRI),
these echoes are captured and analyzed
to form a diagnostic image with the aid of a computer.
PAPIMI, therefore,
has the power and the capacity to be a nanopulse generator
for a Modern Magnetic Resonance Imaging System
used in today's most advanced hospitals.
However, PAPIMI is intended to be used
as a Magnetotherapy Device.
It is classified as Magnetotherapy Device.
However, we see, the same time,
PAPIMI happens to be the therapeutic partner
of the modern MRI Diagnostic Devices, invented, worldwide
patented and developed the last 20 years by Professor Panos Pappas.

PAPIMI IS AN MRI NANOPULSE GENERATOR

PROFESSOR PAPPAS' PATENTS
BY THEIR OBJECTIVE CLASSIFICATIONS,

A61N2/00 - Magnetotherapy Medical Device.
G01R 33/28 - Nuclear Magnetic Resonance Generator Device.

**IDENTIFY PAPIMI AS A MAGNETOTHERAPY DEVICE
AND AT THE SAME TIME AS AN MRI GENERATOR.**

THEREFORE, THEY ALSO PROVE OBJECTIVELY FOR THE FIRST TIME TO
MEDICAL SCIENCE:

THAT ONE OF THE MOST ADVANCED AND KNOWN DIAGNOSTIC
TECHNOLOGIES -
IS ALSO A THERAPEUTIC TECHNOLOGY.

MRI IS KNOWN TO BE A SAFE DIAGNOSTIC TECHNOLOGY
(THE SAFE MAGNETIC RESONANCE IMAGING)

PAPIMI IS THEREFORE A SAFE THERAPEUTIC TECHNOLOGY
(THE SAFE MAGNETIC RESONANCE GENERATOR INCLUDED IN EVERY MRI)

DIFFERENCES OF PAPIMI AND AN MRI

An MRI uses a steady magnetic field for calibration purposes in the order of 2 Tesla (A Very Strong Magnetic Field)

PAPIMI uses the natural ambient magnetic field of the Earth, (No Strong steady Magnetic Field, at all).

An MRI uses magnetic nanopulses in the order of 5 to 10 KWatts average power.

PAPIMI uses in the order of 20 times less the average power (non focused) of an MRI.

There are more than 22,000 MRI Devices all over the world, diagnosing almost all organs such as the brain, the spinal cord, the heart, the nervous system...etc, for more than 60,000,000 people per year without side effects since 1970s,

PAPIMI is estimated to treat (without implants) almost all tissues and organs for 1,500,000 people per year for 15 years (since 1990) without side effects.

Possible Working Hypothesis

Enhances
* Penetration of matter into matter by the Hammer Principle,
* TMP
* Metabolism
* Blood circulation, Lymphatic movement
* Detoxification

Relaxes
*Muscle contractions, Tone and spasms

Dilates
* Arteries, veins and capillaries

Accelerates
* Healing of tissue, bone and nerves

Improves
*Immune and endocrinal functions

Eliminates
* Pain, inflammation, edema and swelling

* Rejuvenates tissues - particularly, nervous, brain and bone tissue.

* Enhances mental functions

* Eliminates Hyperactivity, Lack of Concentration, Mental retardation,

* Improves IQ, Memory and Mental Clarity) reflexes and senses:vision (colors, peripheral view and night vision), hearing, touch, smell, taste and mobility.

* Accelerates of slow-healing bone fractures
* Eliminates Chronic and acute back pain

* Increases Range of motion, flexibility and numbness

Enhances the Morphogenic Field of the Body
(consider a cancer state)

Finally Alleviates
*Various medical symptoms when nothing else works
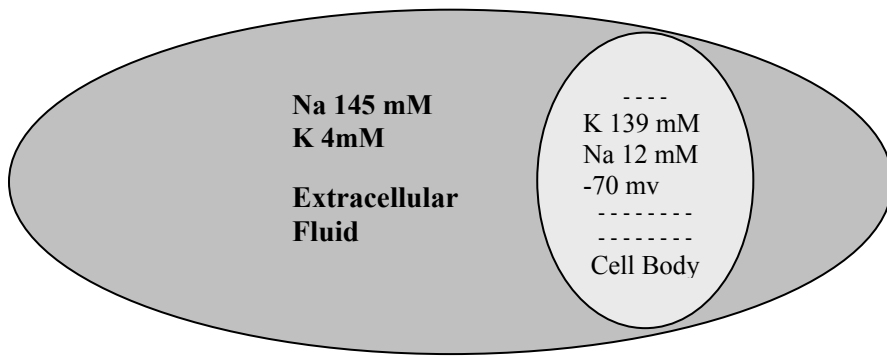
There is a close assosiation between the trans-membrane potential (**mV**) and the health state of the cell**:**

-70 mv,	-50 mv,	-15mv,	-12mv,	0 mv
Young and	Aged or	Cancer Cell	Cell Divion	Dead Cell

7

Healthy Cell   Sick Cell

Na 145 mM
K 4mM

Extracellular
Fluid

- - - -
K 139 mM
Na 12 mM
-70 mv
- - - - - - - -
- - - - - - - -
Cell Body

The above figure shows The K$^+$ and Na$^+$ distribution inside and out side the cell. The particular K-Na distributions cause a potential difference of the order of -70mv, between the interior of the cell and the extra cellular matter. This potential is called the trans-membrane potential. This potential is a key motive force for the cell intakes and metabolism. Absence of TMP for the cell causes for the cell to be in the state of death.

Diagram 1 indicates the relationship between the intracellular concentration of Na+ ions and the associated trans-membrane potential, as they are correlated with the health state of the cell. PAPIMI™ device moves TMP up and Natremia down, from the upper right of the curve towards the lower left part.
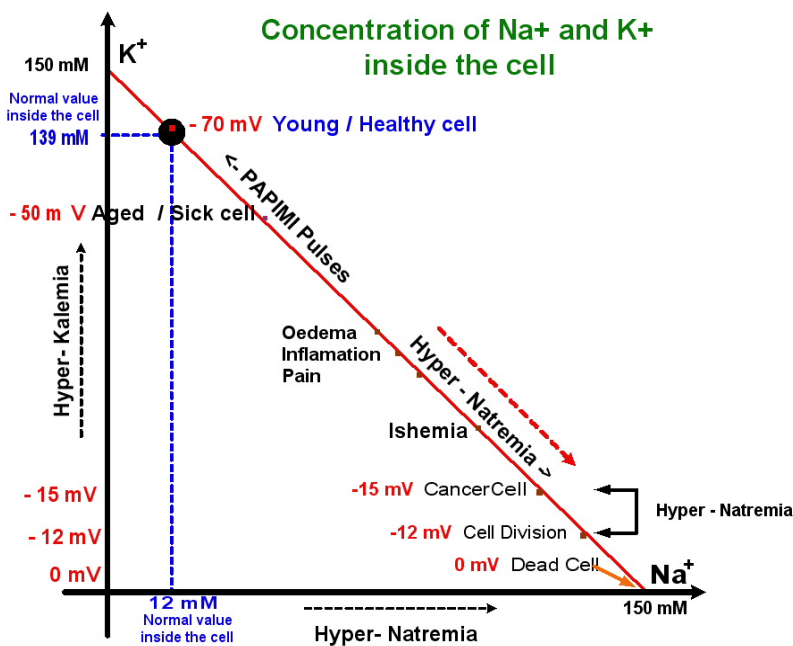

Diagram 2 indicates the relationship between the relative intracellular concentrations of K$^+$ and Na$^+$ ions, as they are correlated with the trans-membrane potential and the health state of the cell. PAPIMI™ device pushes the condition of the cell from the lower right to the upper left to the young and healthy condition, from Na$^+$ → K$^+$

Na, K are Metals : Metal – Metallon – Transmutable   Meta/Allon
Consider the most control state of life that of a coma state.

Enhances sodium potassium pump or the ***exothermic*** sodium potassium transmutation:
$_{11}Na^{23} + _{8}O^{16} = _{19}K^{39} + Energy$

which enhances TMP as well as, the reverse *endothermic*, **neuro-transmittal reaction:**

$_{19}K^{39} - _{8}O^{16} = _{11}Na^{23} - Energy$
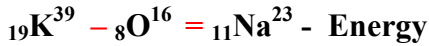
which is essential for the nerve and muscle cell vitality.
Explanation assuming Nuclear Transmutation of Na to K and K to Na by Oxygen transportation
$_{19}K^{39} - _{8}O^{16} = _{11}Na^{23} - Energy$
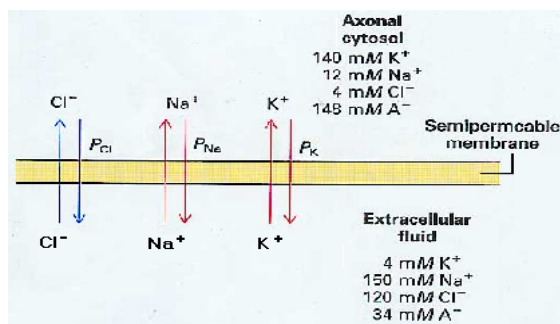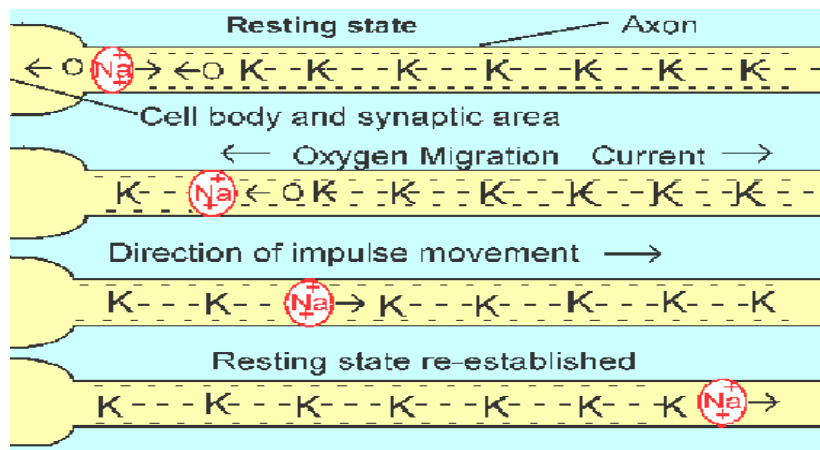
Ad-Hoc
Classical Explanation of Nerve Transmission with lateral entrance of Na
As suggested by the apparent validity of the Fundamental Equation
$_{11}Na^{23} + _{8}O^{16} = _{19}K^{39} + Energy,$
PAPIMI™ is found to have sysnergetic results with Oxygen Therapies and particularly
Hyberbaric Oxygen Therapy.
PAPIMI™ acting on **Na**
Oxygen Therapies acting on **O**
of the same equation.
Good Oxygenated Breathing is very much recommended along with PAPIMI™ treatments.
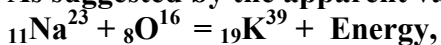
New Findings and Recommendations

Treat Aggressive Cancer frequently
several times a day 3-5 min each time.
Treat Slow Developing Cancer; once a day, every other day, 3 times a week or 2 times a week,
depending on the rate of cancer proliferation.
USE ONLY 2-3 PPS AT HIGH POWER FOR STRONG ATHERMIC NANOPULSES FOR THE ABOVE
SESSIONS.

Leukemia, treat long bones
Malaria
Peyrony's Desease, Enhances Erection
Enhances Fertility
Meningitis
Mental Retardation, Hyperactivity, Lack of concentration
Schizophrenia
Stops craving for drugs
Macular Degeneration
Lymes Disease
Epilepsy, Muscle Convulsions – acute and chronic

SUGGESTED Nutrition

Allways increase Nutrition intake
No special Diets. Must take a lot of Na(Cl) - Salt, Hydrocarbons, Oxygen, Antioxidants,
Selenium, Zinc, Alpha lipoic Acid, Melatonin, vitamins C, E, Alpha Beta Carotene, Olive Tree
Leaves, Itamus-Taxos,
Inhale Oxygen and treat,
Provide Insulin + Glucose to keep up metabolism
Nutrition to keep PH high – Alkaline
Increase or at least Stabilize weight.
No loss of weight is allowed. Special consideration should be given to underweight cases.

Underweight patient should receive reduced duration treatments.

Current ver. 2.00, 28/02/2004, ver 2.01. 11 / 05 / 2004

This Presentation is Under Continuous Evolution
Please check periodically for updates.
(In this evolution: The dual role of oxygen Oximutation - Oxidation is added, after the 6 hour lecture of the author at the Zurich PAPIMI International Conference of 28/2/2004, of the author, see below)

(Natural distribution of K isotopes is added. Comments about Pollution and Toxicity of Chemical Oxidation are added. Minor references - Animals that practically take no Oxygen (click towards the end), Notice for formula's **E=mc^2** correctness.

This Page is an HTM fast version from the Author's Breakthrough Power Point Presentation at the **International Conference "On PAPIMI Therapies"**,Salzburg, Austria, **1 - 3 /11/2002.**

This page is a Step in and Stand Up Voice by Acad. Prof. Prof. Dr. Panos Pappas for Scientific Truth against Contradiction and Tolerance in Scientific Knowledge and Critical Sciences.

YOUR SUGGESTIONS ARE VERY WELCOME HERE
papimi@papimi.com

Criticism against (none yet, over 135,953 web visitors in the first two months 3 years ago) or
Supporting evidence **(a lot received today)** is very much invited.
Submit your criticism or support with or without the indication to be published here, to:

ppappas@papimi.com, papimi@papimi.com

Oximutation and

Oxidation

The dual role of Oxygen
in Biology

by Acad. Prof. Prof. Dr. Panos Pappas

 Current ver. 2.00, 28/02/2004, upgrated after the 6 hour presentation lecture of the author at the Zurich International Conference on PAPIMI on 28/02/2004, at the Technopark, Technoparkstr. 1, CH 8005, Zurich.

Clasical Model : The no sense model

Cell

$2K^+$ → → $3\ Na^+$
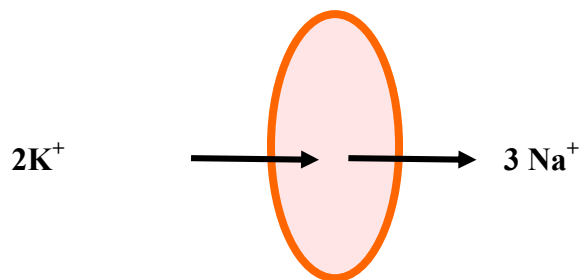
Pappas Model : The sensible model

$$(\text{Electrical} + \text{ATP}) \text{ Trigger Energy } +$$
$$_{11}Na^{23} + {}_8O^{16} = {}_{19}K^{39} + \text{ Atomic Energy}$$

Cell

O →

ATP → K+ Fast out + Atomic Energy

Slow in 6(H$_2$ O) + Na$^+$ →
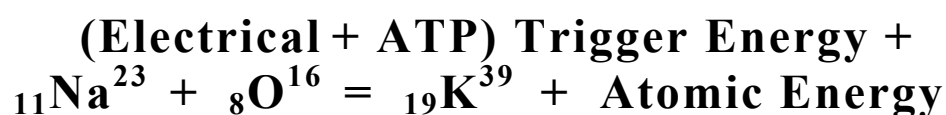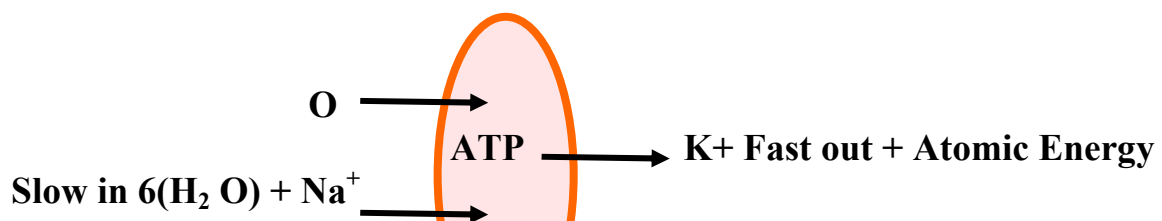
Electrical excitation   -70mV
    of the Na nucleous
    by TMP (-70mv) or NMR.

(Outside) Na 145 mM/L, K4mM/L
(Inside) Na 12mM/L, K 139 mM/L, -70 mv

Summary

In the present Pappas' Theory, the Cell is considered to be an (ATP) controlled microscopic Nuclear Reactor, turning atomic energy directly into electricity (TMP). Our proposal is the very first mechanism we know worldwide for a nuclear reactor to turn atomic energy directly into electricity. The nuclear fuels are O and Na entering a nuclear trans-mutation inside the cell, which we first coined into the term oximutation. The nuclear waste is K. The ignitors are, electromagnetically: TMP, and/or external EM fields like those of PAPIMI, chemically: ATP, Glucose, (controlled by a chain factors: insulin, adrenalin, relevant hormones). This model surpasses the classical ad-hoc model of sodium-potassium pump for the cell in too many and too overwhelming number of paradoxes of the classical model, which becomes non comparable to the present model of oximutation.

The present model not only is free of the "too many paradoxes" of the classical model, but, also connects logically and explains naturally many so far apparent unconnected facts. For example, why hyperkalemia causes heart arrest and death, why hypernatria increases energy and blood pressure, why cancer relates to hypernatria and free radicals, why we consume so little oxygen and we do not pollute by breathing compared to a oxygen+fuel engine, why we spent much more energy than the intaking energy (chemically) from food, why fishes do not release CO_2 bubbles, why we release kallium while taking only saline water, oxygen and glucose (a person in a coma), why kalium kills and natrium energizes, why oxygen is anticeptic and kills microrganisms, why we should take relatively small quantities (mgrs per day) of antioxidants against oxygen's massive (Kgrs per day) oxidation in our body.

 Fact 1: Penetration mobility of Na^+ via cell membrane is much less than penetration mobility of K^+, because Na^+, holding six molecules of water becomes, so to speak, a "very big and slow molecule" compared to K^+.

Fact 2: This is, also, true for the mobility of both Na^+ and K^+ escaping through kidneys. So, practically, concentrations of Na^+ and K^+ outside the cells is controlled by kidneys, under normal conditions of kidneys.
Na^+ concentration is high, K^+ concentration is low, outside the cells.

Fact 3: Concentration of Na^+ inside the cell is controlled by the Na^+ mobility (low) going in and out of the cell by osmosis, assisted by the acceleration towards the cell by the negative electrical field of the cell TMP, normally, -70mV; and minus the rate of Na^+ transmutating in K^+.
Thus, concentration of Na^+ is low inside the cell, provided transmutation rate of Na to K is adequate.

Fact 4: Concentration of K^+ is controlled by the transmutation of Na^+ to K^+, minus the mobility K^+ (high) escaping to the outside the cell, delayed by the de-accelaration of escaping K^+ by the negative potential TMP of the cell.

Kinetic energy of positive K^+ is lost, leaving the -TMP field, while -TMP is increased by the escaping positive K^+, (because they leave net negative charge behind)
Kinetic energy of positive Na^+ is increased entering the cell by -TMP, while -TMP is decreased, (because while attracted and accelerated, they decrease the net negative charge inside the cell).

Thus, the excess (after the exothermic nuclear reaction) energy of escaping K^+ is turned into a net electrical energy in the form of -TMP.

The cell is a (spherical type) capacitor. TMP is its charged voltage, due to its net charge inside it. Considering Na^+, K^+ as unit (one electron) charge carriers, and neglecting minor other ion charge transporters,

We have the obvious condition of steady state equilibrium for the cell's TMP:

-TMP increases, and reaches a steady value, when the slow inwards rate of Na^+ reaches the high outwards rate of K^+, (which, again K^+, is actually a Na^+ transmutation by O to K^+ - Oximutation) , under the above conditions and facts !

