structure and allowing subsequent resorption of the mass by the body.

Also, the present invention provides a means to detect benign or malignant tissue types using resonant acoustic and/or acousto-EM energy, using the apparatus described in Figures 12 and 19 A &B, including any and all embodiments, the cell test disc or tissue preparation is placed between two transducers and the frequencies are scanned looking for resonant peaks and EM patterns. Differences in the resonant peaks and EM patterns will differentiate between tissue types, for example between normal epithelial cells and cancerous epithelial cells.

Example 6

Augmentation, Detection and/or Disruption of Biochemical Compounds or Tissues

Biologic organisms are composed of many biochemical compounds including nucleic acids, carbohydrates, lipids, amino acids, and steroids. Many biochemical compounds align themselves in regularly repeating patterns: in other words they adopt crystalline forms. Examples of biochemical crystals include insulin, hexokinase, aldolase, hemoglobin, myoglobin, and spectrin. In addition, certain tissues or cell structures adopt crystalline form such as bone, muscle fibers, and connective tissue fibers for the former, and cell membranes, Na/K membrane pumps, and visual rod receptors for the latter.

The biochemical compounds from which biological organisms are composed have their own unique resonant frequencies, based on their innate crystalline structure. Many of the biochemical compounds are also piezoelectric, intrinsic energy dissipation, acoustoelectric, and magnetoacoustic structures. As such, biochemical compounds are subject to the augmenting, disrupting, and/or detecting features of resonant acoustic and/or acousto-EM energy. The present invention uses specific resonant acoustic and/or acousto-EM frequencies, which can be used to treat a multilayer organism. The present invention also has the potential to utilize piezoelectric, intrinsic energy dissipation, acoustoelectric, and/or magnetoacoustic effects to achieve desired results, either alone or in combination with a resonant acoustic field.

Example 7

Stimulation or Disruption of Proteoglycans Adhesive Units Between Cells Yielding A Skin Welding Scalpel

The present invention provides a method to stimulate and/or disrupt proteoglycans adhesive units between cells using resonant acoustic and/or acousto-EM energy. Millions of operations are performed on humans every year, using metal scalpels to make the incision. The use of such scalpels requires closure of the incisions with stitches, a period of healing, and invariably results in scar formation. In addition, millions of people suffer traumatic cuts, tears, or ruptures of the skin, again requiring closure of the wounds with stitches, a period of healing, and scar formation.

In multicellular organisms, the cells are held together by proteoglycans units, at the rate of approximately 1,600 per cell. These units are approximately 200 um long, with some variation between the species.

When an incision is made, or a traumatic break in a cell layer occurs, the cellular adhesions are ripped apart, some cells are ruptured, and blood vessels are torn open. White blood cells, platelets, and fibroblasts congregate in the extracellular space and eventually lead to the formation of a scar which readheres the tissues. During this healing phase the open tissues are much more susceptible to invasion by foreign organisms, and wound infection is a complication that must be constantly guarded against.

Even if the wound heals without the complication of infection, a scar still remains. Modern plastic surgery techniques try to either minimize or hide scars, but the formation of a scar is inevitable.

An energy field achieving acoustic resonance with the proteoglycans units at high amplitudes indicating high power levels will cause separation of the adhesive bonds between cells, thus producing separation of tissue layers, and in essence, a non-traumatic incision. The same energy field at lower amplitudes will cause readhesion of the adhesive bonds, with nearly instantaneous and scarless healing of the readhesed incision.

The present invention dramatically improves the surgical process by nontraumatically separating cell layers in the tissue, and by instantly readhering the cell layers with minimal or no scarring, using resonant acoustic frequencies. In so much as proteoglycans units may exhibit piezoelectric, intrinsic energy dissipation, acoustoelectric, and/or magnetoacoustic effects, the present invention has the potential to produce the above results using the electromagnetic energy pattern of the acousto-EM signature, either alone or in combination with a resonant acoustic field. The present invention also has veterinary and agricultural significance, i.e., treating wounds or performing surgery in livestock and poultry, and grafting of various plant tissues or branches from one plant to another.

For example, as shown in Figure 33, a transducer tipped scalpel is used to produce an acoustic/acousto-EM wave of appropriate frequencies to disrupt the proteoglycans adhesive units between cells and create a surgical incision. At the end of the procedure the edges of the incision are held together, and another transducer of appropriate frequencies and type is passed over the incision, readhering the tissues.

