assessment during the challenge bioassay, experimental units (500 mL) were inoculated with 1×10^7 CFU/mL (LD_{50}) of *V. alginolyticus*. Juveniles grew significantly ($p < 0.05$) larger in weight and height with Pav-Mix/Sit (6.99 ± 0.09 mm; 0.132 mm d^{-1}; 41.16 ± 0.35 mg; 1.35 mg d^{-1}), compared to the control group NT (5.05 ± 0.10 mm; 0.043 mm d^{-1}; 24.33 ± 0.1 mg; 0.54 mg d^{-1}).

Higher post-infection survival rate occurred with Pav-Mix/Pha (85%), compared to Oxytetracycline (30%), Ampicillin (53%) and control group CH (0%). Superoxide dismutase (SOD; % of inhibition; SIGMA 19160 Kit) was especially higher ($p < 0.05$) for Pav-Mix/Pha, in relation to other treatments and controls. Under this experimental evidence, we conclude that homeopathic drugs really improved growth, survival, and immune response in juvenile scallop *A. ventricosus*. The homeopathic drugs could be a potential alternative to antibiotics in mollusk spat hatcheries, and additional benefits could be expected to reduce the progressive increase in bacterial pathogenicity associated to the use and abuse of antibiotics.

Keywords: Aquaculture and homeopathy, Mollusk disease and immunity

Homeopathy for shrimp aquaculture: increased survival and superoxide dismutase activity in juvenile white shrimp *Litopenaeus vannamei* during a bacterial pathogen-challenge

José Manuel Mazón-Suástegui*,
Milagro García Bernal, Fernando Abasolo-Pacheco,
Araceli Avilés-Quevedo, Ángel I Campa-Córdova,
Carmen Rodríguez-Jaramillo
and Ricardo Medina Marrero

Centro de Investigaciones Biológicas del Noroeste (CIBNOR, S.C.), México

*Correspondence: Dr José Manuel Mazón Suástegui, Centro de Investigaciones Biológicas del Noroeste (CIBNOR, S.C.), Calle I.P.N. 195, Col. Playa Palo de Santa Rita Sur, La Paz, B.C.S., CP.23096, México.
E-mail: jmazon04@cibnor.mx (J.M. Mazón-Suástegui)

Homeopathy is a discipline of medical science with successful application in humans, but its effects on growth, survival, immune response, and gene expression of species of plants and animals is still preliminary. We evaluated homeopathy in marine aquaculture of white shrimp *Litopenaeus vannamei* looking for an increase in resistance of shrimp to the pathogenic bacteria *Vibrio parahaemolyticus*, which is associated with acute hepatopancreatitis and early mortality syndrome (EMS) that causes huge economic losses in commercial shrimp farms worldwide.

Juvenile shrimp (8 g mean fresh weight) were cultivated with three homeopathic treatments for a four days period (Hel-Mix; Pav-Mix; Vid-Mix; Hel-Mix/Pav-Mix) and then challenged for 120 h against a pathogenic strain of *V. parahaemolyticus* (CAIM 170; www.ciad.mx/caim). The experimental design included two controls (NCH-Control untreated/not challenged; CH-Control untreated/challenged). Homeopathic medicines (31CH) sprayed in commercial balanced food (PIASA™; 35% protein) were provided ad libitum during both culture and challenge periods. Control groups received balanced food without homeopathy. As no mortality occurred with a first dose of 1×10^6 CFU/ml (=LD_{50}) of pathogen strain at the beginning of the challenge, a second dose was added 24 hours later.

96 hours after challenge, superoxide dismutase (SOD, percentage of inhibition) was 44.49% (Hel-Mix), 26.53% (Pav-Mix), 94.30% (Vid-Mix), 91.59 % (Hel-Mix/Pav-Mix) and 41.63% (CH-Control) ($p < 0.05$). 120 hour after challenge, cumulative survival was 0% (Hel-Mix), 33.3% (Pav-Mix), 58.3% (Vid-Mix), 50% (Hel-Mix/Pav-Mix), 100% (NCH-Control) and 0% (CH-Control). Hel-Mix/Pav-Mix and Vid-Mix increased survival and immune response in shrimp subjected to stressful conditions associated with *V. parahaemolyticus*, similarly to what happens in infected farms. It suggests that homeopathy has a great potential for application in shrimp aquaculture. Nevertheless, more studies are required to demonstrate that homeopathy can improve the eco-sustainability of aquaculture industry, by increasing health of cultured shrimp and the safety/inocuity of harvested shrimp for human consumption.

Keywords: Aquaculture and homeopathy, Shrimp disease and immunity

Differential dose-dependent effects of arsenic in pro- and anti-inflammatory cytokines

M Marzotto*, D Olioso, C Bonafini and P Bellavite

University of Verona-Dep. Pathology and Diagnostics, Italy

*Correspondence: Marta Marzotto, University of Verona-Dep. Pathology and Diagnostics, Italy.
E-mail: marta.marzotto@univr.it (M. Marzotto)

Introduction: Arsenic is known to exert detrimental effects at high doses, due to its action on multiple cellular pathways and epigenetics. Conversely, arsenic-containing agents have been in medicinal use and *Arsenicum album* is widely used homeopathic drug. Lymphocytes, monocytes/macrophages are major targets of *Arsenicum album* and homeopathic Materia Medica associates it also to inflammation and blood alterations. Inorganic arsenic ($NaAsO_2$, iAs) has reported multifaceted actions at cell level, that depend on the doses, the time and the type of cells.

