Arndt Schultz Law and Its Applications

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According to the Arndt Schultz Law, substances vary in action depending on whether the concentration is high, medium, or low.

High concentrations kill; medium concentrations suppress or inhibit; and low, or minute concentrations stimulate.

Over a century ago Schultz's experiments (1888) showed that many chemical agents had the effect of stimulating the growth and respiration of yeast. The phenomenon became known as the Arndt-Schultz Law and was widely referred to in the pharmacological literature for over 30 years and became one of the scientific principles.

Hueppe (1896) at about that time made similar observations on bacteria, apparently unaware of Schultz's experiments. His generalization became known as Hueppe's Rule. Long before them both, the German alchemist and physician Theophrastus Bombastus von Hohenheim ((1493-1541), who coined for himself the name **Paracelsus**, had recognized with respect to the medical use of small amounts of toxic chemicals that their efficacy depended principally on the dose. Such ideas are perhaps more easily accepted nowadays, when it is in the experience of most to use the stimulatory effects of alcohol, caffeine or nicotine, all of which are toxic at high concentrations.

Much later Southam and Ehrlich (1943) studied the effect of a natural antibiotic in cedar wood that inhibits the growth of wood-decaying fungi. They found that subinhibitory concentrations of the antibiotic had the reverse effect and stimulated fungal growth. The term "hormesis" was coined to describe it.

Some of the observations have an interesting origin. In the later stages of World War II, when supplies of penicillin were in such short supply, work of Miller et al. (1945) explained why reducing the dose to make short supplies of the new drug go further sometimes had the reverse of the desired effect. At low doses penicillin actually stimulated the growth of Staphylococcus.

Arndt - Schultz Law and Microcurrent Therapy

Microcurrent therapy, commonly referred as MENS (Microcurrent Electrical Neuromuscular Stimulation), is extremely small pulsating currents of electricity. These currents are finely tuned to the level of the normal electrical exchanges which take place at body's cellular level. These currents being more biologically compatible than any other electrical stimulation device. MENS have the ability to penetrate the cell - as opposed to passing over the cell as other stimulation devices do. It works on ARNDT - SCHULTZ Law which states that: "Weak stimuli increases physiological activity and very strong stimuli inhibit or abolish activity."

This subsensory current normalizes the ordinary activity taking place within the cell if it has been injured or otherwise compromised.

The external addition of microcurrent will increase the production of ATP, protein synthesis, oxygenation, ion exchange, absorption of nutrients, elimination of waste products, and neutralizes the oscillating polarity of deficient cells. Homeostasis is restored.

The biologically sensitive stimulation effect of microcurrent picks up where the body's own electrical current fails, as the human body must adhere to the natural law of electricity which is: "electricity must take path of least resistance." Therefore, its electrical current is destined to move around an injury or defect, rather than through it.

By normalizing cell activity, inflammation is reduced while collagen producing cells are increased. Healthy cell metabolism creates a healthy, pain free internal environment.

Arndt - Schultz Law and Homoeopathy-Law of Minimum Dose

The similimum remedy works in a sick individual while administered in minimum possible dose. The minute dose means that smallest quantity of a medicine which is sufficient to produce the least possible excitation of the vital force. This concept of minimum dose led to the discovery of potentisation theory.

Administration of the minimum dose has the following advantages:

❖ No unwanted reaction
❖ The specific dynamic action which produces the uncommon, characteristic, distinguished symptoms of the drug.
❖ Not any chance of organic damage nor there do any risk of drug addiction and drug effects.

The concept of minimum dose can be verified by Arndt-Schultz law that small doses stimulate, medium doses suppress and large doses kill. In other words, the action of small and very large doses of the same substance on living matter is opposite.

The Law of Least Action, formulated by Maupertius, the French mathematician, states: "The quantity of action necessary to affect any change in nature is the least possible; the decisive amount is always a minimum, an infinitesimal."

Health is a theme of ideal equilibrium, perfect balance, trivial circumstances may persuade it, and so may it be balanced by the least possible medication.

The second Law is the most controversial: use the infinitesimal dose, a dose so small that no molecules are left in the substance resulting in a gentle speedy, cure, with no side effects, allergic reactions or toxic after effects.

Arndt-Schultz says that, "Minimal doses of a drug stimulate, medium doses inhibit or suppress and large doses destroy cellular activity." Pasteur should have known this when he introduced his rabies vaccination, killing thousands of innocent people before he finally reduced the doses. This was 1888 and unfortunately, he did not learn from the genius of Hahnemann who already 100 years before Pasteur and Koch, cured epidemics of scarlatina, typhoid, cholera, syphilis, gonorrhea and TB. That success alone has given Hahnemann his well-deserved place in history but he did so much more.