Example 8

Augmentation, Detection, and/or Disruption of Structures of Multicellular Organisms

The augmentation, identification, detection, and/or disruption of multicellular organisms has many applications. The world population is plagued by a variety of pests such as insects, rodents, and mollusks. In other situations, the detection of various species in particular habitats is of importance to human activities. Finally, there are many multicellular organisms whose growth and augmentation are desired for harvesting of food, medicines, jewelry, etc. Pests can be eliminated by the use of resonant acoustic and/or acousto-EM frequencies matched to the size and shape of their body, parts of their bodies, or specific biochemical compounds contained in their bodies. For example, a resonant acoustic and/or acousto-EM frequency matched to the size of the head, thorax, or abdomen, could be lethal to bees, wasps, ant, or termites. Similarly, a resonant acoustic and/or acousto-EM frequency matched to the size and shape of a mouse's internal organ (brain, kidney, gonad, aorta, etc.) could be lethal to that animal. Mollusk pests such as the zebra shell mussel and barnacles could be controlled or eliminated through the use of resonant acoustic and/or acousto-EM frequencies matched to the size and shape of their eggs, internal organs, chitin shell, or cement/cement plate, etc.

Detection of various pest organisms such as termites, or desired organisms such as endangered species could be aided through the use and detection of resonant acoustic and/or acousto-EM frequencies specific for those organisms. The use of resonant acoustic and/or acousto-EM frequencies could potentially aid in the identification and differentiation of species and subspecies throughout the animal, plant, and microbiological kingdoms.

Examples of multicellular organisms whose growth and augmentation are desired for harvesting include plants and protein sources such as fish, clams, shrimp, chickens, and other livestock. Medicines, drugs, and chemicals harvested from a wide variety of plant and animal sources include hormones, perfumes, dyes, and vitamins. Other materials harvested from plant and animal sources are such an intrinsic part of human activities that they are simply too numerous to list (i.e., pearls, clothing fibers, building materials, leather, etc.) At lower power inputs of the resonant acoustic and/or acousto-EM frequencies, these organisms and their structures can be selectively augmented.

The present invention takes advantage of the discrete shape and size of numerous organisms to make use of resonant acoustic and/or acousto-EM frequencies specific to those organisms, for purposes of augmentation, identification, detection and/or disruption. Using the piezoelectric, intrinsic energy dissipation, acoustoelectric, and/or magnetoacousto effects, the invention has the potential to produce the above results using electromagnetic energy pattern of the specific acousto-EM signature, either alone or in combination with a resonant acoustic field. The present invention has the potential to provide chemical-free control of numerous pests. The present invention also has the potential to provide for the detection and identification of numerous species of organisms. Lastly, the present invention has the potential to augment growth and metabolism in and of structures in various species deemed beneficial.

The present invention provides a means to augment, detect, and/or disrupt structures of multicellular organisms using resonant acoustic and/or acousto-EM energy. For example, as shown in Figure 32, a transducer apparatus with the resonant frequency for the cement plate of barnacles (by which they attach themselves to the hulls of ships) is fitted into an underwater "scrubber" which is operated remotely from the deck of the ship via cables, or from inside the vessel via RF control. As the scrubber moves along the outside of the hull, the acoustic wave disrupts the cement plate of the barnacles, causing them to lose their grip on the hull and fall off into the ocean.

Example 9

Augmentation or Disruption of Growth Rate of Fish

The present invention provides for augmenting and/or disrupting the growth rate of fish in a commercial fishery as shown in Figure 34.

Two breeding pairs of small fish were maintained in a 10 gallon fish tank at 80°F. The breeding pairs produced eggs which hatched in approximately 3-5 days. The three day old small-fry hatchlings were removed from the breeding tank and measured for acoustic resonance frequency profiles. The small-fries were placed, one at a time, in a drop of water on top of a 2.25 MHz Matec transducer to measure and determine resonant frequencies of the small-fries. All of the small-fry tested produced similar resonant acoustic frequencies profiles with minor individual variations. One of the strongest initial signals was at 2.4 MHz.

TEST A. The first test was conducted on two different groupings of small-fry, one group exposed to an acoustic resonant field and the other used as a control group. The experimental tanks were fitted with Matec 2.25 MHz acoustic transducers through a water tight grommet, through and parallel to the bottom of the tanks. One half of the small-fry were placed in a control tank that was connected to a transducer, but not activated. The other half of small-fry were placed in a tank with a transducer and an acoustic field was applied to the tank. The acoustic field transmitted at 2.4 MHz, continuously at 10 volts/sec. power. The small-fry that were in the control tank all thrived and grew while all the small-fry in the acoustic field died within two weeks.

TEST B. Another testing regime was conducted on small-fry wherein the small-fry were divided into three groups.

DAY 1. One third of the group was left in the breeding tank with parents as controls. One group was put in another small control tank, attached to a transducer but without activating power to the transducer. The third group was placed in a tank attached to a working transducer and the small-fry were exposed to an acoustic field of 2.4 MHz, using the pulse mode of the power source at 10 msec repetition rate with a 20 microsecond pulse width or duration. The voltage power was set at 300 volts/s, via the Matec TB 1000.

DAY 7. Within one week there was a noticeable difference in the sizes of the different groups of small-fry, the small-fry exposed to the acoustic resonance field being