Methods: In this study the effect of iAs on human monocytic leukemia cell line THP-1 was analyzed. Dose

response experiments have been conducted using iAs concentrations from 10^{-10} Mol/L to 5×10^{-3} Mol/L for 24 h with THP-1, cells differentiated into activated macrophages by phorbol (PMA) exposure and primed with the endotoxin LPS (10 ng/ml). Proinflammatory (TNF-a and IL-1β) and anti-inflammatory (IL-10) cytokines expression was monitored, while variation of viability and cell density were examined by WST assay.

Results: THP-1 cell metabolic activity dropped to 20% of the control after 24 h exposure to 10^{-4} Mol/L iAs, while lower concentrations did not affect the viability. Cell survival was not improved after pre-sensitization of the cells for short times (2−3 h) with sub lethal doses of iAs. Pro-inflammatory cytokines Il-1b and TNF-a showed hormetic-like dose-response with peaks around 10^{-6} to 10^{-5} Mol/L iAs, while the anti-inflammatory cytokine IL-10 was downregulated by iAs in dose-dependent fashion. These results suggest different signal pathways engaged by arsenic in macrophage cells. Little effects of *Arsenicum album* high dilutions were found in the THP-1 cellular model explored so far. Further results will come from the analysis of other biomarkers involved in inflammation and stress response signaling under *Arsenicum album* conditioning in THP-1 and other primary immune cells.

Keywords: Arsenicum album, Macrophages, Cytokines

The patient's 'journey to cure' as a quantum theoretically-based topological metaphor

Lionel R Milgrom[1,2,*]

[1]*London Metropolitan University, London, UK*
[2]*Program for Advanced Homeopathic Research, London, UK*

[*]Correspondence: Dr Lionel R Milgrom PhD CChem FRSC LCH MARH, London Metropolitan University, N7 8DB, London, UK.
E-mail: Milgromlr27412@gmail.com (L.R. Milgrom)

Introduction: A metaphor for the therapeutic process was previously developed based on the discourse of novel generalised forms of quantum theory, from which the constraints of Planck's constant have been removed. This metaphor combined three-way quantum-like 'entanglement' between patient, practitioner, and the remedy/therapeutic modality with a representation of the patient's Vital Force (Vf) as a quantised spinning gyroscope. This led to a semiotic quantum/topological metaphor for the patient's 'journey to cure'. Two new models for the homeopathic therapeutic encounter are proposed, based on a) a quantum-mechanical model of Adaptive Mutation (QMMAM), and b) geometric patterns generated by a light source attached to a spinning gyroscope.

Method: a) QMMAM suggests superposition of DNA with mutant adaptations. Environmental pressure then 'collapses' the DNA wave function to a favourable state. Using QMMAM as a ***metaphor*** for the therapeutic process, isolation-induced coherence between patient, practitioner, and remedy, may be thought to generate a quantum-like 'superposition' of patient 'unwell' and 'well' states. b) Light beams attached to precessing gyroscopes sweep out ellipses that become circular the faster the gyroscopes spin, and the less they precess. Ellipses have two foci that, again as a ***metaphor*** for the state of a patient's Vf, are seen to represent the patient's 'unwell' and 'well' states. The faster the Vf gyroscope spins, the more these foci merge.

Results: a) In the QMMAM metaphor, a patient's superposed 'unwell' and 'well' states may 'collapse' to the cured state, following decoherence at the end of therapeutic process. Similarly, b) the curative therapeutic process may be thought to 'spin up' the patient's Vf, so the precessing ellipse's 'foci' (i.e., 'unwell' and 'well' states) merge into a 'circular' cured state.

Conclusion: These new models may be seen as equivalent, semiotic simplifications of a previous quantum/topological description of the patient's 'journey to cure'.

Keywords: Quantum metaphors, Therapeutic process, Gyroscopes, Vital force

"Living is easy with eyes closed…." On blinded RCTs and their effect on specific and non-specific effects of complex therapeutic interventions

Lionel R Milgrom[1,2,*]

[1]*London Metropolitan University, London, UK*
[2]*Program for Advanced Homeopathic Research, London, UK*

[*]Correspondence: Dr Lionel R Milgrom PhD CChem FRSC LCH MARH, London Metropolitan University, N7 8DB, London, UK.
E-mail: Milgromlr27412@gmail.com (L.R. Milgrom)

Introduction: It is generally assumed that, as measured during RCTs, specific effects (SEs) and non-specific effects (NSEs) of an intervention are simultaneously observable and do not interact with each other. Here, it is argued this assumption leads to the results of RCTs (particularly for complex interventions, e.g., homeopathy) being treated far too simplistically, and is essentially incorrect.

Purpose of study: To examine if a complex intervention's SEs and NSEs are *complementary* (in a sense derived and generalised from quantum theory), i.e., they are non-separable correlated sets of observables derived from an RCT, in which *both* are necessary to achieve a more complete understanding of an intervention's efficacy.

Method: Based on Abelian and non-Abelian algebras, a mathematical argument is developed that enables examination of the relationship between a complex intervention's