<div align="center">

Steady state of TMP
Rate in of Na^+ = Rate out of K^+
= Rate of oximutation of Na^+ to K^+

</div>

continuous...

For some relevant details see also the articles.

"THE EQUATION OF LIFE PART I"
"THE EQUATION OF LIFE PART II"

Please, note: At the time the above articles were first written, **Louis Kervran** critical error was not realized yet, see also below.

Major Contradictions for the Classical Model: Related to Human and Animal Energy
***
Important Note to avoid confusion:

Usually in textbooks of nutrition and in related literature, the following confusing notation is used:
1Cal= 1cal=1kcal=4,2 KJoules !
instead of the correct:
1cal=4.2Joules=1 celsius degree rise/gr of H_2O
from standard physics definition.

Also in references of nutrition, "1calory" or "1 cal" or "1 c" may mean
 (usually without warning):"1000 calories" or "1000 cal" = 4,2 KJoules !

We apologize for the confusion that is arising, but, it is not our preferred or intended notation !

***
Estimated Energy needed for human heart and vein – artery movement for blood circulation.

70 wattsx3600x24 secs = 70 watts x 86400 secs
6.048 KJ = 1.440 Kcal a day = 1.440 Cal a day

  Energy needed for Brain:

25watts x 86400 = 2.160 KJ = 514 Cal a day

Energy for Breathing and Body Heating:
another 500 watts to 1000 watts
corresponding to 43200 to 86400 KJ/Day

10.282 to 20.572 Cal/Day.

Important Notice: The human body has normally to be in an environment of 25 to 26 degrees Celsius, about 11 degrees less than its normal temperature - 36.6 degrees, to feel comfortable, thus to be constantly able to keep a rate of losing heat (dissipation of heat) to a cooler environment of about 11 degrees.

Minimum Needed Energy Estimation just for living:
12.500 Cal/Day without any work.

The above figure is only an approximation of ours. However, it proves our point, even it is an overestimation and actually it is less than half of the above proposed value.

Recent data, based on Olympic athletes, exercising daily for the August 2004 Olympics, indicates:

Daily work spending >1000000 cal

Daily controlled and strict in taking food calories<2000 cal

Contradiction:
Actual average nutrition intake:
600 to 2.000 Cal/Day !

The above contraction is excused in the literature by claiming the Human and Animal Organism is the highest efficient energy engine.

What a myth!
The Human and Animal Organism is the most Energy Wasting System, having and using huge atomic energy resources.
For details see HUMAN MUSCLE EFFICIENCY

****

Read for other serious CONTRADICTIONS

OOOOO

EXACT ATOMIC MASSES

for the related isotopes of Na, O, K

("HANDBOOK of CHEMISTRY and PHYSICS" 82-nd Edition © 2001 by CRC Press LLC, Section 11, page-52, 59.)

and calculation of Atomic Energy by formula:
$E=mc^2$
Calculations confirmed by Gregory Hatzis, Physicist.
Notice: Results are correct to the same degree as the above formula is correct (?)

$$Na^{23} = 22{,}989769700000 \quad 100\% \text{ (only one isotope)}$$

$$O^{16} = 15{,}99491462200 \ (99{,}757\%), \text{ Leading to } K^{39} = 38{,}963706900000 \text{ - natural abundance: } 93{,}2581\%$$

$$O^{17} = 16{,}999131500000 \ (0{,}038\%), \text{Leading to } K^{40} = 39{,}963998700000 \text{ - natural abundance: } 0{,}0117\%$$

$$O^{18} = 17{,}999160000000 \ (0{,}205\%), \text{ Leading to } K^{41} = 40{,}961826000000 \text{ - natural abundance: } 6{,}7302\%$$

Mean mass for O = 15,999404927439,

K mean value from above =38,9637069x99,957+ 39,9639987x0,038+40,961826x0,205
=38,968182

K books' mean value = 39,098300000000

MASS CHANGED INTO ENERGY

For O^{16}: DM = 22,9897697 + 15,994914622 - 38,9637069 =
0,000020977422 Kgr/Mol (SI Units)
99,757%
For O^{17}: DM = 22,9897697 + 16,9991315 - 38,969987=
0,00002490125 Kgr/Mol (SI Units)
0,038%
For O^{18}: DM = 22,9897697 + 17,99916 - 38,9681823=
0,0000271037 Kgr/Mol (SI Units)
0,205%

which, using $E=DMC^2$, C=299792458 m/s for the velocity of light, leads to exothermic (giving out energy) reactions for Na and all Isotopes of O, as follows:
PAPPAS' EXOTHERMIC NUCLEAR REACTIONS:

$$_{11}Na^{23} + {}_8O^{16} = {}_{19}K^{39} + 452.484 \text{ Kcal/mMol} \quad 99{,}757\%$$
$$_{11}Na^{23} + {}_8O^{17} = {}_{19}K^{40} + 537.149 \text{ Kcal/mMol} \quad 0{,}038\%$$
$$_{11}Na^{23} + {}_8O^{18} = {}_{19}K^{41} + 584.629 \text{ Kcal/mMol} \quad 0{,}205\%$$
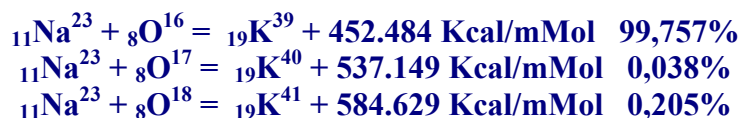
Mean: $_{11}Na + {}_8O = {}_{19}K + 452.787$ Kcal/mMol

Louis Kervran's Critical Error

Using the mean book values for O and K (=39,0983)
Dm=0,109130000000 gr/Mol
which leads to an endothermic (absorbing energy) reaction for Na and O.
Obviously this is a wrong result, because the mean book value for K=39,0983
("HANDBOOK of CHEMISTRY and PHYSICS" 82-nd Edition © 2001 by CRC Press LLC, Section 11, page-52, 59.)
is not the mean value for K=38,9637069 given above, assumed to be produced in the body, assuming all naturally occurring isotopes of oxygen give nuclear reactions with equal probability in the body. Obviously, in such a case of equal probability, the frequencies of K isotopes assumed to be produced in the body are equal to the corresponding frequencies of O isotopes. Therefore, the mean value of 38,9637069 given above for K isotopes, assumed to be produced in the body is not the book given value K=39,0.
983 of nature

Louis Kervran, apparently using the book mean value for K, was led to the ironic and wrong result that the nuclear equation which he first proposed, is an endothermic one.
Read also in our website about LOUIS C.KERVRAN HISATOKI KOMAKI
"The above correction from an endothermic to an exothermic (producing energy out) nuclear reaction for Na and O seems to be the missing link to a complete understanding of the physiology of the cell and its atomic energy"
Read Frequently asked Questions

Obviously, even if, the occurring probability for all oxygen isotopes to enter to one Pappas Nuclear reaction is not equal as we assumed above, the particular occurring reaction is always exothermic releasing the same order of energy as the assumed mean value for energy of:
452.787 Kcal/mMol

Therefore, for any other (different) relative percentage for the Pappas' Nuclear equations, actually occurring in the body will lead to slightly different, but not significantly different, results than the above figure, which may not change the status of the present theory.

Important Test and Confirmation of the present Theory:

Any deviation of isotopic natural occurrence of K in the body - from that provided by nature:
K^{39}: 93.2581%, K^{40}: 0,0117%, K^{41}: 6,7302%
HANDBOOK of CHEMISTRY and PHYSICS" 82-nd Edition © 2001 by CRC Press LLC, Section 11, page-52, 59
will prove that K is nuclearly produced in the body and not all received from nature!

ANSWER
14/2/2003

Indeed the answer of this test is affirmative to the present Hypothesis-Theory, for the K occurrence in the body is known to be variant, believed to depend on the individual's kind of food intake.
The isotopic occurrence of K in the body is indeed variant, individualized and different from the Natural occurrence of K in Nature:
K^{39}: 93,2581%, K^{40}: 0,0117%, K^{41}: 6,7302%
HANDBOOK of CHEMISTRY and PHYSICS" 82-nd Edition © 2001 by CRC Press LLC, Section 11, page-52, 59
This proves K isotopes are produced in animals and not all K isotopes are received from nature.
The occurrence of K produced will be that or closed to that of the corresponding oxygen occurrence:
O^{16}: 99,757%, O^{17}: 0,038%, O^{18}: 0,205%

This makes their occurrence obviously different than the nature's occurrence. Animals and vegetables - (with no known oxygen intake, therefore, no Na+O to K) - serving as food to men will offer a different isotopic composition, depending on the individual's food preference, animal or vegetable. This K isotope composition will further individualize, depending on the individual rate of metabolism-transmutation of Na and O isotopes to K isotopes.
References: "Isotope Geology", Kalervo Rankama, Pergamon Press, p 302-311 .....

MEAN ATOMIC ENERGY RELEASED PER MASS

$E = DMxC^2 = 1.885.352$ KJ/mMol $= 452.484$ Cal/mMol of Nacl or mMol of O_2,
Cal = Kcal, 1 mMol NaCl = 23 + 35= 58 mgr, 1mMol O_2 =32mgr
A.E. = 452.787/58 Cal/mgr Na(Cl) =
7.806 Cal per mgr Na(Cl)

SEVEN THOUSAND EIGHT HUNDRED AND SIX CALORIES
per mgr Na(Cl)

OR IN TERMS OF OXYGEN
A.E. = 452.787 Cal per 0.0224 Liters O_2
(per 22mL of O_2)
452.787 Cal/mMol O_2 /32 =
14.149 Cal per mgr O_2

FOURTEEN THOUSAND AND ONE HUNDRED AND FOURTY NINE CALORIES
per mgr O_2

Chemical Energy Released
for Carbohydrates, Proteins, Fats

0,0042 to 0,00945 Cal per mgr
or
4.200 TO 9.450 Cal per Kgr

Recommended about 2000 Chemical Cal per day.

****

The dual role of oxygen

Therefore, oxygen may enter two types of reactions:

1. Oxidation: This a Chemical reaction - Oxygen burns Carbohydrates, Proteins, Fats
producing H_2O, water and CO_2, carbon dioxide a gas, (however, not seeing much for fishes..., no CO_2 bubles seeing for the gold fish...)

2. Oximutation: This a coined term by us from oxygen's nuclear trasmutaion into K, according to O + Na =K.

****

Generally Chemical burning with Oxygen - Oxidation - in nature
is very much Polluting. It is also known in certain cases to be damaging, creating toxic substances (for example: free radicals in the body) for which Anti-Oxidants are recommended for their elimination.

Nuclear "burning" with Oxygen - Oxygen fusion -

oximutation

involving only tiny quantities anyway, is practically quantitatively sufficient and non Polluting.

In general, the quantity oxygen needed for the Nuclear fusion of oxygen - Oximutation - to produce the same energetic result is in the order of 1.00.000 times less than the Oxygen's Chemical reaction - oxidation.

In other words, the efficiency of the Nuclear fusion of oxygen-Oximutation is in the order of 1.00.000 times higher than the corresponding Chemical reaction - Oxidation.

This might explain why so little oxygen for animals and humans is enough to consume, in order to live and to be active, when Oxygen is used for Oximutation.

Particularly for fishes, even as big and powerful as the shark.(read New Scientist Puzzling Article, sharks and animals that practically take no oxygen!!!!. New Scientist, vol 177, issue 2385 - 08 March 2003, page 46) dissolved Oxygen in the water is enough for their all the time living and acting under water (mostly + NaCl), with seriously limited possibility of oxygen supply, a fact that can not be disputed.

****

ESTIMATION OF ENERGIES IN THE BODY

ATOMIC ENERGY IN THE BODY
Oximutation

Higher than 90 TO 95%

CHEMICAL ENERGY IN THE BODY
Oxidation
Less than 5% TO 10%

Ratio of C.E. over A.E. (Nacl)
for the same mass quantity in the range of
1 / 1.000.000 =
$$x\# \text{ of mgr}/ x\# \text{ of kgr} = 10^{-3}/10^{3}= 1/10^{6}$$

The picture shows two typical household containers, one for sugar and one for salt.
Sugar, like hydrocarbons, is a typical source of chemical energy leading into Oxidation
Salt is a typical source of sodium Na, source of atomic energy, as explained above, leading into
Oximutation

**A few GRAINS (10) coming out of the salt shaker, containing Na, are energy equivalent to few
10 GRAMS of sugar - several teaspoons,**

Surprisingly, they closely reflect the above ratio of 1/1.000.000 = mgrs / Kgrs
of chemical energy to atomic energy ratio !

Excess intake of Na will result in excess availability of energy in the body system, resulting in excess
energy storage in the form of fat tissue build up, increase of heart energy output - "pump output,"
resulting in higher blood pressure, etc, as it is commonly found and known.As with every nuclear
reactor - (carrier for controlled nuclear reactions, as opposed to non controlled destructive atom bomb)
- the nuclear body should also be limited and controlled.

Please control your Na intake according to your body's need as your Doctor recommends.
Remembering that the beat of your heart and your very existence depends on the nuclear reaction of
Natrium - (salt, "the life of earth", according to the holy scripture texts), as much as life also depends
on the corresponding
Oxygen's nuclear participation!

0. ENERGY MEDICINE

SHOULD BE PROPERLY UNDERSTOOD
particularly the dual role of oxygen leading

A. to oximutation good role
B. to oxidation bad role

1. PAPIMI ENHANCES

BODY'S (A) ENERGY

**by enhacing oxygen's oximutation
and limiting oxidation**

2. PAPIMI ENHANCES
BODY'S METABOLISM
by enhacing oxygen's oximutation

and limiting oxidation

Read here the related articles

"THE EQUATION OF LIFE PART I"

"THE EQUATION OF LIFE PART II"
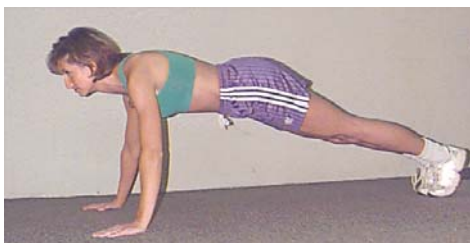
" PAPPAS' THEORY OF CANCER"

****

PROOF FOR

0%

For the

HUMAN MUSCLE EFFICIENCY =

Useful Energy/ Consumed Energy FOR OSCILLATORY MOTION

Push Ups one of the most tiring oscillatory exercise for which the "center of gravity" of the body is raised up and down. Obviously, the useful final work is zero.

However, the athlete is getting very quickly exhausted in 10 to 20 oscillations or so.

Therefore, the coefficient of work performance is: n = 0 out / muscle work = 0% = zero%

This is because muscle energy is first transformed into potential energy when the body (center of gravity) is raised up, but when the body is lowered back, this potential energy is completely lost into heat. The athlete gets very hot, sweats and gets quickly exhausted, limiting his capacity of spending energy to 10 - 20 push ups or so.

In general, for every oscillatory-periodic motion of a muscle, its energy is transformed to some kind of work and/or potential energy, which in no way is turned back in to muscle energy.

This inability of muscle function to turn potential or any other form of energy back into muscle energy lowers the coefficient of efficiency significantly, even makes it equal or close to zero - 0%, in most practical cases, walking, running, exercising, moving the hands, the body or parts of the body up and down.
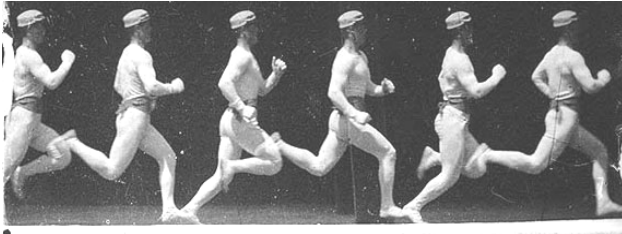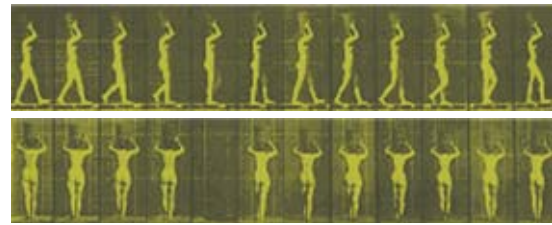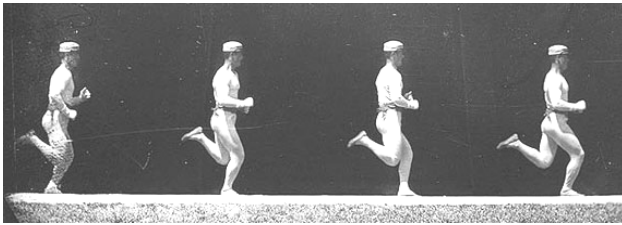
Raising and lowering the legs or the body for walking and mostly running is an oscillatory motion that raises the "center of gravity" of lower leg or the "center of gravity" of the body (in case off running) to 0.2 to 0.6 m or more.

The muscle energy stored in potential energy, $E = mgh$, when the leg or the body is raised is lost into heat when the leg or the body is lowered to normal height.

On the other hand, the energy needed to keep the body's constant speed on an horizontal road is minimal to practical nothing - equal to that of air friction.

Therefore, the efficiency for a walking and particular running human or animal is very very low.

Estimated to less than 1% for walking and less than 0.1% for running.

Therefore, walking and particular running for human's and animals is a very very energy wasting process that only abundant atomic energy may richly and adequately provide.

On the contrary, for most mechanical engines that they return back kinetic, potential energy or other forms of energy, their efficiency may be as high as close to 100%.

Another direct proof of this argument of lower human and animal energy efficiency is the comparison of human efficiency and that of the system human bicycling.
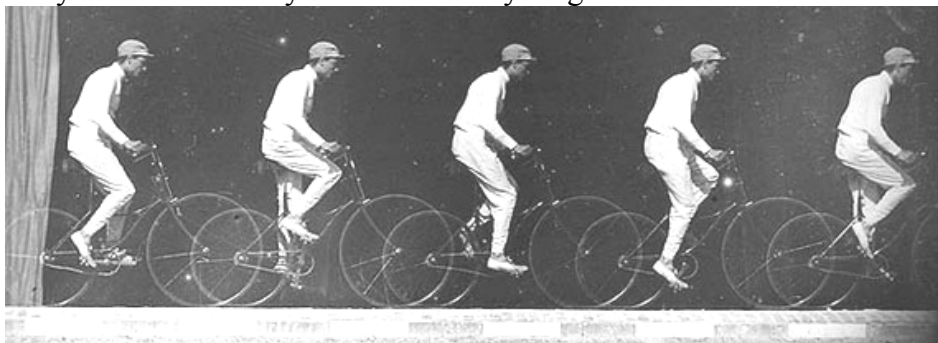
The system man-bicycling running on a horizontal road is at least of the order of 100 times more efficient than man walking or ruing on the same horizontal plane.

If we assume that bicycle's efficiency is n, the man's alone efficiency < n/100.

The efficiency superiority for bicycling is due to the pedals. With pedals, when one leg is lowered the other leg is simultaneously raised. In this way, the pedals have the ability to offer-exchange the potential energy of a lowering leg back to the raising leg potential, instead spending and wasting a new energy each time one leg is raised.

Therefore, pedals enable the legs never to lose their potential energy, instead pedals allow the same potential energy to be carried from leg back to leg. The only energy, thus spent for bicycling on a horizontal plane is that due to friction. Though, for a human the energy spent for walking or running is that of friction-relatively very small plus the potential energy that is wasted into heat for raising the legs or the whole body in case of running. In running the body moves with jumps that raise the whole body above the ground to some 0.4-0.6 when the both legs do not touch the ground.

In this case, **the energy lost Erunning = m $_r$gh$_r$ is much much more tiring, compared to walking Ewalking=m$_w$gh$_w$, for m$_r$ >>m$_w$ and h$_r$ >h$_w$.**

Even Bicycling Scientists, realizing Atom Bomb's Energy = mc^2 , Sometimes may not realize that
for Bicycle and Man's Energy = mc^2 , their corresponding Efficiencies are:
for Bicycle n >99% and for Man n <1% !