However, the potency of homeopathic medicines is believed to increase with their dilution over many orders of magnitude, rather than restricted to a narrow range of concentrations like hormesis.

Arndt - Schultz Law and Low Level Laser Therapy (LLLT) & Physiotherapy

Electrotherapy and low-level laser are used in physiotherapy to assist in the attenuation of pain and to stimulate tissue repair. As such, their application is also bound by the Arndt-Schultz Law of Biomodulation, as described above. Thus, it can be seen that the dosage delivered by the practitioner during a laser treatment is determined by the condition being treated, and the desired therapeutic effect. For example, if the desired effect of an initial treatment is that of pain attenuation, an inhibitory dosage (8.0 to 16.0 Joules/cm2) would be indicated.

Australian research has also shown that dosages of between 0.5 and 5 Joules/cm2 (Laakso et al, 1994) applied to Myofascial Trigger Points will effect an analgesic response through the body's hormonal/opoid mechanisms. If the desired effect is that of tissue repair, then the required dosage per treatment point will generally fall within the optimal therapeutic window between 0.5 and 5 Joules/cm2.

Available laser Output Power may range from 5mW to 500mW, with the higher powers indicated for larger muscle groups and treatment of the back. Near-infrared lasers penetrate further into the tissue. Multi-diode cluster probes may be effective in reducing overall treatment times where large tissue areas are to be treated. However, it must be noted that multi-diode cluster probes generally contain multiple wavelengths, which can lead to a degradation of the effectiveness of laser therapy (Karu, 1998)

Treatment will be effected by application of the laser probe to points along tendons and ligaments, and at the origins and insertions of muscles. Larger muscles can be treated by application of the laser in a grid pattern to a series of points across the body of the muscle.

Joint conditions, such as osteoarthritis, can be treated by applying the laser probe to a series of points along the joint line, aiming the probe tip at the articular surface where possible, and to the origins and insertions of muscles around the joint.

Open wound healing can be accelerated through laser therapy, by the application of 4 Joules/cm2 to a series of points in a 1cm square grid pattern across the surface of the wound.

As a gereral rule, optimal biostimulation is effected by the application of smaller dosages-per-point to more points at the treatment site.

Optimal bioinhibition is achieved through applying higher dosages-per-point, but to less treatment points.

Arndt - Schultz Law and LLLT & Acupuncture

Laser Acupuncture relies upon similar dosage principles as needling, and knowledge of acupuncture theory and practice is required.

Dosage is determined by way of the intended effect, which is generally characterised as to TONIFY or SEDATE Acupuncture Points (APs), Ah-Shi Points, and Trigger Points (TPs).

Basing dosage selection upon the Arndt-Schultz Law, it can be seen that low dosages will TONIFY, whereas higher dosages will SEDATE.

Dosages of 0.5 to 2.5 J/cm2 are reported to be effective in the stimulation (tonification) of superficial Acupuncture Points, with 2.5 to 5.0 J/cm2 being effective for deeper APs and Myofascial Trigger Points. Higher dosages (8 - 12 J/cm2) are effective for the sedation of APs.

LEDs and LASERs both generate biomodulatory effects within living tissue, however, most published research relates to LASER;

Therapeutic effects of laser are both wavelength and dosage dependent;

Low dosages stimulate, high dosages inhibit (ref: Arndt-Schultz Law of Biomodulation) - both have therapeutic applications;

Optimal therapeutic window for photobiostimulation - 0.5 to 5.0 Joules/cm2;

Optimal Biostimulation: lower dosages per point - more treatment points;

Optimal Bioinhibition: higher dosages per point - less treatment points;

Visible red wavelengths (~620-690 nanometers) - shallow penetration - superficial tissue treatment, eg. wound healing, superficial APs, acne, etc.;

Infra-red wavelengths (~760-1260 nanometers) - deeper penetration - deeper tissue treatment, eg. musculoskeletal injuries, sports therapy, deeper APs and myofascial TPs, also wound healing,etc;

High Output Power + Infrared Wavelength + Safe Power Density = Maximum Effective Penetration

Treatment parameters to be recorded in minimum terms of Output Power (mW), Beam Spot Size (cm2), Treatment Duration (Seconds), and, Wavelength (nm);

Laser therapy works on the principle of inducing a biological response through energy transfer, in that the photonic energy delivered into the tissue by the laser modulates the biological processes within that tissue, and those within the biological system of which that tissue is a part.

The Arndt-Schultz Law of Biomodulation infers that low dosages of photonic energy will stimulate those biological processes, and higher dosages will inhibit them.

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