CONTRADICTIONS

VER.1.1	CLASSICAL MODEL'S PARADOXES	VERSUS PAPPAS MODEL'S CONFIRMATIONS
1	DEPLETION INSIDE THE CELL OF Na SHOULD EVENTUALLY OCCUR - MAJOR PARADOX	NO DEPLETION OF Na OCCURS - NO PARADOX
2	SATURATION OF K INSIDE THE CELL SHOULD EVENTUALLY OCCUR-MAJOR PARADOX	NO SATURATION OF K OCCURS - NO PARADOX
3	EXCHANGE OF Na TO K IN RATIO 3 TO 2 MAY OCCUR AT ENERGY EXPENSE OF THE CELL WITHOUT A LIMIT BY TMP (Trans Membrane Potential) THE SODIUM POTASSIUM PUMP SHOULD FUNCTION WITH ZERO TMP-DEAD CELL - NOT HAPPENING	A LIMIT OF TMP (-0,07V) SHOULD BE EXPECTED AS DEEPENING OF NEGATIVE TMP SHOULD CAUSE THE HALTING BACK OF THE ESCAPING POSITIVE K^+ IN CONFIRMATION WITH THE LIMIT OF -0.07 V
4	NO TWO DISTINCT STATES LIFE AND DEATH WITH RESPECT TO SODIUM-POTASSIUM PUMP AND TMP. EXCHANGE OF Na TO K IS IRRELEVANT TO THE VALUE OF TMP A CELL WITH ZERO TMP-DEAD CELL, MAY IN PRINCIPLE CARRY THE EXCHANGE. PARADOX FOR DEAD CELLS RELEASE K TO THE BLOOD - CAUSING HYPERKALEMIA AFTER DEATH.	THREE DISTINCT STATES SHOULD BE EXPECTED OF A CELL BASED ON THE TRANSMUTATION OF "Na AND O TO K", TRIGGERED BY THE TMP: 1. ONE STATE WITH ADEQUATE TMP TO TRIGGER THE REACTION OF Na + O TO K. - STATE OF LIFE. 2. ONE STATE WITH NO ADEQUATE TMP WHICH TRIGGERS A LOW RATE OF THE REACTION OF Na + O TO K. DISEASED STATE OF CELL IN WHICH CELL MAY REMAIN FOREVER UNLESS AN EXTERNAL FACTOR BRINGS IT BACK - PAPIMI™, HEART BIOFIBROLATOR -TRIGGER. 3. ONE STATE WITH ZERO TMP THAT THE REACTION OF Na + O TO K IS NOT TRIGGERED AND IT IS NOT POSSIBLE. IN THIS STATE ZERO TMP REMAINS TO ZERO FOR EVER, DEATH STATE OF CELL IN WHICH THE CELL REMAINS FOREVER, UNLESS AN EXTERNAL FACTOR BRINGS TMP BACK - PAPIMI™, HEART BIOFIBROLATOR. MAJOR CONFIRMATION. EXPLAINS THE IRREVERSIBILITY OF DEATH. EXPLAINS THE CONDITION OF CONTINUATION OF LIFE. ONCE LIFE IS STOPPED, IT IS IRREVERSIBLY STOPPED. MAY BE USED FOR DEFINITION OF THE STATE LIFE FOR A CELL AND THE DEFINITION OF THE STATE OF DEATH FOR A CELL ALIVE CELL IS A CELL WITH A NON ZERO TMP. A DEAD CELL IS A CELL WITH ZERO TMP. HYPERKALEMIA AFTER DEATH MAY BE EXPLAINED BY OSMOTIC EQUILIBRIUM AFTER THE LOSS OF TMP
5	IN A CONTROLLED STATE OF LIFE, SUCH AS A COMATOSED PERSON, ACCORDING TO THE CLASSICAL MODEL, WOULD NEED A CONTINUOUS INTAKE OF K FOR THE CONTINUOUS INSERTION OF K INTO THE CELL TO KEEP THE ASSUMED Na - K EXCHANGE BY THE ASSUMED K-Na CELL PUMP. MAJOR PARADOX. IN GENERAL: NO K IS GIVEN, UNLESS IN LIMITED QUANTITIES UNDER SPECIAL CIRCUMSTANCES	ON THE CONTRARY A CONTROLLED STATE OF LIFE, SUCH AS A COMATOSED PERSON MAY STAY ALIVE IF: 1. OXYGEN IS GIVEN - PERSON BREATHS 2. THE SAID ISOTONIC INTRAVENOUS SOLUTION IS GIVEN WITH MINIMUM CONTENT: WATER, NaCl AND GLUCOSE - NOT NECESSARILY K. 3. HAS KIDNEY FUNCTION TO URINATE AND EXERT K, AVOIDING HYPERKALEMIA THIS IS A DIRECT PROOF THAT A PERSON, IN SUCH CONTROLLED SITUATION EXERTS K AFTER THE INTAKE OF NA AND O. THIS IS A DIRECT PROOF OF Na + O TO K BY MEDICINE FOR PHYSICS, TOO!.
6	THE KNOWN HEART ARREST BY HYPERKALEMIA IS NOT JUSTIFIED BY THE CLASSICAL MODEL	ON THE CONTRARY PROVISION OF AN ISOTONIC SOLUTION OF KCL WILL KILL IMMEDIATELY THE PERSON, CAUSING THE KILLING CONDITION OF HYPERKALEMIA - THE KNOWN METHOD OF EUTHANASIA.

7	SWELLING OF CELLS DUE TO Na IS NOT EXPLAINED, AS ACCORDING TO CLASSICAL MODEL, THERE IS NO Na IS INSIDE THE CELL TO RETAIN WATER.	SWELLING + INFLAMMATION IS EXPLAINED BY RETAINED WATER BY Na INSIDE THE CELL WHEN Na + O TO K IS NOT ADEQUATELY PROCESSED. URINATION AND EXERTION OF K WITH ANTI-IFLAMATORY MEDICATION OR PAPIMI™ TREATMENTS IS EXPLAINED BY SPEEDING Na +O TO K AND WITH THE EXERTION K TO URINE.
8	WITH KIDNEY INSUFFICIENCY, ACCORDING TO CLASSICAL MODEL INTAKE OF NaCl WOULD REDUCE HYPERKALEMIA OR HAVE NO RELEVANCE. NOT IN AGREEMENT WITH THE PRACTICAL RECOMMENDATION "NOT TO TAKE NaCl" WHENEVER THERE IS KIDNEY INSUFFICIENCY. PARADOX	WITH KIDNEY INSUFFICIENCY PRIMARILY THE INTAKE OF NaCl IS RECOMMENDED TO AS LITTLE AS POSSIBLE TO AVOID HYPERKALEMIA - THE INCREASE OF K IN THE BLOOD STREAM - THIS IS DIRECTLY UNDERSTOOD WITH PAPPAS MODEL.
9	NO RELEVANCE TO HEART ENERGY WITH THE INTAKE OF NaCl PARADOX	INTAKE OF NaCl INCREASES BLOOD PRESSURE WHICH IPPLIES AN INCREASE OF ENERGY EXPENDITURE BY THE HEART AS AN ENERGY SPENDING PUMP.
10	NO RELEVANCE TO BODY'S ENERGY WITH THE INTAKE OF NaCl PARADOX	INTAKE OF NaCl INCREASES BODY ENERGY, KNOWN TO BE GIVEN TO HORSES, SOLDIERS DURING WAR, WORKERS, ETC.
11		DEFICIENCY OF NaCl LOWERS BLOOD PRESSURE AND LUCK OF ENERGY AND CAUSES RELATED SHORT TERM AND LONG PROBLEMS TO MAN AND ANIMALS.
12	NaCl CAUSES GAINING OF FAT. IN FAT A CERTAIN AMOUNT OF CALORIES IS THE SAME TIME STORED. THESE CALORIES IS UNEXPLAINED BY THE CHEMICAL CONTRIBUTION OF NaCl, ACCORDING TO THE CLASSICAL MODEL. PARADOX	NaCl CAUSES GAINING OF FAT. IN FAT A CERTAIN AMOUNT OF CALORIES IS THE SAME TIME STORED. THESE CALORIES IS EXPLAINED BY THE NUCLEAR CONTRIBUTION OF NaCl, ACCORDING TO PAPPAS MODEL
13	LOW TMP - A CANCER STATE ACCORDING TO SAINT GIORGI (NOBEL PRIZE)- SHOULD HAVE NO RELEVANCE TO LOSS OF WEIGHT, LOSS OF ENERGY AND ISCHEMIA, FOR THE SODIUM POTASSIUM PUMP-CLASSICAL MODEL. PARADOX	LOW TMP, LOW "Na AND O TO K" AGREEMENT WITH CONDITIONS OF CANCER: LOW ENERGY, LOSS OF WEIGHT ISCHEMIA.
14	INTAKE OF K SHOULD INCREASE HEART NANOPULSE RATE. FOR IT WILL ASSIST THE SODIUM POTASSIUM PUMP THAT INTAKES K INTO CELLS. THIS IS IN DISAGREEMENT WITH CLASSICAL MODEL. PARADOX	INTAKE OF K IS FOUND TO DECREASE HEART NANOPULSE RATE. IN AGREEMENT WITH PAPPAS MODEL, FOR EXCESS OF K IN BLOOD STREAM WILL FORCE IT BACK TO THE CELLS THUS DECREASE TMP, THUS DECREASE OF "Na AND O TO K", THUS DECREASE OF RELEASE OF ENERGY, THUS HEART SHOULD SLOW DOWN DUE TO MISSING OF ENERGY.
15		CHILDREN'S CANCER OCCUR AT GROWTH SPURT STATISTICS (WILL BE POSTED SOON)
16	Na and K STATISTICALLY ARE FOUND TO FOLLOW REVERSED CONCENTRATIONS: LOWER Na WITH HIGHER K; HIGHER Na WITH LOWER K THERE IS NO RELEVANCE TO SODIUM - POTASSIUM PUMP MODEL	THIS IS READILY UNDERSTANDABLE WITH PAPPAS MODEL: Na TURNING INTO K
17	NORMAL OXYGEN INTAKE IS TOO LITTLE TO PROVIDE ENERGY FOR THE BODY FUNCTIONS IF THIS ENERGY COMES FROM CHEMICAL OXIDATION. (MATH WILL BE POSTED SOON) MAJOR PARADOX	NORMAL OXYGEN INTAKE IS MORE THAN ENOUGH TO PROVIDE ENERGY FOR THE BODY FUNCTIONS IF THIS ENERGY COMES FROM NUCLEAR BURNING OF OXYGEN. (MATH WILL BE POSTED SOON) IN AGREEMENT WITH THE PAPPAS MODEL
18	CELL IS A SODIUM POTASSIUM PUMP. THE EARTH IS FLAT	CELL IS A NUCLEAR REACTOR. THE EARTH IS A SPHERE

Breathless

A shark with an amazing party trick is teaching doctors how to protect the brains of stroke patients. Douglas Fox made its acquaintance

IT IS 90 minutes since Lazarus last breathed oxygen, and he is finally slipping away. I reach into his aquarium, past the hoses that bubble pure nitrogen through his water, and flip him belly-up. No response. Just to make sure he's gone for real, Gillian Renshaw and I wait a while longer - for us a boring five minutes serenaded by the hum of fluorescent bulbs. But not for Lazarus. His oxygen-deprived brain must be drifting somewhere east of Jigangaland.

When I finally lift Lazarus from the water, he hangs limp in my hands like a slab of sashimi, and I worry we've waited too long. But then as I carry his flaccid frame over to another aquarium, it happens: like a blue bolt from heaven, a surge of slippery, writhing fishlife suddenly animates his body. Once again, Lazarus lives.

At 70 centimetres long, Lazarus is a typical epaulette shark, so called for the black patterns resembling military insignia on their "shoulders". In the wild, these fish are confined to the waters off eastern Australia and Papua New Guinea. But their reputation for surviving without oxygen is spreading far and wide. If we can understand how they do it, then we could vastly improve our treatment of medical conditions where organs are deprived of oxygen, such as stroke and heart attack. But it doesn't stop there. Somewhere within the shark's stoic capacity for life after breath may lie something even bigger: clues that could help us withstand many life-threatening conditions in which our cells commit suicide.

An animal living in the shallows around coral reef platforms might not seem an obvious candidate for becoming a Hercules of hypoxia. But the epaulettes' seemingly cosy home has a habit of turning nasty. The water, just centimetres deep, is isolated from the ocean at low tide, and although its oxygen is replenished during daylight hours by photosynthesising algae, this doesn't happen during low tides after dark. Instead, as reef inhabitants respire, oxygen levels plummet to as low as 20 per cent of normal - low enough for non-adapted fish to suffer permanent brain damage within a few minutes. But not epaulettes. They remain on the reef as oxygen levels fall, hunting shellfish and crabs.

Even more impressive, the sharks can survive being left high and dry. At extreme low tides you occasionally find them beached on the exposed reef, limp and comatose. But pick one up and it quickly reboots and wriggles for freedom. This amazing talent for resurrection is what first attracted Renshaw, a physiologist at Griffith University in Gold Coast, Australia. Five years on, she has found the epaulette's abilities go way beyond what it displays in the wild: in her lab Lazarus and his chums regularly survive three hours with nary a bubble of oxygen, and have even been known to recover after their tails begin to stiffen - an early sign of rigor mortis.

It's true that a few other animals can cope with oxygen deprivation for far longer - some fish and turtles pass the entire winter frozen, without oxygen, under ice **(see "Masters of hypoxia")**. But at low temperatures, cells tend to consume oxygen more slowly, delaying their death. What makes the epaulette so interesting is that it has evolved to survive oxygen starvation at up to 26 °C - tantalisingly close to human body temperature.

Unlike the shark, however, we are ill-equipped to deal with low oxygen. Nowhere is this more apparent than in the brain, where hypoxia caused by a stroke triggers a fatal chain reaction in just five minutes or so. That's because brain cells rely so heavily on aerobic respiration: unlike other cells such as muscle, they store almost no glucose that can be used for emergency energy production in the absence of oxygen. And the brain is the body's biggest energy guzzler, so supplies soon run low when the blood flow is cut off. Without energy, neurons become depolarised as potassium ions leak out and sodium and calcium ions rush in. Next, the pumps that usually pull neurotransmitters, especially glutamate, into the cell go into reverse. As glutamate flows out uncontrollably it triggers neighbouring neurons to fire, just when they should be conserving energy, and to release glutamate themselves, in turn exciting their own neighbours. And so the chain reaction goes on. All this conspires to push neurons over the brink - most will eventually opt for apoptosis, cell suicide **(see Diagram).**

Even cells that survive oxygen starvation aren't home free. In strokes, neurons continue to die for 48 hours after blood flow has been restored, and delayed cell death also occurs after heart attacks. The culprit is "reperfusion injury": during oxygen shortage, the mitochondria (the cell's energy-producing organs) mysteriously shift gear, producing free radicals from what oxygen they can get. But when blood flow

returns, the mitochondria are still in this altered state, and convert the tide of life-giving oxygen into death-dealing radicals, damaging proteins and membranes, and sending more cells spiralling into apoptosis.

So how do epaulette sharks avoid this catastrophic series of events? Renshaw has found that as oxygen levels drop, the shark first maintains its uptake by breathing more rapidly. Once levels fall below about 30 per cent of normal, however, it slows its breathing and heartbeat, and relaxes arteries so that it is easier to pump blood to the brain. Next, it powers down non-essential brain functions by releasing GABA - a depressive neurotransmitter that counteracts the excitement of glutamate - in brain areas that aren't needed. The shark becomes limp and paralysed, and possibly even blind. But its electroreception sense continues to run and, if it detects predators or prey, it can lurch back to life. As it shuts down brain centres, the epaulette also turns down its mitochondria. As well as saving energy, says Renshaw, this protects the mitochondria from reperfusion damage by minimising the production of free radicals once oxygen returns.

Of course, it's a gross oversimplification to compare a stroke victim to an oxygen-deprived epaulette shark, not least because a blocked artery doesn't just deprive cells of oxygen, but also glucose, which can serve as an anaerobic energy source. But Renshaw's studies highlight some promising approaches to stroke management. One obvious candidate is GABA, which is produced not only by epaulette sharks but also by other animals that can tolerate low oxygen levels. In the 1990s, researchers thought chemicals that mimic GABA or block the toxic effects of glutamate would become wonder drugs for treating stroke. But a decade and more than 30 failed clinical trials later, it is apparent that transferring lessons learned from animals that cope with low oxygen into humans isn't going to be so simple.

Part of the problem is that glutamate is not the only neurotransmitter that excites neurons to death: dopamine, aspartate and others also play a part. Although researchers tried to damp these down as well, most clinical trials tested only one drug at a time, and that may not have been enough to calm excited neurons. What's more, studies from hypoxia-tolerant turtles hint that small amounts of glutamate may somehow help - possibly by tuning neurons to be more sensitive to calming neurotransmitters such as GABA. If this is the case in humans, then blocking glutamate could do as much harm as good.

Another problem is that not all strokes are alike. Drugs that damp down glutamate should work best for patients in whom only a small bit of the brain has been starved of oxygen, and most of the damage is likely to be caused by the spreading wave of neurotransmitter hysteria. But these people can be difficult to distinguish from patients whose brain cells have mostly been killed directly by oxygen starvation.

While some clinicians still hold out hope for GABA and its ilk, Renshaw's studies have persuaded her to experiment with an alternative approach that has the potential to counteract hypoxia throughout the body, not just in the brain. She has found that by giving epaulettes several two-hour bouts of 5 per cent normal oxygen levels, she can increase their subsequent ability to survive without oxygen. Experiments with rats show that such "preconditioning" also works in animals that have not evolved to tolerate low oxygen. And there are some indications that humans are no exception. Patients who have experienced chronic chest pain (a sign their heart is short of oxygen) are more likely to survive a heart attack than those who haven't. And patients who suffer mini-strokes, are less likely to die when they have a major stroke. Surgeons performing a coronary bypass sometimes exploit the effect by clamping off arteries feeding the heart for several minutes before they halt circulation for longer while they attach a graft.

Preconditioning seems to evoke a wide range of defences, from inhibiting some types of glutamate receptors to producing enzymes that neutralise radicals. Exactly how it works is a bit of a mystery, but it looks like mitochondria are the key. Navdeep Chandel from Northwestern University in Chicago has found that when heart cells are stripped of their mitochondria, they lose the ability to turn on preconditioning in response to low oxygen, or undergo apoptosis. This supports the idea that mitochondria signal when oxygen is low - by emitting a trickle of oxygen radicals - and then give the cue to either turn on protective responses or commit cell suicide. The trick with preconditioning is to persuade them to choose life.

Low-oxygen preconditioning is already being tried on patients. In Russia, intermittent hypoxic therapy (IHT) has been used for years to treat all sorts of conditions from asthma to heart disease and chemotherapy toxicity. Elsewhere, a handful of doctors are trying it for diabetes and chronic fatigue. Patients are typically given IHT five minutes on, five off, for one hour a day, five days a week - starting near 90 per cent of the oxygen concentration at sea level and gradually decreasing to 50 per cent.

Critics doubt whether this is enough to induce the sort of preconditioning seen in rats given 50 per cent of normal oxygen levels for hours per day. Nonetheless, Renshaw is now testing whether humans given IHT have preconditioning-like responses, such as increases in levels of proteins that make blood vessels grow and heat shock proteins, which limit cell damage. If so, then regular IHT might work as prophylaxis for people at risk from heart attack and stroke.

Limiting oxygen may not be an option for really sick patients, but there are other ways to get a similar response. In rats, preconditioning has been induced by low doses of poisons such as cyanide, by a synthetic version of a bacterial endotoxin, by electrical stimulation of a brain region called the cerebellar fastigial

nucleus, and even by mild cooling of 5 °C for 20 minutes. Cooling might be an especially benign way to precondition, says Kevin Lee, a neuroscientist at the University of Virginia in Charlottesville. But since the protective effect takes six hours to mount and lasts no more than 10 days, cooling would only be useful if you could somehow anticipate oxygen deprivation.

Many of the protective effects of preconditioning require cells to turn up or down certain genes, which takes hours, but some preconditioning effects kick in within minutes. Researchers are now looking for precise ways to activate these. For example, certain pores in mitochondrial membranes open up and allow potassium ions to flow in during low-oxygen preconditioning. And studies in rabbits show that drugs that promote opening prevent apoptosis and cause cells to respond as if they have already been preconditioned.

Another short cut exploits the finding that two days after preconditioning, brain cells increase production of chemicals called EETs, which reduce inflammation and cause brain capillaries to widen. By injecting EETs into rats 20 minutes before clamping off a brain artery, Nabil Alkayed from Johns Hopkins University School of Medicine in Baltimore reduced the volume of dead brain tissue by 30 per cent. He speculates that a drug that had this effect could provide rapid protection to patients who have just suffered a stroke.

But the word is that preconditioning drugs could turn out to have much wider uses than simply treating oxygen starvation. Targeting mitochondria gives you the potential to treat a whole variety of stresses throughout the body. Mitochondria stand at the crossroads, determining whether a cell dies by apoptosis or survives by preconditioning, so a drug that nudged them in the right direction could protect against damage following head trauma and seizure, spinal cord injuries, heat stroke, severe haemorrhage, the toxic effects of chemotherapy, and on and on. Experiments have already shown that hypoxic preconditioning protects rats against several of these insults.

"If it doesn't kill you," concludes Renshaw, "it makes you stronger. What we're interested in is why." She and others in the field are well on their way to finding out - and what better ally to have than a fish that's perfectly happy floating belly-up?

Douglas Fox
Douglas Fox is a freelance science writer living in northern California

FURTHER READING

"Exposure to hypoxia primes the respiratory and metabolic responses of the epaulette shark to progressive hypoxia" by Matthew Routley, Goran Nilsson and Gillian Renshaw, Comparative
Biochemistry and Physiology Part A, vol 131, p 313 (2002)

"Surviving anoxia with the brain turned on" by Goran Nilsson, News in Physiological Sciences, vol 16, p 217 (2001)

Masters of hypoxia
GOLDFISH : In its natural habitat can spend winter months sealed, with no oxygen, under pond ice. It depresses its metabolism by 90 per cent, swimming slowly. Like a runner, it uses glucose as an anaerobic energy source. Unlike a runner, it gets rid of the toxic waste - lactic acid - by converting it to alcohol and peeing it away. Low-oxygen tolerance made goldfish the world's first aquarium fish a thousand years ago.

RED-EARED SLIDER TURTLE : Also passes winter under ice. It depresses its metabolism by 95 per cent, becoming comatose, and uses glucose as an energy source. The turtle detoxifies lactic acid waste by neutralising it with carbonate that it leaches from its shell.

WOOD FROG : During winter, its breathing and heartbeat stop and 65 per cent of the water in its body freezes. It uses glucose as a cryoprotectant and energy source. European explorers described finding frozen frogs in Canada for the first time. "A remarkable Experiment," wrote Captain Francis Smith in 1747, "is to take the Earth in which the Frog is froze, and break it in Pieces without thawing it, the Frog will break like Glass. But thaw that Earth by the Fire, the Frog will recover and leap."

BAR-HEADED GOOSE : Migrates from India to Tibet, flying across the Himalayas at altitudes of up to 11,000 metres. There, oxygen levels are 20 per cent those at sea level - low enough to kill a human, but not the goose. While flying, it still has enough spunk left to honk, or so say delirious mountaineers who claim to have heard it.

LOÌC LEFERME, FREEDIVER : Last year he descended to a world-record depth of 162 metres on a single breath of air. When freedivers like Leferme hit the water, their hearts slow by 50 per cent, and their circulation shifts, lavishing most of their blood on the heart and brain.

FREQUENTLY ASKED QUESTIONS

At 0951 PM 1/11/2003 +0100, Jacques Valentin wrote

Dear Pr Pappas,

I am one of your French reader and read your Website regularly with great interest.
First thanks a lot for your very interesting work. At the same time bringing a new
operational electromagnetic device and so interesting theories on cancer or
Kevran etc is realy fantastic!
On Kevran you say that he made an error confusing an endothermic with what
you thing is an exothermic nuclear transformation.
In the pages of Kervran books you give extracts, he explained with a lot of details
that the endothermic reaction explains why the inner heat of the body goes down
when given salt wich becomes potassium preventing hypertermia. It seems a
strong argument but you don't speek of it. It would be nice if you could bring some
light there!
I hope we can see one day, a PAP IMI™ application center in France where some of
your best ideas are coming from!

Sincerely,
Jacques Valentin

My Reply:
”AIR CONDITION”- REFRIGERATORS NEED ENERGY TO COOL.
THEY NEED EVEN MORE ENERGY TO COOL IN HOTTER ENVIROMENTS.

18/1/2003
Dear Dr Jacques Valentin

Thank you for your letter.
I am very much excited to get an input from France about Louis Kervran.
Definitely, Kervran made a great contribution in revealing the "non political correct" in Medicine, as the other
World's Greatest French Physicist Andre Marie Ampere did in Physics, by giving the "non political correct
formula" in Electrodynamics, suppressed today-after Einstein- practically in all Physics Text books. One has to
look in older (100 years older) encyclopedias, about the original Ampere formula submitted to the French
Academy of Sciences in the years 1821-1826 and compare it with the Ampere formula given today! It is an
unbelievable surprise to experience.
Also based in Nuclear Physics calculations for "Na and O to K energy", one gets an exothermic reaction, as for
most fusions of lighter elements.
So Kervran is wrong here.
About your comments on Kervran's arguments concerning hot conditions, my answer is that energy is still
needed from Na and O, to increase breathing, blood circulation to carry the heat to the outside body surface and
environment and probably for other cooling body's extra functions.
I remember the real hot days in Greece. People with weak heart get into serious problems for their heart is
stressed and deaths due to heart insufficiency increase dramatically during those days.
Heart is an organ that takes a lot of energy and consequently, it consumes a lot of Na and O, too.
A usual picture is with dogs, when they are overheated they spent more effort to breath, much deeper and much
quicker with their tongue sticking out of their mouth to dissipate fast more heat.
Finally, I would say "air conditions" to cool in a hotter environment consume more energy which is
understandable from thermodynamics point of view.
I will appreciate of any farther input, as I am considering these lines, too.
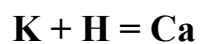Thank you again.
Sincerely,
Prof. Panos Pappas, PhD in Physics.

Question end 2004:
K seems to be important too, not just a nuclear waste. How do you count this?
Answer:
Kalium or Potasium K may be farther used in a similar nuclear fashion with Hydrogen H to produce Calcium Ca as follows:

$$K + H = Ca$$

$$K + H = Ca$$

Professor Pappas' Theory of Cancer

Upgraded version 25/1/ 2004

**Developed by Professor P.T. Pappas,
based on the experience of PAP IMI™ results,**

over the last ten years.

Professor P. T. Pappas as keynote speaker presenting his theory of cancer
at the First German Conference of Alternative Medicine.
Oct. 20-th, 2001.   Munich - Germany
 Minor corrected January 12, 2004 Corrected Version, January 19, 2004
Minor corrected February 3, 2004
Original January 21, 1998

THE PRINCIPLE FOR THE CURE OF CANCER WAS KNOWN SINCE SOME SEVERAL THOUSANDS YEARS
Cancer is an ischemia or a state of starvation of a group of cells.
www.papimi.gr   www.papimi.tv **(in Spanish)**

 We would like to state a more consistent theory of cancer that we came up with, **based on ten years of
experience**. The results are fascinating, obtained after **PAP IMI™** exposures, and after comparing these results
with other theories and methods .

The first assumption involves the most basic principle of physics, which we have come to realize
several years ago in association with cancer. The assumption concerns the physical energy of the cell . Energy
in physics, as in the universe as a whole, is the most fundamental and universal concept of cause and effect. This
controls every action in the cosmos, between a donor of the energy [the cause] and a receptor of the energy [the
result]. We may say, a biological system with energy transformed from one form to another or given from a
donor to a receptor, is a living system. A biological system with active metabolism and energy not given and
taken between donors and receptors (without metabolism) is a dead system. We state below an extremely simple
and fundamental principle for cancer in relation to the physical energy condition of a cell.

*Cancer , is a <u>critically low state of energy</u> <u>within a cell and with a critically low metabolism</u> ,
in which the cell is being "trapped" for various reasons. This critically low energy and metabolism
state is manifested by a low transmembrane potential (TMP) of 15 mvolts, which causes a "chain "
of specific malfunctions for the cell, and a general state of ischemia (low energy) for the organism .
When a cell is in this particular low energy/metabolism state and has below TMP of 15 mvolts that
is responsible for cell metabolism (Nobel Laureate Albert Szent-Gyorgyi, Cone and others). The
extremely weak TMP of 15 mvolts cell divides in two identical parts in an attempt to survive in
larger numbers as a species.*

Cancer is also the most general phenomenon of missing cell energy , low metabolism and division in biological systems. It is a phenomenon found in all forms of life, i.e., plants, animals and, we may even say, in all living societies such as that of humans, animals, plants, and various micro-organisms .

We may suggest that Cell Cloning, Meristomatic Culturing for plants and Cancer, all have the same starting point in common for cell proliferation, that is metabolic stress, or poor nutrition, long known for cell cloning and meristomatic culturing for plants.

We demonstrate the above, with a common example taken from agriculture, which is known to most farmers: Let us suppose that we have two plants which we water every day. The plants stay healthy, but as a result do not produce flowers or seeds, which would lead to reproduction of the plant. If we deprive one of the plants of its nutrition by halting the water supply, as a result you will find the plant in a state of "stress". This plant will then produce flowers and seeds in order to multiply and thus survive as a species. This result is due to an "instinct" or "survival program" deeply encoded in its DNA by its creator. This is a general phenomenon of reproduction, known for almost all plants .

The same holds true for advanced organisms which may secure food fairly easier versus a primitive one, which strives every day for food. Indeed a primitive organism is in a continuous state of stress while finding food and energy. In order to counter this and overtake its daily battle for food and survival as a species, it multiplies very fast and in large numbers.

On the contrary, an advanced organism or animal multiplies relatively very slowly, and in fewer numbers. For example, larger animals such as elephants or humans multiply very slowly, in comparison to a smaller animal such as a rabbit or a primitive organism.

The same is true for a poor, versus a rich society. For example, in poor couples of primitive societies we will find that they usually have between five and eight children. In comparison, the couples in rich societies tend to have one or two children.

Cancer environment, diffusion and metastasis: When a low energy proliferating cell is found to be lacking the proper nutrition and energy, many times this is so because it is surrounded by an adverse environment. This environment can be an anaerobic (non-oxygenated) one, which is limiting the "energy providing synthesis" of Na and O to K. Shortage of nutrition and energy may also be due to the fact that cells are adjacent or are surrounded by another tumor, or other low energy cells with limited veins and arteries. When a tumor is starving for energy and nutrition, the starvation is transmitted to the neighbors. Obviously, adjacent cells will suffer for proper oxygenation, nutrition and metabolism. Removing energy and nutrition by a tumor from adjacent cells, may cause a similar shortage of energy and nutri**ion**, thus cancer diffusion and cancer metastasis to adjacent cells.

We can say, proliferating cells in an energy crisis, cause a similar "energy crisis" to nearby cells. In other words, the energy crisis of a smaller area of cells, is diffused or extended to a broader area, because of the most basic and fundamental principle of physics, the principle of the conservation of energy and the principle of conservation of matter.

This crisis of low energy is reflected in the following general chain reactions and results : \

- low transmembrane potential,

- increased accumulation of sodium ions inside the cell : Hypernatremia

- increased water molecules attached to sodium molecules inside the cell associated to hypernatremia

- inflammation;

- increased volume of the cell and osmotic pressure inside the cell, damaging the cell membrane

34

- swelling

- thinning of the cell membrane

- cell division.

The above conditions further obstruct cell metabolism. When transmembrane potential drops below 15 mvolts, it leads to cell division and eventually causes cells to over populate. This enhances and diffuses the existing energy crisis from the cells to the system. The energy crisis is then extended and generalized for the system as a whole with the characteristic of low energy and ischemia for the system itself. We may say, that cells with low energy get into a "panic" state of feverish multiplication in order to preserve their species, following an inherent program encoded in the most fundamental part - their DNA, for survival under the emergency of severe conditions. More cells are produced inside the tumor, or more cells are produced adjacent to the tumor which found naturally in a low energy or impoverished environment, diffused from the expanding prime energy crisis – the prime cancer. Newer cancer cells will lack even more energy for the same reasons. So, we see naturally why the tumor grows or diffuses to adjacent areas and tissues, **a phenomenon known as "cancer diffusion"**, i.e., cancers ability to diffuse to adjacent healthy cells and tissues which is particularly **unexplained today by medicine**. Obviously, the more those "low energy" cells multiply, more energy is needed in the organism as a whole to feed the newborn cells. **Therefore, the energy crisis and the cell starvation continually expand, as does cancer.**

The organism soon becomes a "poor society in a panic crisis situation" as a whole, lacking even more energy. In such a case, more and more cells will be in a "panic state" for nutrition and energy and so, we see that cancer triumphantly **metastasizes and generalizes**. **The organism or person becomes thin, weak and ischemic, with the common characteristic of loss of weight, low energy, and low nutrition intake.** Cancer then spreads and generalizes, with no way for the organism or person to overcome this **increasing** need of energy and nutrition.

Apparently, there is <u>no way out of this</u> "energy crisis" when many more new cells appear, and the organism (or the person) dies. This is more or less the macroscopic "scenario" of the cancer phenomenon. This is of course omitting numerous details of the cell physiology, and the details of how the organism gradually fails as a whole. The reason for this is "over population of starving cells" and the resulting expansion of this "energy crisis".
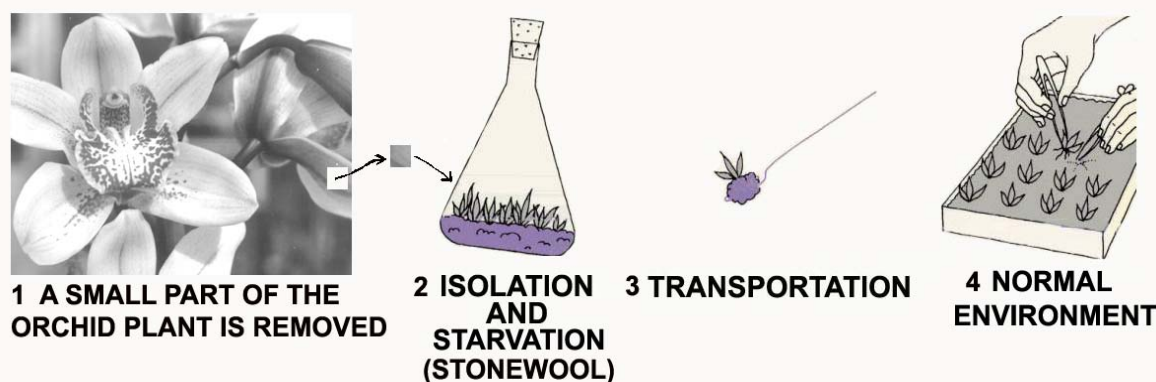
As an indisputable example and confirmation of the above, we may consider the modern technique of cloning living cells through genetic engineering. **The technique of cloning living cells consists of forcing a newly fertilized cell (egg) to duplicate into more copies so that one identical embryo develops. This technique simply reported in the mass media consists of isolating a newly fertilized egg and placing it in an environment of very low nutrition. This state of starvation and obviously low energy causes it to divide into copies in exact agreement to the ideas expressed above.**

After a number of divisions into cell copies, biologists then remove the cell copies and place them in an environment of **proper nutrition and energy, where an independent** and self organized embryo develops.

The same technique for plants has been known for many thousands of years to farmers for plants, called "meristomatic" culturing, or plant cloning as we could say today. The description of this old technique can be found in encyclopedias. A typical example (suggested to find and read) for meristomatic culturing or "cloning for the plants" can be found in relevant books and encyclopedias for Orchids, directly confirming our above hypothesis of multiplication and cancer.

Say you cut a small part of the leaf of the orchid and move it to a dry, isolated air sealed environment. It is then placed on a dry inorganic material such as stonewool (used in the building industry for sound insulation). Stonewool has nothing to offer to the piece of leaf from the orchid. It only holds the leaf mechanically in this air sealed environment. Being found in a "stressed environment" without any nutrition, the cells in the leaf multiply and form a new born orchid. The orchid is then moved into an environment where proper nutrition is given to the plant for its future survival.

The secrets of life revealed by the phenomenon of Meristomatic Culturing -Cloning for plants – known by farmers for thousands of years now – see major encyclopedias

1 A SMALL PART OF THE ORCHID PLANT IS REMOVED

2 ISOLATION AND STARVATION (STONEWOOL)

3 TRANSPORTATION

4 NORMAL ENVIRONMENT

Meristomatic culturing of an orchid is common and typical with meristomatic culturing of other plants – cloning for plants, known for thousands of years now.

Small pieces, cut from an orchid leaf, are placed in a closed bottle on a wool stone, where the orchid cells are seriously nutritionally starved, away from the mother plant. The cells, in order to survive, multiply and produce a new orchid. Then the new developed plants, after the nutritional stress, are transported to a normal nutritional culture where they further develop to new plants. Modern cloning for animals is initiated by a similar nutritional stress. We suggest "cloning meristomatic culturing" and "cancer", all three based in cell division and multiplication, have a starting phase of nutritional poverty and stress or a forced low metabolism.

However, we may immediately question the following:

Why orchid cells when stressed lead to a new orchid and not to cancer?

Similarly, the other way around:

Why cells in a body when stressed lead to cancer and not to a new plant or animal like in meristomatic culturing or in biological cloning?

 The answer is that meristomatic culturing or biological cloning is always processed away from the main plant or animal. A new identical plant or animal is developed according to its DNA description of the cell and regardless of its location. On a particular location or anatomic position of an organism, cells differentiate, or specialize, or restrict their DNA function to a specific task according to the location. This DNA restriction imposed by the anatomic position of the organism is what prohibits a multiplying cell in the organism to develop into a new independent organism as it would have done away from it and away from the particular anatomic position. The position directs the new born cells to differentiate according to a plan specifying the task of that position.

When starving conditions are imposed on an anatomic position of a plant or on an animal, either the cells will die or the cells with the "DNA restricted by this position" will produce a "monster form" multiplication that we call cancer.

 It is beyond the scope of this article to discuss and prove the "form giving" or "cell differentiation" factor on an anatomic position of an organism. For the present scope, we may only call the controlling factor, the **etheric archetype or morphogenic ether** associated with the organism, after Aristoteles who specifically defines the non material and non visible "Ether" or the "Fifth Essence", as the non material agent that gives form to inorganic and organic matter. Additionally, we may say that the **etheric archetype** universally seems to be in operation in giving forms to plants, animals, stones, clouds, mountains, the visible craters of the moon, the recent (late 90's) found galaxy arrangement in lines in the Universe, forms associated with cohesion forces, forms of the iris of the eye, forms in crystals, ores concentration, forms in dried water, dried blood, dried saline, ice, all different forms of the very well known, but still unexplained, snow flakes!... etc. (suggested typical reference for water formations: "Messages from Water" by Masaru Emoto, MD, Hado Kyoikusha Co., Tokyo, Japan, ISBN4-939098-00-1, http://www.hado.com

Cancer also certainly has a form. Though, cancer is considered as a non controlled multiplication of cells. We may directly say this is an exaggeration because cancer is indeed the opposite. It is a controlled multiplication in a particular volume. Any arbitrary accumulation of cancer cells in a particular volume is subject to immediate fatality, as the necessary metabolism is not supported. For any cells, including cancer cells, an elementary system providing nutrients and sustaining at least an elementary metabolism is required. Tumors are known to create an organized net of capillary tubes - arteries and veins that collectively connect to a main artery for blood supply. Medication for halting an organized geometric structure called angiogenesis is provided to cancer patients to destroy their tumors. So, we see that tumors without the position-differentiated cells and organization to form geometric structures called angia or arteries cannot survive.

Therefore, though it is explicitly said that cancer is a non controlled undifferentiated multiplication of cells, the opposite is also clearly admitted - cancer cells also differentiate in an organized form, for example in arteries.

We may call the factor here that differentiates and gives the particular **form to new born cells and geometry to the tumor that was non-existing before,** the **etheric archetype of the tumor** that gives organization to it, enabling it to survive.

We shall also postulate here that this form factor is also the same as the universal form-factor once called the "ether" by Aristoteles and that is present everywhere in the Universe, as in the great variety of examples we have given above.

To understand the rest of this presentation, we shall also state here, as postulates, two basic principles which govern this **non material form of etheric archetype that associates with the material structure of every object**, based on many years of relevant observations and experimentations in several different scientific branches.

1. **the Principle of extendibility of etheric archetype, i.e., its tendency to copy or extend itself to any available material carrier.**

2. **the Principle of fractal information for the etheric archetype, i.e., to store all the form information irrespectively in any point of the structure of the associated object.**

We are suggesting here, that the methods of treating cancer should be based on controlling one or more of the factors, governing the above self-sustained mechanism of lack of energy and shelf-organized division, which is creating more need for energy, for the induced population growth. We call this suggestion the **"constructive"** treatment of cancer, as opposed to the **"destructive"** treatment described below.

Destructive controls of cancer:

 "*We consider this category, to be the first category used to control cancer.*

We call this category "destructive", because, it is mainly based on means of destruction (or means for killing cancer cells), which may, or may not be the same means, which have already caused cancer in the first place, according to the ideas expressed here.

Immediately, we see that the "destruction methods" or any "cell destruction processes" are causes of cancer too, as cancer itself is a state of emergency for survival against any destruction and extinction.

The destructive methods of controlling cancer practically are:

1. Surgery .

Surgery consists of removing and destroying completely a large population of cancer cells and potentially other cells, mainly by mechanical means.

2. Radiation

Radiation consists of destroying a large population of such cells and potentially other cells, by a sufficiently strong radiation -mainly radioactivity. This treatment is based on the assumption that cancer cells are weaker cells and more likely to die than normal and healthy cells.

3. Chemotherapy

Chemotherapy is a generic term derived from two Greek words that of **chemia** for chemistry and that of **therapia** for treatment. However, chemotherapy in practice consists of destroying a large population of cancer cells and potentially other cells, by **strong toxic** substances. This treatment, too, is mainly based on the assumption that cancer cells are weaker cells and more likely to die than normal and healthy cells.

We see the starting basis of treatments 2 and 3, is the same as our main assumption for cancer cells being weak, low energy and low metabolism with a relatively higher death rate. However, the applied method for correcting the weak situation is basically not any different.

In practice, for example, chemotherapy reduces the cancer population. However, the same action of chemotherapy is the characteristic reason for cancer development, in the same sense we explained above, by making the cells which survived, get into a more adverse state of "panic" and division for survival. On top of this, the toxic action of chemotherapy does not assist at all in restoring the missing energy resources of the organism by destroying other vital functions and particularly by damaging the immune system. The same facts are more or less true for a radiation treatment.

Considering the following which we consider, fundamental conditions and principles for cancer:

> **A.** Cancer is a panic state of low metabolism, leading to starvation, leading to a death threat, leading to multiplication for survival

> **B.** Self organization

> **C.** Problems of vital functions

We may say that chemo and to a lesser extent for radiation and surgery, for the surviving cells, clearly enhances A and C. We may also even add for the rest of healthy cells, that the destructive methods enhance C which may cause A for them, that is a new cancer or a new metastasis. This interrelated scheme explains the relative known failure of the destructive methods which in many cases after these treatments, new cancerous and more aggressive situations appear, making cancer to be widely considered an incurable disease.

Constructive methods controlling cancer may consist of:

1. Primarily restoring the missing energy , so the cells do not need to divide, and subsequently become more cancer cells.

   This works against principle A above.

2. Helping the organism to restore its vital functions, for damage or loss of vital functions, results in lack of energy .

   This works against principle C above.

3. Enhancing the immune system, which may limit the number of cancer cells, and thus limit the energy and nutrition expenditure of the organism .

   Preventing self-organization of tumors by the extinction of the etheric archetype associated with the particular tumors.

This works against principle B above.

Unfortunately, medical methods that exist are not oriented into the "constructive methods" of the treatment of cancer. On the contrary, constructive methods are called "**alternative**" methods. Law excludes them in many cases. For some of those medical cases, the destructive methods are admitted to offer no hope.

For example, in certain cases, any treatment of cancer other than surgery, radiation and chemotherapy is considered illegal!

A law, which in its strict sense obviously contradicts and interferes with the freedom of "scientific" method and development.

PAP IMI™ exposures are assumed to provide inner magnetic and induced electrical inner energy. This transforms and directs inner energy to all cells and particularly to inner energy for the "energy thirsty cancer cells". The PAPIMI™ increases the transmembrane potential of the cells towards the healthy state of 70 mvolts, and thus, puts them into a state which is known to prohibit division at 12 mvolts. **(**Nobel Laureate Albert Szent-Gyorgyi, Cone, and others).

At the same time, the immune system is generally enhanced by PAPIMI™ exposures, and may start "extinguishing" cancer cells. Also PAP IMI™ enhances the vitality of other vital functions.

PAP IMI™ exposure, due to its unique instant power, may cause considerable disturbances that apparently may disorganize or may erase the etheric archetype associated with the tumor. As soon as the tumor's etheric archetype is erased, during the PAP IMI™ nanopulse pause, the rest of the body's healthy etheric archetype may be extended or copied in the area, under the first principle of extendibility of etheric archetypes.
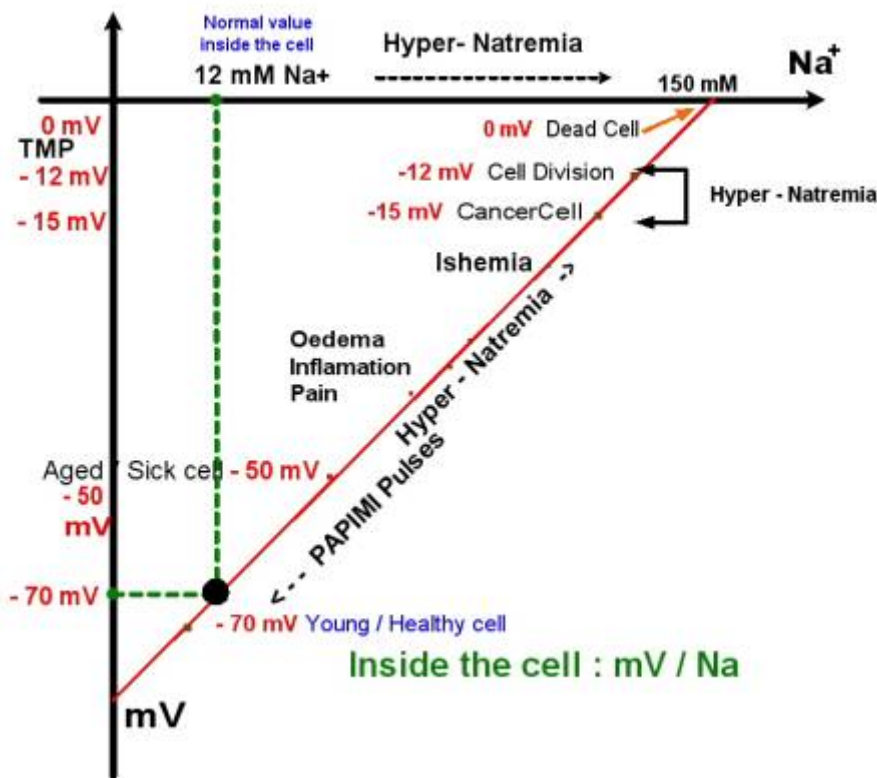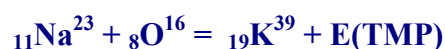

Diagram 1 indicates the relationship between the intracellular concentration of Na⁺ ions and the associated trans-membrane potential, as they are correlated with the health state of the cell. PAPIMI™ device moves TMP up and lessens Hyper Natremia down, from the upper right of the curve, towards the lower left part.

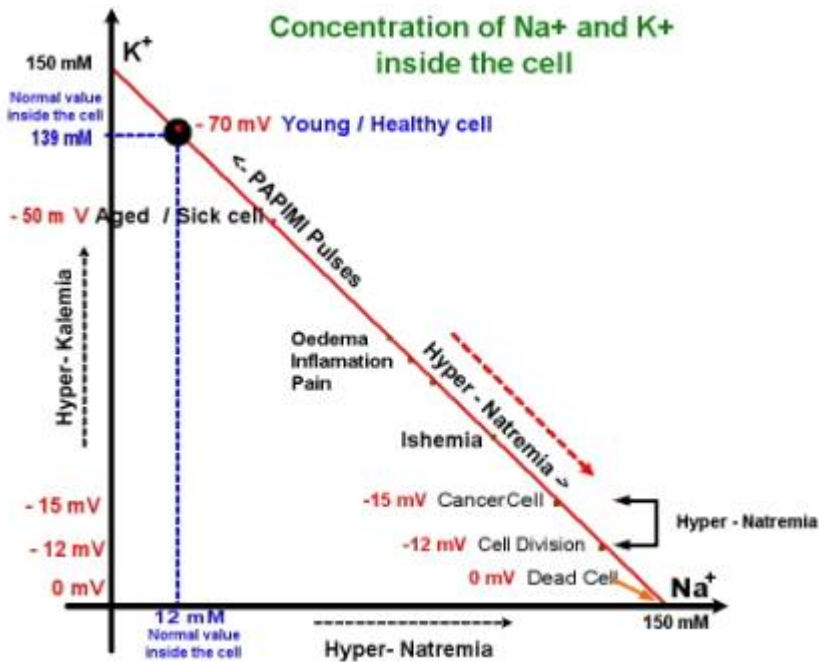$$_{11}Na^{23} + {_8}O^{16} = {_{19}}K^{39} + E(TMP)$$

Diagram 2 indicates the relationship between the relative intracellular concentrations of K^+ and Na^+ ions, as they are correlated with the trans-membrane potential and the health state of the cell. PAPIMI™ device pushes the condition of the cell from the lower right to the upper left to the young and healthy condition, from **High Na^+ to Higher K^+**. As Na decreases, the K increases according to:

$$_{11}Na^{23} + {_8}O^{16} = {_{19}}K^{39} + E \text{ (TMP).}$$

In accordance to the principle of the etheric archetype extendibility, a rejection has been reported in many cases along with or after **PAP IMI™** exposures, by an "under the tumor growth" of healthy tissue, to the point that the tumor itself was rejected, in a manner that a "foreign body rejection" took place. Also, many times, tumor necrosis has been observed, without ever having any destructive effect on adjacent tissue or anywhere else that consists of healthy tissue. Only cancerous tissue seems to respond relatively better to normal tissue

Apparently, systematic or generalized cancer cases may not be helped by PAP IMI™ exposures and the principle of extendibility, for there will be no healthy area to be copied or extended to over a local cancerous area. Indeed, systematic or whole body leukemia cancer was not found to be helped by PAP IMI™ exposures, treating the blood as a whole. However, according to C. Wallach, with the treatment of the long bones alone, for leukemia depending on bone marrow defects he reports statistics of 60% success.

The triple action of PAP IMI™ exposures for treating cancer cells may be summarized as follows:

1. **ENERGY AT LEAST ENTROPY: PAP IMI™** exposures, are assumed to stop cell proliferation by increasing energy and decreasing entropy, directly in the form of increased of transmembrane potential and also by reestablishing cell metabolism to normal levels, via the nuclear synthesis:

$$_{11}Na^{23} + {_8}O^{16} = {_{19}}K^{39} + 452484 \text{ Kcal/mMol.}$$

2. **IMMUNE SYSTEM ENHANCEMENT: PAP IMI™** exposures are assumed to enhance or excite the immune system, which may extinguish cancer cells. Also, PAP IMI™ enhances other vital functions of the body, i.e., liver function, lung function, blood and lymph circulation, kidney function, etc, that may sustain or enhance metabolism in general.

3. **ETHERIC INFLUENCE: PAP IMI™** may erase the etheric archetype associated with the tumor to the point that in several treatments it was found to cause tumor disorganization and necrosis, as well as to initiate tumor rejection as a "foreign body rejection", because of under the tumor healthy tissue growth, presumably associated with an extension of the underneath etheric archetype to the tumor area to the point of rejecting the tumor out of its location.

As secondary actions of **PAP IMI™** exposures in the respect of treating cancer cells with the above ideas of "cancer being in a state of low biological energy and nutrition", in general may be considered to be:

 PAP IMI™'s strong anti-inflammatory action, enhancement of metabolism, nutrition via blood influx and tissue oxygenation.

Suggested provisions associated with PAP IMI™ treatments for reestablishing metabolism:

It is an imperative condition that a cancer patient may have availability in all nutrients for his intended enhancement of metabolism by PAP IMI™.

"All cancer patients should be in good and sufficient order with respect to all of their vital functions that will sufficiently sustain their metabolism during and after PAP IMI™ exposures. In this direction, vital function's sufficient restoration or enhancement is necessary prior to the fulfilment of PAP IMI™ exposures.

We consider the following to be true and would be applicable with any treatment of cancer.

It has been found beneficial for underweight cancer patients to consider a weight gain program by increasing the intake of foods that are nutritious for the body. When the weight gain occurs it has been observed that the patient's health is improved in regard to their particular cancer condition.

We consider this to also be true with any treatment of cancer.

The thermometer for an underweight cancer patient should be a daily weight scale. Inability and failure to restore lost weight, or further loss of weight, should place the procedure under reconsideration into a state of alert. Consultation with an expert Medical doctor with knowledge on nutrition and metabolism should be an emergency and first priority."

We consider this to be generally true and that it **should be applicable with any treatment of cancer.**

We anticipate to publish in the near future, (see articles on nuclear transmutation on this presentation) numerous didactic examples and paradigms, more details of how PMF energy of the kind the **PAP IMI™** devices is producing, increases in cell energy, action and vitality, in the light of the research of biological **nuclear transmutations of low energy**, made by the Great French Scientist **Louis C. Kervran;** as well as in the light of the recent developments of **cold nuclear fusion relating and confirming Louis C. Kervran** of **low energy nuclear reactions**, which seem to take place particularly in every biological activity and to be the soul of every living cell.

We believe Louis C. Kervran's findings are the missing link so far, for understanding properly basic cell physiology, energy and cancer. Such ideas will distinguish the year 2001 and beyond from all previous years.

Upgraded January 2, 2002
Original January 21, 1998
Professor Panos T. Pappas ,
e-mail: ppappas@papimi.com
Copyrighted
Minor corrected February 20, 2002

Minor upgraded January 12, 2004, May 2005

FOR SCIENTIFIC RESEARCH AND CONFIRMATION

"THE EQUATION OF LIFE PART I"

Keywords: pump[1] (nuclear transmutation), **SPP** (**S**odium **P**otassium **P**ump), Cold Nuclear Fusion, **TMP** (**t**rans-**m**embrane **p**otential of the cell)

Electrically Induced Nuclear Fusion

PART I

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Summary:
Biology in order to explain the trans-membrane potential of the cell -(TMP) adopts an unproven hypothesis of a procedure in which sodium Na is exchanged with potassium K inside and out of the cell. This assumed exchange in Biology is called the sodium-potassium pump[1]-(SPP). The SPP leads to elementary contradictions, known in the literature. However, the SPP is the best choice hypothesis based on *the exclusion, assumed impossible, of cold nuclear fusion of sodium to potassium in the biological cell level.*

In this paper, we prove that the SPP process in Biology is actually a cold nuclear fusion and transmutation of sodium to potassium in the presence of oxygen-(SPT). In the paper, we also present, for the first time, the relevant nuclear exothermic equation and its important relationship to the cell parameters, the needed energy resources and most important to the cells' energy.

The SPT is the most important process to sustain the living cell and its physiology. The complete physiology of the sodium and potassium of the cell and in extension of the sodium-potassium physiology of the human body is understood and explained without the "not understood artifact" mechanisms and contradictions. The SPT and fusion is the basis of understanding several other mechanisms and similar cold nuclear fusions and transmutations in Biology and Medicine. The SPT nuclear process takes place continuously in the human body. It is the basis for the continuous function of the heart, and the key for the metabolism of all cells. It is clearly understood why the excess of Potassium in the blood stream prohibits the SPT nuclear reaction, leading to luck of energy, heart arrest and death.

The basic cell physiology is presented in terms of standard osmosis, nuclear transmutation of Na to K, and the physicochemical properties of these elements, only.

Introduction:

1. In 1964, G. Oshava and M. Torii[1] (OT) proved in an experiment that cold fusion of Na to K is possible. OT took 2.3 mg of Na, put it in a vacuum tube, 20 cm long and 2 cm in diameter, and sealed it. They ran electrical discharges of 60 watts through it for 30 minutes. After stopping the discharges, they inserted Oxygen in the sealed tube with the electrically treated Na. A second later Na transmuted to K, according to the exothermal[*] equation:

$$_{11}Na^{23} + \text{Electrical Excitation} + {_8}O^{16} = {_{19}}K^{39} + \text{Energy}$$

This experiment proves that if Na is first treated electrically, apparently its nucleus gets into an excited state, and secondly, when exposed to Oxygen, fuses with it to Potassium.

2. In 1955, an assumed process related to the same elements of Na and K for the cell, was suggested by Hodgkin and Keynes[2] under the name of Sodium-Potassium Pump[1]-SPP, in order to explain the trans-membrane potential of 0.07 volts that exists between the interior of the cell and its environment. This potential is also related to the cell content of K. According to this hypothetical process, Na is assumed to be continuously exerted out of the cell without eventual depletion and simultaneously K to be continuously inserted into the cell without eventual saturation. The obvious eventual depletion of Na from inside the cell, as well as the obvious saturation of K inside the cell is not addressed and remains as a paradox or contradiction of the said hypothesis.

However, this "hypothetical" process of exchange is regarded in Biology as an unquestionable "truth" and its results elevated to "findings".

According to Harold Hillman[3], Biology in this case, does not distinguish between hypothesis, truth and findings.

For SPP, a mechanical action of the cell membrane, is assumed synchronously and selectively to pick up precisely 3 atoms of Na from inside the cell and eject them out of the cell. In the same period of time, it is assumed synchronously with the previous transportation, selectively to pick up 2 atoms of K from outside and eject them inside the cell.

This assumed artifact process is also called the active transportation of the cell membrane. It is also assumed that the specific rates of the "in" and "out" exchange of Na and K are different for the two atoms. Specifically for 3 atoms of Na out, 2 atoms of K come in, by an artificially assumed specific "picking up" structure of the cell membrane in the ratio 3/2. Therefore, it is believed that more positive Na^+ ions come out than positive ions K^+ go in. Thus, it is assumed that a net of positive charge is coming out at a rate of 3/2 for every K^+ going in.

This way, standard Biology attempts to explain the cell's trans-membrane potential and its relation to the content of K^+ inside the cell as a difference in the "in and out" rates for Na^+ and K^+, and by an artifact "picking up" mechanism of the cell membrane. It is doing so, without considering the possibility of the direct nuclear transmutation of Na to K inside the cell, which gives the same results, without the obvious contradictions of expected depletion and saturation respectively, as well as, without the need of the unlike mechanical action of the membrane, requiring precise synchronicity and selectivity of cog wheels.

It is also experimentally found (and this may be thus considered a fact) that for the charge of the trans-membrane potential, energy is required, as it should be expected. This energy was found (Skou[2] 1957) to be supplied by an exothermic consumption of a substance inside the cell called ATP. ATP is

produced or actually reformed by a reverse process of energy which is supplied by the so-called Krebs' circle. Krebs' circle is powered by the burning of glucose inserted to the cell by insulin.

However, the actual active transportation of Na-K has never been proved, but, remains as an unjustified hypothesis in Biology, as it is also emphasized by H. Hillman[3], and H. Hillman and P. Sartory[4] in a relevant analysis. Besides, contemporary University textbooks in Biology admit that the assumed process is not understood, for example, ibid. page 541, "Molecular Cell Biology" by James Darnell, et al[5], "*The activity of this (sodium-potassium pump[1]) and other cellular ion pumps[1] is closely regulated by mechanisms presently unknown...*"

By the hypothesis of Sodium-Potassium pump[1] or exchange, saturation of K should eventually occur inside the cell, which has a finite volume. At the same time, Na inside the cell should eventually be completely depleted. The sodium potassium exchange should be over and terminated after a finite time, depending on the initial concentration of Na inside the cell, and the available space inside the cell to be filled with K, a fact that is against observation and findings.

3. It is also known that the correct concentration of Na^+ and K^+ inside and outside the cell is responsible for the normal trans-membrane potential 60 to 70 mvolts and the normal vitality of a cell. A dead cell equalizes by osmosis alone the "intra and extra" cellular Na^+-K^+ concentrations and drops its trans-membrane potential to zero. The normal "intra and extra" cellular concentrations are:

	Out (blood)	In (cell)	
Na^+	145	12	mM
K^+	4	139	mM

4. Lois C. Kervran[6,10] and Komaki[7,8,10] established after many years of observations and experimentation that there is a continuous intake of Na by humans and animals and a continuous discharge of K by urination, as published in the celebrated book "Biological Transmutations", Swan House Publishing Co. NY 11223, 1972.

Kervran also established that with the intake of Na, K also increases. The ratio Na/K remains constant with or without intake of K, which is a generally known fact in Medicine and Biology.

It is very well known that for people with kidney deficiency, potassium K increases continuously in their blood stream, practically regardless of the food intake of K. However, It is also strongly recommended for them to avoid taking NaCl as much they can resist, not though emphasized to avoid taking foods reach in K. These medical suggestions directly prove that the intake of Na directly increases K on a short or long and permanent basis which for people with deficiency to discharge K avoidance of Na is recommended on a permanent basis.

From time to time, serious kidney deficiency patients have to go through a process, called blood dialysis, to remove the excess K among other toxins from their blood stream, otherwise, they die. It is also known that excessive concentration of K (hyperkalemia) in the blood stream for any reason which may halt the equation suggested here, instantly causes heart's function arrest.

These facts make sense only, if Na nuclearly transmutes to K inside the human body on continuous daily basis which sustains life.

5. Pappas[9], since 1989 and for 10 years of continuous observations and systematic research, established that the K concentration in the blood increases, when human or animal cell's are exposed to the PAP-IMI Device (PAP-Ion Magnetic Inductor) - a generator of nanopulsed magnetic induction

field, causing to the exposed tissue, an instant electrical potential per meter (potential gradient or electrical field volts/meter) of a fraction of the normal trans-membrane potential gradient of the cell, which is of the order of 10 MVolts/meter[5].

6. The phenomenon[9] of K increase by PAP IMI exposures is found to be more enhanced, when cells are in a state of edema or inflammation which are known to contain higher concentration of Na inside the membrane of the cell. At the same time, a drastic reduction of edema and inflammation is found to occur, which indicates a drastic reduction of sodium and a simultaneous increase of K inside the cell. These findings make the device characteristically known to be associated with one of the most, or in certain cases, the best anti-inflammatory and edema reduction method. In PAP IMI exposures to inflammatory or edema cases, excess K accumulates in the blood stream, which under normal kidney function is immediately discharged from the body by the kidney functions and urination.

This is a decisive phenomenon, for it clearly proves a significant increase of production of K, in case of an increased concentration of Na associated with an inflammation or edema which is exposed by appropriate (PAP IMI) electrical nanopulses to enable the transmutation of Na to K!

The Equation of life:

Under the observation and the circumstances of 1, 2, 3,4 and particularly under the findings of 5 and 6, see also Part II, we come to a unique conclusion that the unproved hypothesis of Biology[2,5] for the so called sodium-potassium pump[1] is wrong, just because of

"having no means of explaining the phenomenon" excluding as unthinkable, the case of cold fusion inside the human and animal cell.

On the other hand, a continuous transmutation of Na to K inside the cell seems to explain all the Na-K physiology of the cell and the Pappa's related electrical findings for the cell. The exchange of Na to K which logically contradicts all findings[6], and in particular the known physiology of Na and K is totally wrong and a forced assumption based on the ad hoc **wrong** assumption: "*no cold nuclear transmutations may occur in Biology*".

We propose for the first time, the Pappas' equation of **nuclear fusion** on the level of the living cell, indicating its relation to the involved vital energies as an exothermic reaction:

$$_{11}Na^{23} + {_8}O^{16} + \text{Electrical Excitation} + \text{ATP Energy} = {_{19}}K^{39} + \text{Bio Energy}$$
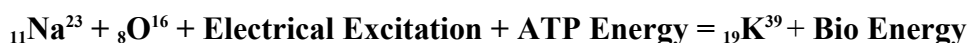
which results in the energy own resource of the living cell.

The exact role of the membrane's electrical energy or the externally supplied electrical energy, the separate role of the ATP energy, as well as the role of K to the trans-membrane potential-TMP of the cell, the relation of TMP to the cell metabolism and proper function and cell energy, will become clear in the following.

It is well known that although K is a bigger atom than Na. Na's mobility should have been higher than K's. However, Na hydrates with 6 atoms of H_2O, K does not. Thus $Na+6H_2O$ is becoming extra large and thus Na's mobility is finally much less than K's. Thus once Na is inserted by osmosis into the cell and transmutes into K; the naked K escapes by osmosis more rapidly though the cell membrane, due to its smaller size and thus higher mobility. This causes an imbalance to the electrical charge concentrations, for positive ions may escape faster out under the vehicle of K ion, than they are inserted as Na ions. This naturally explains, for as long as Na transmutes to K inside the cell, why the cell loses positive charge and becomes more negative with respect to its environment, until it reaches

45

an equilibrium value of negative potential to retard the exit of K^+ and to increase the input of Na^+ and other positive ions from the extracellular space.

The trans-membrane potential difference, thus created, powers metabolism of the cell by electrostatically attracting other materials into the cell- a generally known phenomenon as electroinsertion. Further, the trans-membrane potential enables the nuclear transmutation of Na to K by preparing the Na nucleus during its crossing the field across the membrane, in case of a normal TMP present which is of the order of 10 MVolts/m.

SPT maintains TMP, and TMP maintains SPT in an auto-catalyze, maintain or enhance one another mode.

A cell in the state of death -known to have no trans-membrane potential, may not initiate Na to K fusion and may not restore the lost potential. Thus, the state of death with no trans-membrane potential for the cell is an irreversible state of no metabolism.

The role of insulin enhanced by adrenaline, secreted from the adrenal gland (situated on the top of kidneys) is better understood, as a mechanism of controlling ATP, which complements the fusion of Na to K, thus controlling the rate of metabolism and the rate of vitality of the cells of the body, in respect to the adrenaline triggered by the state of the brain and eventually the state of mental perception and activity.

In case of an increased activity of SPT caused by the adrenal gland, the kidneys are also required to be alerted by the same mechanism that triggers adrenaline, to quickly discharge as nuclear ash, the expected increase of K, thus maintaining the balance of low K concentration in the outside the cells environment; and to prevent reinsertion of mobile K into the cells by osmosis and electroinsertion; and thus to prevent the annihilation of TMP; and thus to prevent the cell death by luck of its energy resource.

This makes understandable the wisdom of positioning the adrenal gland on the top of the kidneys.

This basic mechanism of cold nuclear fusion explains the simple wisdom and physiology of the cell and the miracle of life, without unknown, magical and mysterious mechanical functions for the cell membrane, contradicting the elementary logic of saturation and depletion for finite volume cells.

Conclusion:

It has been shown that the assumption of nuclear fusion in Biology is not contradictory, but leads to the understanding of biological procedures without contradictions. In particular, from over 10 years observations of the PAP IMI electric exposures on living cells, we are led to the correct assumption that the process known today in Biology as the Sodium-Potassium pump[1] is incorrectly assumed a molecular exchange, but actually it is a nuclear process of fusion under electrical excitation of Na nucleus, firstly by the charged cell membrane, and secondly via an endothermic catalytic action of ATP. The electrical excitation of the Na nucleus may be assisted externally by appropriate strong electrical nanopulses. ATP seems to control this fusion reaction which otherwise could exponentially increase under the self catalytic excitation of the trans-membrane potential-TMP which is related with a positive feedback reaction to the fusion of Na to K in the presence of O. The role of ATP, related mitochondria, Kreb's cycle, insulin, glucose, adrenaline, adrenal gland and kidneys is better understood as a co-mechanism to control this nuclear fusion which otherwise may increase exponentially or may die out.

The irreversibility from the "death" state to "life" state for the cell is clearly understood, as in the death state, the "first" electrical excitation by the cell membrane, i.e. TMP, is missing to

catalyze or prepare the nucleus of Na to transmute to K and maintain farther the TMP and enable subsequently metabolism.

The nuclear fusion of Na to K by Oxygen seems to be the most important function of the cell and the key to its life and metabolism. A great number of other biological and medical functions and malfunctions are better understood by standard osmosis related mechanisms alone, and via the above nuclear fusion as well the equivalent to its reverse for example:

$$_{19}K^{39} = {_{11}}Na^{23} + {_8}O^{16} \text{ - \textbf{Electrical Current Energy}}$$

and will be presented shortly.

pump[1] = nuclear transmutation.

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FOR SCIENTIFIC RESEARCH AND CONFIRMATION

"THE EQUATION OF LIFE PART II"

K-Na-K

Nuclear Transmutations inside the living cell

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Summary:

In this paper, we prove under controlled experiments with the PAP IMI Device -a strong Magnetic Nanopulse Generator, and with human subjects that potassium may increase in the presence of excess sodium. This suggests a sodium-potassium cold nuclear transmutation process takes place in Human Biology in the presence of oxygen and electrical excitation.

This fusion is the basis of understanding several other mechanisms and transmutations in Biology and Medicine. The exact reverse process also takes place in the living cell, leading to a triggered nuclear exothermic fission of K to Na and O that acts as an ordinary electronic positive-hole-conducting semiconductor. This "positive whole semiconductor" transmits signals in one direction in the axons of nerve cells, keeps the heart beating, the muscles moving and producing work.

Introduction:

In a previous paper[11], we had made the hypothesis that a nuclear transmutation of Na to K takes place inside the living cell, maintaining its known trans-membrane potential. We had introduced this hypothesis to replace the paradoxical and contradictory unproven hypothesis of Na-K pump or exchange of biology.

Our hypothesis was based on Louis Kervran's[6] and on H. Komaki's[7] biological findings as well as to the following facts:

1. In 1964, G. Oshava and M. Torii[1] (OT) proved in an experiment that cold fusion of Na to K is possible. OT took 2.3 mg of Na, put it in a vacuum tube, 20 of cm long and 2 cm in diameter, and sealed it. They ran electrical discharges of 60 watts through it for 30 minutes. After stopping the discharges, they inserted Oxygen in the sealed tube with the electrically treated Na. A second later Na transmuted to K, according to the exothermal[*] equation:

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This experiment proves that if Na is first treated electrically, apparently its nucleus gets into an excited state, and secondly, when exposed to Oxygen, fuses with it to Potassium.

2. The "hypothesis" of Na-K process of exchange is unproved, according to Harold Hillman[3]. Biology in this case, does not distinguish between pure hypothesis, truth and findings.

This assumed artefact process is also called the active transportation of the cell membrane. It is also assumed that the specific rates of the "in" and "out" exchange of Na and K are different for the two atoms. Specifically for 3 atoms of Na out, 2 atoms of K come in, by an artificially assumed specific "picking up" structure of the cell membrane in the ratio 3/2. Therefore, it is believed that more positive Na^+ ions come out than positive ions K^+ go in. Thus, it is assumed that a net of positive charge is coming out at a rate of 3/2 for every K^+ going in.

This way, standard Biology attempts to explain the cell's trans-membrane potential and its relation to the content of K^+ inside the cell as a difference in the "in and out" rates for Na^+ and K^+, and by an artefact "picking up" mechanism of the cell membrane. It is doing so, ***"having no other means of explaining the phenomenon" excluding as unthinkable, the case of cold fusion inside the human and animal cell.***

Biology is thus accepting a hypothesis with the obvious contradictions of expected depletion and saturation respectively, as well as, with an unlike mechanical action of the membrane, requiring a precise synchronicity and selectivity of cog wheels.

3. It is experimentally found (and this may be thus considered a fact) that for the charge of the trans-membrane potential, energy is required, as it should be expected. This energy was found (Skou[2] 1957) to be supplied by an exothermic consumption of a substance inside the cell called ATP. ATP is produced or actually reformed by a reverse process of energy which is supplied by the so-called Krebs' circle. Krebs' circle is powered by the burning of glucose inserted to the cell by insulin.

It is also known that the correct concentration of Na^+ and K^+ inside and outside the cell is responsible for the normal trans-membrane potential 60 to 70 mvolts and the normal vitality of a cell. A dead cell equalizes by osmosis alone the "intra and extra" cellular Na^+-K^+ concentrations and drops its trans-membrane potential to zero. The normal "intra and extra" cellular concentrations are: outside cell Na 145 mM, K 4mM, inside cell Na 12 mM, 139 mM.
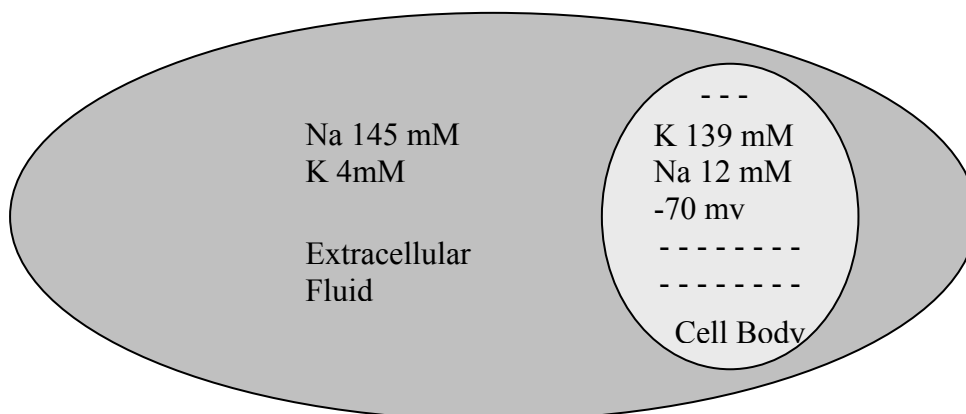
Figure 2 shows The K and Na distribution inside and out side the cell. The particular K-Na distributions cause a potential difference of the order of -70mv, between the interior of the cell and the extra cellular matter. This potential is called the trans-membrane potential. This potential is a key motive force for the cell intakes and metabolism. Absence of TMP for the cell causes for the cell to be in the state of death.

4. Below we report the applications of Bio Magnetic Generator PAP IMI, by the Medical Doctor and Bio-Pathologist Ilias Basteas, 7, Semitelou Street, Athens Greece, tel.: ++301-748 9246.

The device settings were at low intensity, 70% of maximum nanopulse strength. Each session consisted of 888 magnetic nanopulses at about 80 Joules each, dispersed on the exposed area of about 30 cm X 30 cm.

The blood tests performed right before and right after the PAP IMI expossures were are as follows: Analysis of ions K, Nα, Ca, Mg, Fe. General Blood Analysis: Sugar, Urea, Creatinine, Uric acid, Transaminase, Chlerthrine, Phosphatase, Whirte Blood Cells, Poly-monokaryons, Megalokaryons, Iosinophytes, Basophily, Immunoglobins: Iga, Igb, Igm.

28 (7x4) Cases of Osteoarthritic Pain, Osteathritis or Pain were testes were as follows:

a) **Patient H.M. age 65.**

Case of Osteoarthritic pain due to pressure of nervous roots.

Pain ceased permanently since the first session of 20 minutes exposure by the Bio Magnetic Nanopulses of the PAP IMI Device at the location of pain at full power at about 2-3 pps. The only clinical observation-effect was a 12 hour duration sensation of tiredness. The only laboratory change before and right after exposures concerned the maximum observed increase of K in the serum of blood which increased from 4.3 mM to 4.5 mM and at the same time the decrease of Mg from 2.01 mM to 1.97 mM during the session as well as a small temporal decrease of Iga, Igm, Igg,(156 to 149, 1045 to 1006 και 68 σε 61 mM which came back after 4 months, after the termination of PAP IMI exposures 4 sessions in 4 weeks. In the subsequent 3 sessions there was a lessen to no K increase.

b. **Patient P.D. age 58. Osteoarthritis of the Hips since long time with strong pains and unsuccessful painful maintenance operations.**

Patient received 4 sessions PAP IMI local treatments in 4 weeks. From the very first local treatment, there was an impressive result with an immediate significant reduction of pain, which in the subsequent session vanished completely. The absence of pain lasted months after the end of treatments. The only significant laboratory change before and after concerned the increase of K in the serum from 4.9 to 5.9 mM maximum in the first session, with simultaneous increase of Mg of the serum from 2.10 to 2.20 mM. In the subsequent 3 sessions there were lessen to no K changes.

c. **Patient P.K. age 30. Ankylosis - spondylitis (4LA B 27 +). Patient had 3 sessions and discontinued for other reasons the scheduled treatments for a later time. Patient had immediate pain relief, however, pain was coming back the 2nd and 3rd day after each treatment. Pain also changed location. K remained unchanged.**

d. **Patient I.D. age 60. Perichondritis of left Tibia of Traumatic Etiology.**

Patient had 4 sessions. Patient had significant reduction of pain with the first session and a complete disappearance of pain after the second session. There was K increase from 4.1 to 4.4 mM, in the first session. No other change was observed. In the subsequent 3 sessions there was a lessen to no K increase.

e. **3 Patients, young men with repetitive adnasal infection during the last 3 -5 years. No immediate symptoms relief was observed, as well as, no clear K increase or decrease was found.**

Experimental Conclusions and Synopsis of Results.

1.   **The increase of K in the serum occurred in 65% of all cases. In all subcases -!00% - that the pain ceased almost immediately and permanently, there was a clear K icrease. In the rest cases that there was no K increase, pain came back after a few days. This indicates a strong correlation between permanently relieved pain, increase of K and PAP IMI exposures.**

2.   **The K increase ranged from 0.2 to 1 mM/L maximum, assuming this increase was uniformly distributed in the blood stream of an average of 6 L, during the 5 minutes of treatment, a net increase of 0.2 to 40 mgr maximum of new K occurred in the blood after 888 nanopulses within 5 minutes exposure time over an inflammatory area of 20X20 cm^2.**

3.   **The fact that no systematic similar increase or decrease was found for Mg, as well as the fact that the K increase was found in distinct cases of immediate and permanent pain relief indicates that the increase of K in the 65% of cases, is not due to systematic errors in the performed blood analysis.**

4.   **A moderate relaxation of 4 to 6 hours duration followed most all cases.**

5.   **In all cases, there was an immediate reduction of pain, irrespectively of the etiology of pain.**

6.   **It is significant to note in some cases the fact of a pain migration from the area of application to a neighboring area, mainly in the case of neuralgic pain.**

5. The phenomenon[9] of K increase by PAP IMI exposures is found to be more enhanced, when cells are in a state of oedema or inflammation which are known to contain higher concentration of Na inside the membrane of the cell. At the same time, a drastic reduction of edema and inflammation is found to occur, which indicates a drastic reduction of sodium and a simultaneous increase of K inside the cell. These findings make the device characteristically known to be associated with one of the most, or in certain cases, the best anti-inflammatory and edema reduction method. In PAP IMI exposures to inflammatory or edema cases, excess K accumulates in the blood stream, which under normal kidney function is immediately discharged from the body by the kidney functions and urination.

This is a decisive observation, for it clearly proves a significant increase of production of K, in case of an increased concentration of Na associated with an inflammation or oedema which is exposed by appropriate (PAP IMI) electrical nanopulses to enable the transmutation of Na to K!

The Equation of life:

Under the observation and the circumstances of 1, 2, 3, 4, 5 and particularly under the specific new findings of 4, we come to a proof that the unproved hypothesis of Biology[2,5] for the so called sodium-potassium pump is a wrong and forced assumption based on the ad hoc **wrong** principle of no *"nuclear transmutations may occur in Biology"*.

On the other hand, a continuous transmutation of Na to K

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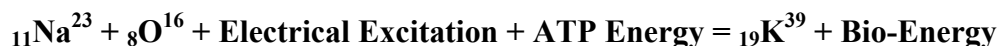
inside the cell, seems to explain all the Na-K physiology of the cell.

This process restores the energy of the living cell in the form of trans-membrane potential.

The exact role of the membrane's electrical energy or the externally supplied electrical energy, the separate role of the ATP energy, as well as the role of K to the trans-membrane potential-TMP of the cell, the relation of TMP to the cell metabolism and proper function and cell energy, will become clear in the following.

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In case of an increased activity of SPT caused by the adrenal gland, the kidneys are also required to be alerted by the same mechanism that triggers adrenaline, to quickly discharge as nuclear ash, the expected increase of K, thus maintaining the balance of low K concentration in the outside the cells environment; and to prevent reinsertion of mobile K into the cells by osmosis and electroinsertion; and thus to prevent the annihilation of TMP; and thus to prevent the cell death by luck of its energy resource. **This makes understandable the reason of the positioning the adrenal gland on the top of the kidneys.**

Understanding Life and Death and its Definitions:

Based on the Na-K transmutation and the described self- catalysed mechanism, we may easily realize for the first time the following:

The maintenance of life is understood by the mutual catalyzation of fusion of Na to K, resulting in the support of trans-membrane potential which in return enables the Na-K fusion.

On the other hand, the irreversibility from the "death" state to "life" state for the cell is clearly understood, as in the death state, the "first" electrical excitation by the cell membrane, i.e. TMP,

is missing to catalyse or prepare the nucleus of Na to transmute to K and maintain farther the TMP, enabling subsequently metabolism.

A system like a cell without a trans-membrane potential is in a state without life. Such a cell, obviously under no circumstances of its own, can achieve a trans-membrane potential, unless an external and outside to it system, -creator, mother system- inherits or gives to it the first trans-membrane potential or life.

A great number of other biological and medical functions are better understood by similar nuclear processes. In particular the reverse to the above nuclear fusion is the nuclear fission:

$_{19}K^{39}$ + Electrical current Energy = $_{11}Na^{23}$ + $_{8}O^{16}$

which is of fundamental importance in nerve signal transmission.

For example, it is very easy and elegant to understand nerve conduction by electrical imnanopulses, a phenomenon described in a very lengthy, complicated, and very little understood and contradictory way by standard Biology[5].

Nerve Cell Description:

Most nervous cells contain four distinct regions, which carry out specialized functions of the cell: the cell body, the dendrites, the long axon, and the specialized axon terminals. Nervous cells and their parts are separated by a membrane which encloses more or less the same ion concentration as the other cells. The nervous cell membrane caries a similar trans-membrane negative potential of 60 to 70 mVolts, called the resting potential. There is no reason to believe that the origin of the more or less similar trans-membrane potential is different than other cells. A nervous cell is specialized to transmit an electrical imnanopulse or signal along its long axon only in a particular direction like a semiconductor diode or transistor. The cell found in the normal state potential of 60 to 70 70 mVolts is said to be in a resting state as every other cell. The nervous cell has the ability to raise the resting negative potential momentarily to +20 to +30 mVolts in a region which suddenly changes composition from K to Na, and which travels along the axon of the nervous cell. Thus, the cell is transmitting a signal from left to right by the motion of Na spot inside of K sea, as shown in the figure 3. The nervous cell transmits a positive signal as an electrical imnanopulse as soon as the such positive imnanopulse arrives at the synaptic body of the cell, it is of a particular threshold and the cell is rested and prepared to guide a new imnanopulse along its axon , only in one direction. These are more or less basic experimental facts for the nervous cell, accepted by every body. The trouble for Biology starts when Biology attempts to explain the mechanism of imnanopulse conduction , in particular the almost instantaneous formation of Na inside the K concentration in a very short time interval.

Standard biology assuming as an impossibility the reverse of nuclear fusion of Na and O to K, that is the equation of

$$_{19}K^{39} = {_{11}}Na^{23} + {_{8}}O^{16} \text{ - Electrical Current Energy}$$

has no other choice than to assume a lateral exchange occurs of Na with K as in the case of Na-K pump. The adhoc exchange attempts to explain the momentary formation of Na inside the K sea by a spontaneous exchange of Na and K inside out of the cell axon, followed by an unexplained reversed process in zero time or return of Na out where it came from milliseconds ago.
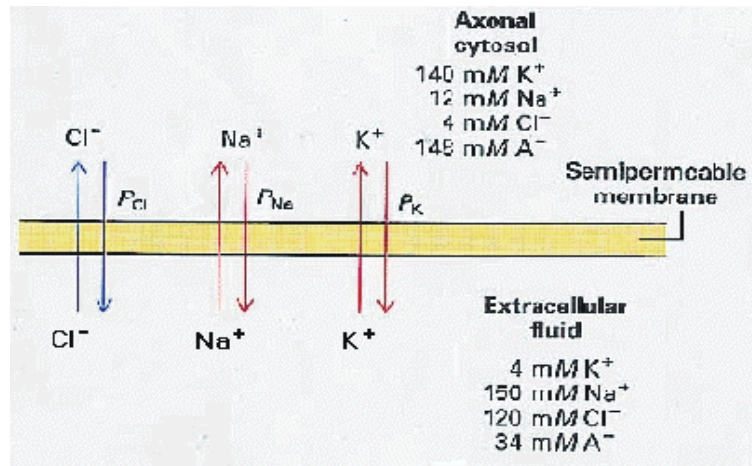
Figure 2. Classical Biology picture for a nervous cell axon. Biology in order to explain the instant presence of Na inside the sea of K, assumes that a spontaneous migration-exchange occurs laterally and from outside-insides the cell, as shown. However, this assumption does not imply and does not explain charge transportation in the longitudinal direction-the axonal direction of the observed electrical imnanopulse.

However, this complicated and improbable assumption involving adhoc lateral motions of charges fails to explain to the first degree the transverse motion of charges. For any lateral motion of charges may not result to charge transportation in a different and in particular perpendicular direction. Charge velocity has zero component perpendicular to its motion or at least the assumed way is the most inefficient and most complicated assumption to be made. For example, it would be far more believable as well as electrically expected that a positive electrical imnanopulse arriving at one ened of an axon tube containing electrolytes such as K, would cause electrolysis, and would cause a current imnanopulse to move from left to right any way. The puzzle is how and why the instant presence of Na inside the sea K. The lateral exchange of Na seems redundant, resulting in no significant current in the particular direction, other than the current expected by ordinary electrolysis!

However, under the circumstances described by Biology and allowing first the nuclear fission:

$$_{19}K^{39} = {}_{11}Na^{23} + {}_{8}O^{16} \text{ - Electrical Current Energy,}$$

second its reverse fusion:

$$_{11}Na^{23} + {}_{8}O^{16} \text{ - Energy} = {}_{19}K^{39},$$

a natural explanation of the mechanism may follow.

Naturally, an electrical imnanopulse conduction along the axon of a nervous cell, may first be explained by electrolysis of oxygen and the simultaneous creation of Na, both formed by the first equation in a sea of K, as soon as a positive and only positive imnanopulse arrives at the synaptic area of the axon of a particular threshold and in a time the axon's K concentration is restituted, as expected. It is apparent an imnanopulse with the wrong polarity negative will not be conducted along the axon. The momentary formation of Na which restituates back to K is easily understood and expected as oxygen may always flow form right to left formed by the fission of K on the right and the action of the electrolysis which will make it to flow to left. Thus as oxygen travels from right to left will form locally Na by its momentary absence until it is replaced by more oxygen from the right, causing Na spot to reach the very end to the right. After this the axon cell will be filled only with K ready to receive another nanopulse.

This mechanism is a typical semiconductor positive hole conduction which will allow only positive imnanopulses to travel from one end to the other.
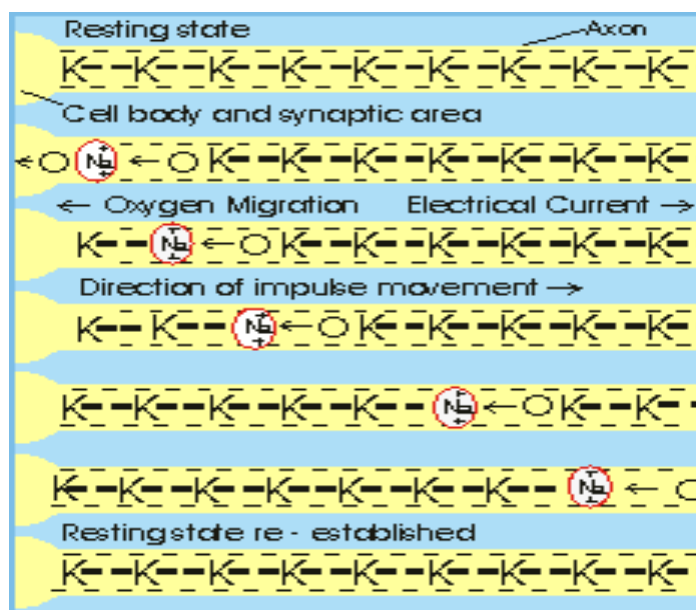
Figure 3 shows: A nerve cell axon based on K-Na-K nuclear transmutations . Distribution of K and transmembrane potential is the same as in every other cell. This is called the resting state of the (nerve) cell. However, the arrival of a positive imnanopulse on the left end of the axon, causes oxygen from nuclear fusion of K to Na and O, to migrate. As soon as this fission occurs oxygen ions would have migrated to the positive anode, and Na ions would have been formatted to the right towards the cathode to the right. This formation is synergetic to any normal electrolysis which would have caused motion of Na towards the cathode, any way. However, subsequent oxygen will turn back the Na region to K region by nuclear fusion, leaving to their right a new area of Na by nuclear fission. Subsequent nuclear fission of K to Na and O, as well as fusion back to K causes positive electrical charges by Na to travel to the right by missing negative charges by the migration from right to left of negative oxygen ions. This causes a positive "hole" to travel from left to right. This nuclear fusion and fission with the resulting motion of luck of electrons from left to right is an identical mechanism of current conduction by a positive hole semiconductor, known in modern electronics!

 As soon as this simple nuclear Fusion-Fission of K-Na-K forming the basic concept of a semiconductor, is understood and realized, then it may easily be expected and extended to reach the transistor concept, semiconductor gating and the other modalities of modern electronic circuitry leading to logical circuits and gating transmission.

Similarly the endothermic character of the fission equation related to nervous cells specialized in muscular function, may easily explain the energy release needed for a muscular function to perform work. Such applications will presented in a second paper followed the present one.

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The following footnote was added by Journal of New Energy Vol. 4, No 2, page 135.

"Pursuant to one of Dr. Pappas previous papers concerning biological transmutation printed in JNE: A website is now available, with abstracts and links to some full manuscripts, of research related to possible biological nuclear reactions and radiogenic metabolism. This work is spearheaded by M. Sue Benford, R.N., M.A. The website is accessible at: http://newvistas.homestead.com/SelPubl1.html

Version 3.1, 15/August/2003, (including the Einstein critical error below).

REVEALING

NUCLEAR MAGNETIC RESONANCE

NMR

and

Multiple NMR

(2025 Hz - 830000 Hz)   Pappas' New Patent Pending

Made Simple by Pictures and Basic Facts

By P.T. Pappas
Page under gradual development
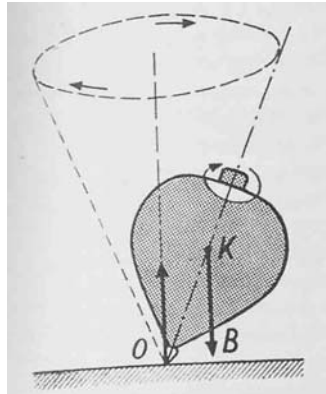
An Actual Mechanical Gyro - Rotating Top

 Generally: Precession of a Gyro is caused by an off center force which,
however, is not overtaking the "angular momentum's resistance" to maintain general orientation in space, by causing precession of the gyro around the axis of the original orientation. Thus, averaging to the original orientation.

General Important Fact for us:

Electron and Protons are

gyros - possessing angular momentum J,

possess Magnetic momentum - They are magnets. They are ring gyros (orbits) of current loops, possessing angular and magnetic momentum.

possess charge q= +/-e
possess mass

i,e, They are characterized by m, q, J, M and can be visualized as Electrical and Magnetic rotating ring Gyros - Tops.

Precession Frequency is much-much smaller than Rotating Frequency. So, it is for the precession frequency of protons.

Fact (not known to the majority of scientists and phycists):
Precession frequency for protons in the ambient magnetic field of the Earth, may come down to audio frequencies, down to 2025 Hz !!!!!!!!!!!!!!!!! (Scientific American : February 1968, page 125)

Theoretically, nuclear protons may resonate at even lower audio frequencies (than 2025Hz), at lower energies, $\Delta E = h\nu = \gamma Bh/2\pi$, at weaker magnetic fields !!!!!!!!!!

Protons when under Precession as above, in a short time may relax back by emitting rather low frequency radio waves, equal to their precession frequency. These Radio waves are the basis of Magnetic Resonance Imagine, MRI, used in Medicine for diagnostic purposes. In MRI, a subject to be diagnosed, is placed in well known (calibrated) value of static magnetic field which acts as an off balance force for the protons - magnets. Another transient and disturbing magnetic field (fast magnetic nanopulse) is applied instantly at right angles to the previous static magnetic field. Obviously the protons - rotating tops - are very much disturbed and start to come under precession, as a disturbed children's rotating top. However, the protons soon come back to their relaxing state - no precession - by emitting radio waves with the energy that was previously acquired by the proton precession. These radio waves come as an echo to the disturbing magnetic nanopulse. They are received by the MRI's sensors that by computer analysis are used to produce an image of the subject under MRI diagnosis.

-PAPIMI™ produces a fast dumping magnetic nanopulse.
-This dumping nanopulse acts first as a prolonged (non constant) restoring magnetic force on the protons, electrons as well.
-Secondly, it acts as a strong disturbing force.
-The two effects produce proton (electron) NMR, (EPR), as explained for MRI.
-Even having no intention to form a diagnostic image, using a digital storage oscilloscope, similar radio waves are received from a subject after a PAPIMI™ nanopulse.
-As a matter of fact, the non constant value of the dumping PAPIMI™ nanopulse, produces a variety of precession frequencies,
according to formula $h\nu = \gamma Bh/2\pi$,
-thus causing Multi-NMR for protons and Multi EPR for electrons.

The critical error of Einstein

In 1913, Einstein was given the Nobel prize, not for "his presumably famous" Relativity Theory, but for an obvious explanation of a simple phenomenon first observed by Hertz many years ago in...., namely the photoelectric effect, which in essence concerns the delivery of electromagnetic energy into matter.

The photoelectric effect explanation concerned the observation of Hertz that a bombarding beam of light would only extract electrons from a metal plate, say of zinc, aluminum..., if and only if, the light beam's frequency was higher than a threshold value V_0 frequency. Einstein's explanation for this effect was based on the Hertz observation, the famous Plank's quantum formula E=hν of... and the elementary Newton's formula for the kinetic energy $E = 1/2mu^2$.
Einstein stated that for extracting electrons from a metal plate by a monochromatic beam of light, the following obvious simple formula should hold:

$$E=h\nu= 1/2mu^2 + b$$

Where the only new term **b** in the above equation of Einstein, represented the work needed for just extracting one electron from the metal.

This formula states that the electromagnetic **E=hv (according to Plank)** should be first enough to extract an electron and then to give the remaining energy to the electron as kinetic energy. The formula of Plank concerns all electromagnetic energies, including of course, magnetic, NMR... The term photon for the energy **E=hv** was introduced much later in 1926 by Lewis. So clearly, the formula concerns delivery or transmission of electromagnetic energy in general, not only whatever is called photons. Of course including the NMR energy we are concerned here.

In essence, Einstein's explanation dictates how the Energy of electromagnetic radiation may be delivered into matter. The electromagnetic energy or the photon's energy may be split into **b** and to **1/2mu^2** , but Einstein, in effect, excludes in his explanation the opposite that two or more photon's energy may be added. In other words, two or more photon's may not add their energy and contribute it to the extraction of one electron in the particular case of photoelectric effect. Extractions of electrons was wrongly believed at the time of Hertz and Einstein that could not occur below the threshold value of frequency provided no matter the intensity of beaming light would be. This last sentence Hertz had wrongly stated, not having, obviously at his time, tested the phenomenon with high density beams and not having accurate instrumentation to detect a small number of escaping electrons.

 The explanation of Einstein makes quantum mechanics too strict, than they are actually. Demanding quantum energies may not be added. This is not true in quantum mechanics in particular and in nature in general. For example, the explanation forbids that small energies may be gradually accumulated to produce a bigger energy work. The source of the Einstein error was the apparent fact at the time of Hertz that they were using only low intensity beams of light. However, in today's technology with relative higher intensity beams, higher accuracies and sensitivity, the photoelectric effect is falsified.

TWO OR MORE ENERGY QUANTA OR PHOTONS OR ANY TWO OR MORE ENERGY AMOUNTS MAY BE ADDED OR ACCUMULATED TO PRODUCE A HIGHER ENERGY WORK, SUCH AS A LASER EMISSION OR A NUCLEAR REACTION.

For example today, it is known that two monochromatic photon's may enter in a crystal and come out as one photon of twice the frequency of the original photons. . Clearly this indicates that the two photons are adding their energies. **(read page 60 for details and references)**

Similarly, today's LASERS are generally based on adding or accumulating the energy of smaller source quanta. This phenomenon is called "Multi photon excitation" and it is in direct opposition of Einstein's Nobel prize given explanation for the photoelectric effect.
No matter what are the errors of Einstein and the errors of the scientific community to issue a Nobel prize, what we are concerned is what we lose allowing errors uncorrected and what we gain at present applying the correct knowledge.

With the Einstein's Photoelectric Effect Explanation, we lose the possibility that NMR low frequencies energies may cause "bigger energy" nuclear reactions.

However, removing the Einstein wrong restriction for Quantum Mechanics in this respect, we understand and expect that:
 Low NMR energy E=hv (due to the low frequency v of NMR, in general)

deliveries may be added or be gradually accumulated (as the laser effect) to cause much higher energy nuclear excitations and possible nuclear reactions !!!!!!!!!!!!!!!!!!!!

The Classical Picture of H Atom
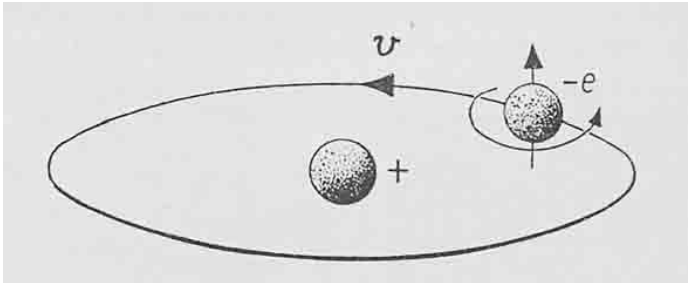
Electron is shown to orbit nucleus.
Electron is shown to spin around it's axis and, thus, it is assumed to posses angular and magnetic moment, like a charged rotating top with dipole magnetic moment
or it could had been an actual flat rotating current solenoid.
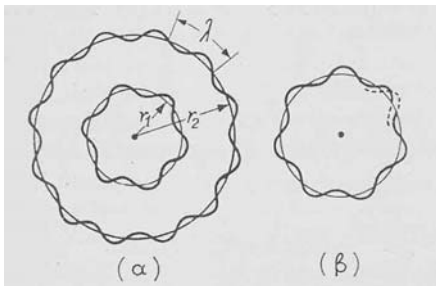
 It would had been simpler, in terms of classical electromagnetism and classical mechanics, to assume that the electron is just its orbit ring - rotating.
It would then naturally mass posses, angular momentum, magnetic moment and charge.
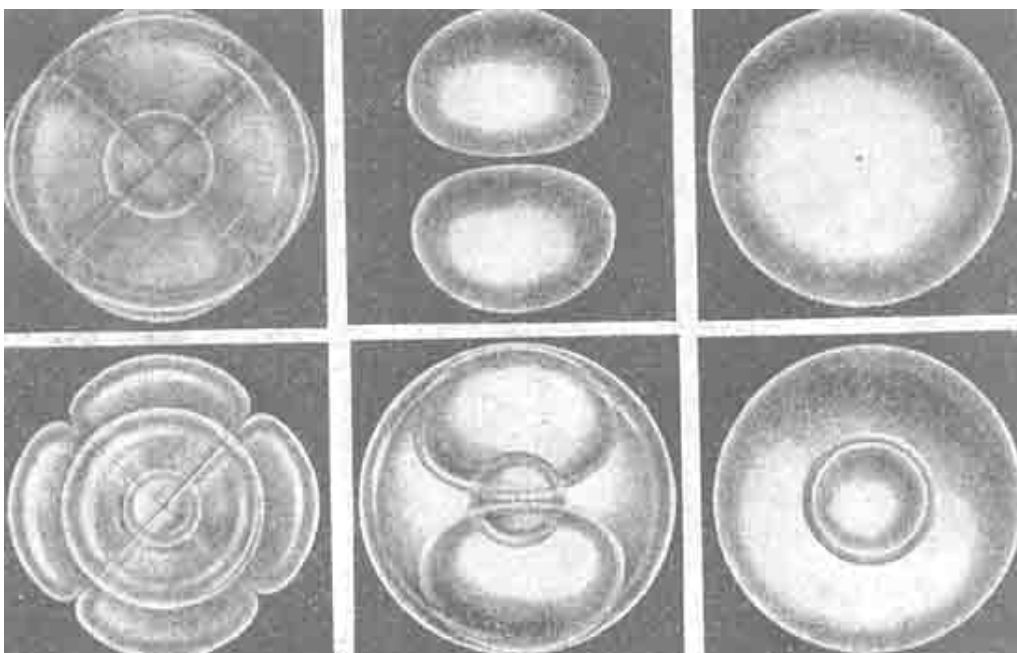
Old Fashion Chemistry is more realistic than modern Physics, showing pictures of electrons around a nucleus, as clouds generated by precessing rotating orbits – rings

The basic equation relating precession frequency ν of NMR and the magnetic field B present is:

$$E=h\nu=\gamma Bh/2\pi$$

At about B=12 Tesla = 120000 Gauss, according to the P. W. Atkins Physical Chemistry Book, Oxford University Press, 1994, Fifth Edition, p. 625:
(1Tesla = 10000 Gauss, Earth's ambient magnetic field is about 12 Gauss,
an (N)MRI (Nuclear) Magnetic Resonance Imagine - a Medical Diagnostic Device at a regular hospitals - is about 2 Tesla.)

Protons come into resonance at about 500 MHz
PAPIMI™'s B is about 200 Gauss down to zero or actually to the ambient magnetic field of the Earth.

Theoretically, the resonance frequency for Protons at the PAPIMI™ probe is (500/12/10000)x200=2x41.66/100= 0.83 MHz down to zero - if the magnetic field dumps to zero.

With reference the Atkins Physical Chemistry Book, above calibration,

The Proton Multiple-NMR at the PAPIMI™ probe with a B - Maximum = 200 Gauss and B - minimum = the ambient magnetic Field of the Earth, should be:

$$2025 \text{ Hz} < \nu < 0.83 \text{ MHz}$$

Version 2 3/9/2003

A common fluorescent lamp, (DURALUX, Distributor : Duralamp SpA Florence - Italy) gets no warmer than 100 degrees Celsius, or 373 degrees Kelvin, yet emits light as a source with a temperature of 4000 degrees Kelvin .
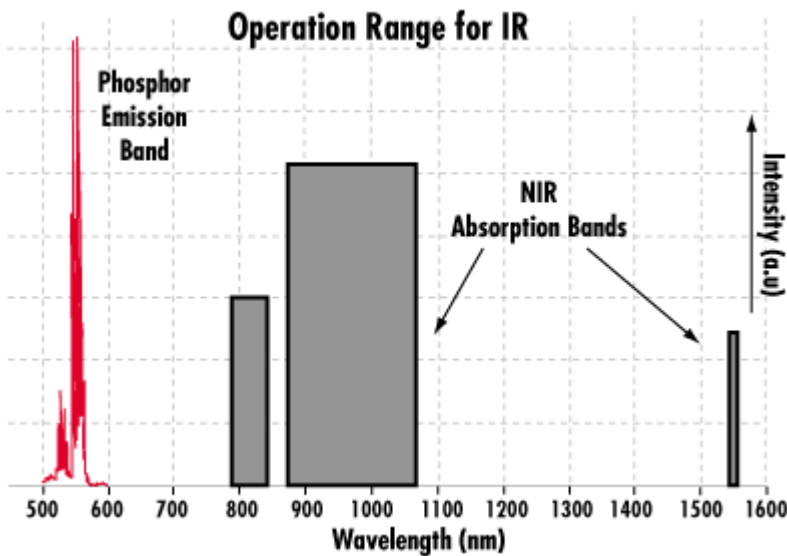
This chart by Edmund Industrial Optics **(R)** displays the visible light's shorter wavelengths and higher frequencies, emitted after stimulation from near-infrared photons longer wavelengths and lower frequencies.

Stimulation Range   Band 1: from 790nm to 840nm   **Band 2:** from 870nm to 1070nm

Band 3: 1550nm

Emission Color   Green (550nm), other peaks at **Red** (673nm) and **Blue** (400nm)

 Near-Infrared photons add up to visible photons.

62

FAIRE DU VERT AVEC DE L'INFRAROUGE

Une nouvelle animation dans la salle Lumière

par Nathalie VIÉGAS

« AMIES » 3ᵉ année, département Physique du Palais de la découverte

Depuis le mois de juin 1995, le département de physique offre à ses visiteurs une expérimentation supplémentaire relative aux phénomènes d'optique non linéaire qui apparaissent dans certains matériaux anisotropes (cristaux), lorsque les intensités lumineuses sont importantes. Ainsi l'irradiation intense par lasers infrarouges de tels matériaux peut-elle produire de la lumière verte (doublement de fréquence). L'initiative de cette nouvelle présentation, le choix du matériel, sa mise en service ainsi que la définition des protocoles de présentation au public ont été assurés par l'auteur.

Le laser

L'image « rayon de la mort » est couramment utilisée au cinéma. Même si les rayons employés en usinage des matériaux concrétisent cette image, il est abusif de se limiter à cette description, tant du point de vue des propriétés que de son utilité. Le laser est une source exceptionnelle de rayonnement, capable de produire des lumières d'une qualité de couleur remarquable et de très faible dispersion spatiale.

Le terme laser est un acronyme anglo-saxon formé par les initiales des mots suivants : *Light Amplification by Stimulated Emission of Radiation* (amplification de la lumière par émission stimulée de radiations).

En physique, la lumière est décrite selon deux conceptions différentes : ondulatoire et corpusculaire. Maxwell est le premier à assimiler la lumière à la propagation d'une onde électromagnétique. La forme de cette onde ressemble à celle des vagues circulaires observées sur la surface d'un lac à la suite de la projection d'une pierre, ou encore à la forme que prend une corde de guitare quand elle est pincée. Ainsi, la lumière est décrite comme la propagation d'une onde électromagnétique : une oscillation d'un champ électrique entraîne une oscillation d'un champ magnétique, qui, à son tour, engendre une oscillation d'un champ électrique... Planck et Einstein décrivent la lumière comme un ensemble de grains d'énergie : les photons.

Mais comment l'émission de radiation se produit-elle ? Dans un modèle simplifié de la matière (ou milieu actif), chaque atome constitutif est représenté par un noyau massif entouré d'un nuage d'électrons tournant autour du noyau sur des orbites quantifiées en énergie. Sous l'effet d'une source d'énergie (pompage), un électron peut passer de son état dit fondamental (car il correspond à un minimum d'énergie) à un état excité (d'énergie supérieure). On parle d'absorption de l'onde incidente par la matière.

L'énergie acquise par l'atome excité est perdue spontanément par l'émission d'un
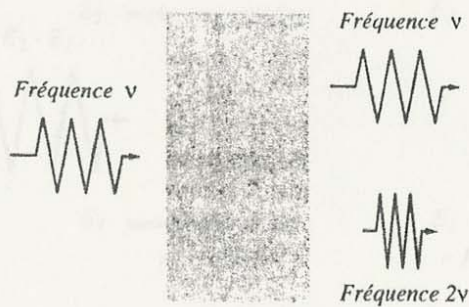
Fig. 4a. — **Principe du doublement de fréquence dans un matériau à propriété non-linéaire.**
Sous l'incidence d'un rayonnement laser de fréquence ν (ou de longueur d'onde λ), le matériau absorbe une partie de cette énergie, la transforme, et la restitue sous forme d'un autre rayonnement, de fréquence 2ν cette fois (donc de longueur d'onde λ/2). La fraction restante du rayonnement incident qui n'est pas absorbée par le matériau est transmise en sortie.
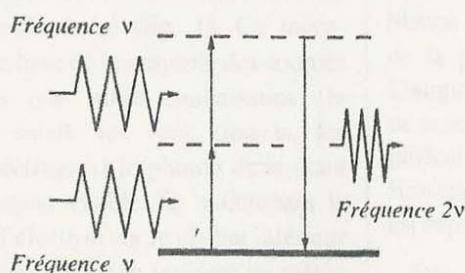
Fig. 4b. — **Principe du doublement de fréquence au sein du matériau.**
Sous l'effet d'un rayonnement incident d'intensité suffisante, les groupements d'atomes formant la matière se polarisent. Ces différentes entités évoluent alors dans leur propre échelle d'énergie (état virtuel de la matière). Sous l'effet de ce rayonnement, ces entités sont capables d'absorber deux photons de fréquence ν à la suite, pour permettre le passage de certains électrons du niveau de plus basse énergie de cette échelle vers un premier stade : un état virtuel d'énergie (un autre barreau de l'échelle situé à une énergie plus importante), puis vers un second niveau d'énergie. La désexcitation conduit à la restitution de l'énergie sous forme d'un seul photon de fréquence 2ν.

rayonnement électromagnétique. Ce rayonnement constitue la lumière diffusée par l'ensemble des dipôles du matériau traversé...

Pour un rayonnement électromagnétique dont le champ électrique E est de faible amplitude, l'intensité de la lumière rayonnée par les dipôles est proportionnelle à celle de la lumière excitatrice. Cela est possible si le déplacement des charges électriques ou encore la polarisation électrique P varient linéairement en

fonction de l'amplitude du champ lumineux E :

$$P = \chi_{L} E$$

(où χ_{L} est la susceptibilité linéaire)

on observe alors des phénomènes d'optique linéaire, comme par exemple la diffusion, l'absorption, l'émission (fig. 5a).

Lorsque sous l'action d'un rayonnement incident dont le champ E est plus important, les électrons s'écartent davantage de leur position moyenne, la force de rappel

Making **Green** out of **Infrared** :

A publication from "Revue du Palais de la Decouverte", Paris, France.

April 1996, no 237, pg 44, 48

indicating photon frequency addition, $E_{total} = E+E = \textbf{h}\nu + \textbf{h}\nu = \textbf{2h}\nu.$

Infrared photons add up to Green photons.

Frequency doubled diode laser pumped Nd:YVO₄ microchip laser

B. V. Zhdanov, G. P. Andersen, and R. J. Knize

Laser and Optics Research Center, Department of Physics, U.S. Air Force Academy, Colorado 80840

We describe the construction and operation of a compact diode laser pumped Nd:YVO₄ microchip laser with intracavity frequency doubling. An output power of about 100 mW at 0.53 μm has been achieved. This device can be used in undergraduate teaching labs and for research applications as well. An experiment using this laser for holography is described. © 2000 American Association of Physics Teachers.

I. INTRODUCTION

Solid state lasers are important research tools in both academic and research laboratories. The most common solid state lasers[1] are based on neodymium-doped materials such as Nd:YAG, Nd:YVO₄, and Nd:glass. In the past, these lasers were usually pumped with flash lamps, which resulted in a large size, and they were generally complex and expensive. In the last few years, the availability of high power laser diodes, which can be used as pump sources for these neodymium materials, has allowed reductions in the size of these lasers. The size of these lasers has also been drastically reduced with the use of a microchip[2–4] assembly. These microchips can incorporate both the neodymium laser material and a frequency doubling material so that green light can be produced in a cavity that is less than 1 cm in length. In this paper, we describe the assembly of a microchip laser with green output using commercially available parts. The construction and operation of this device can be used for teaching the fundamentals of lasers and optics and for research applications.

II. LASER DESCRIPTION

A block diagram of the laser is shown in Fig. 1. An 808-nm laser diode (LD) is used as the pump source and the light is focused into the microchip. The microchip consists of thin Nd:YVO₄ and KNbO₃ crystals joined together. The Nd:YVO₄ crystal absorbs the 808-nm light and lases at 1064 nm. The KNbO₃ crystal frequency doubles this light to produce green light at 532 nm. The outer surfaces of this crystal assembly have coatings with a high reflectance for 1064 nm and a low reflectance for 808- and 532-nm light. These coatings allow input of the 808-nm pumping light, lasing at 1064 nm, and escape of the green 532-nm frequency doubled light.

We used a 1-W laser diode[5] which had a nominal wavelength of 808 nm. The Nd:YVO₄ crystal has strong absorption around this wavelength. In order to optimize the Nd:YVO₄ laser performance, it is necessary to tune the temperature of the laser diode so that its wavelength matches the Nd:YVO₄ crystal absorption band. Laser diodes in this wavelength region tune by about 0.25 nm/°C so that the nominal specified room temperature (25 °C) wavelength should not be more than about 5 nm from 808 nm. Otherwise cooling below freezing, resulting in the formation of ice, or excessive heating, reducing the laser diode lifetime, is required. In high humidity environments, it may be desirable to use a diode with a wavelength slightly below 808 nm so that heating is required, which alleviates the problem of dew formation on the diode. We controlled the temperature of the laser diode using a circuit described below. The laser diode also required a stable current source for constant power operation, which is also discussed below.

As is well known, the output beam of a diode laser usually has a large divergence that is quite different in two mutually orthogonal planes. This divergence arises from diffraction caused by the small rectangular shape of the diode laser output. We measured the divergence of the output beam of the diode laser and it appeared to be about 47 and 330 mrad in these two planes.

To focus the diode laser beam into the microchip cavity we tried two different lenses: an aspheric lens[6] and a gradient index (GRIN) lens.[7] Both these focusing systems are appropriate, but the GRIN lens proved to be more suitable, because it has a greater input acceptance angle (55°) compared to the aspheric lens (for the lens with $f = 3$ mm and aperture 7 mm this angle is about 20°). In addition, the GRIN lens can provide better focusing.[8]

We used a commercially available microchip assembly[9] (MCA) which contained both the Nd:YVO₄ and KNbO₃ crystals with appropriate coatings. The Nd:YVO₄ crystal (laser gain medium, $\lambda = 1.064$ μm) has a thickness of 0.4 mm and it is fixed on a 0.4-mm-thick YAG plate. On the other side of this plate, a frequency doubling KNbO₃ crystal of 1.5 mm thickness was fixed. The outer surfaces of the Nd:YVO₄ and KNbO₃ crystals are coated with more than 99.85% reflectance at 1064 nm and more than 85% transmittance at 808 and 532 nm. The total optical length of the cavity L is about 4 mm, and thus the mode separation is $\Delta \nu = c/2L = 37.5$ GHz (or 1.25 cm⁻¹). Because the gain bandwidth of the Nd:YVO₄ crystal[10] is 257 GHz, we expect our laser to operate in several longitudinal modes. In order to obtain a single longitudinal mode operation, it is necessary to reduce the optical length of the laser cavity and thus to mode separation. This, however, will lead to the of output laser power. At the same time it is
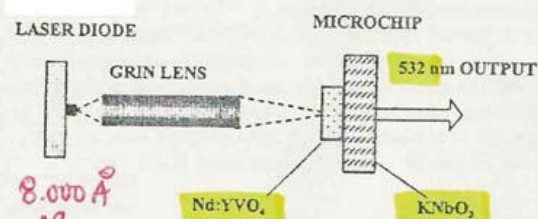

Fig. 1. Block diagram of the laser.

An experimental arrangement transforms 1064 nm **infrared** laser light to 532 nm **green** light. **Infrared photons add up to Green photons.**

Reference from : American Journal of Physics, vol 68, issue 3, March 2000, pg 282.

Note : All green laser pointers sold nowadays, employ this or similar arrangements.

Edmund Scientific - Industrial Optics Division, 1997 Optics and Instruments Catalog :

Sells an infrared detector screen, manufactured by Kodak(TM) emitting visible light photons, when irradiated with infrared photons. Screen's phosphor emits orange light (0.55 µm to 0.7 µm) from infrared photons.

Infrared photons add up to Orange photons.

Edmund Scientific - Industrial Optics Division. 1997 Optics and Instruments Catalog :

A demonstration of visible light emission, using infrared laser light illumination.

Infrared photons add up to visible photons.

A CHANGE FOR THE BETTER
An important discovery in the search for ways to vary the frequencies of laser beams was that an ammonium dihydrogen phosphate crystal (*below*) will double the frequency of a ruby laser beam, changing its colour from red to ultraviolet light, which the film "sees" as blue (*below*). The laser beams have been sent through smoke to make their characteristic colours more visible.

A red laser beam after passing through an Ammonium Dihydrogen Phosphate (ADP) crystal doubles its frequency to ultraviolet. Photographic film "sees" it as a blue colored light beam.

Red photons add up to produce Ultraviolet photons.

Life Science Library : **ENERGY** by Mitchell Wilson and the Editors of LIFE : pg 188.

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