



## **New Pediatric Guidelines for Vitamin D by Katie Strauser**

Rickets is usually caused by a vitamin D deficiency in children and can cause soft, weak bones. Vitamin D is essential in helping bones absorb the nutrients needed for proper growth. Vitamin D comes from food and it is synthesized in the skin when exposed to sunlight.<sup>1</sup> Finding the balance between enough sun exposure for vitamin D synthesis and too much sun exposure (which increases an individual's risk for skin cancer) is difficult to establish. Adequate dietary vitamin D and calcium in the pediatric population may also decrease the risk of osteoporosis later in life.<sup>2</sup>

Supplemental vitamin D is recommended for all infants who are exclusively or partially breastfed, or who are being weaned from breast milk. Infants do not need supplementation if they are fed formula exclusively and drink at least a liter each day, because infant formulas sold in the United States are required to contain between 40 and 100 IU/100 kcal vitamin D.

Studies have shown that lactating mothers who take normal doses of vitamin D did not produce breast milk with the amount of vitamin D recommended for infants. However, in two studies, women were given high dose vitamin D (up to 6400 IU/d) and they did provide milk with a vitamin D content high enough for the infant to reach the recommended daily dose. Vitamin D toxicity could occur at this level of supplementation but no signs of it occurred in the women participating in these studies.<sup>2</sup> It is recommended that high doses of vitamin D be used only for short periods of time and not in excess of 2000 IU/day.<sup>3</sup> Further study of higher vitamin D dosing is needed to prove safety and efficacy before this method of supplementation can be recommended.

Previous guidelines recommended 200 IU/day of vitamin D beginning with the first two months of life and continuing through adolescence. This guideline was based on data showing that 200 IU vitamin D/day prevented physical signs of deficiency and maintained levels of 25-hydroxyvitamin D (25-OH-D) at 27.5 nmol/L or greater. 25-OH-D is the nutritional indicator of vitamin D concentration. There is evidence that 400 IU/day of vitamin D is sufficient to treat, as well as prevent rickets. Although there is currently no consensus on the concentration of 25-OH-D that defines vitamin D deficiency for infants and children, the guidelines recommend maintaining the concentration of 25-OH-D levels above 50 nmol/L, which has been established as the minimum concentration to prevent deficiency in adults. The newly recommended dose of 400 IU/day has been shown to achieve 25-OH-D levels above 50 nmol/L in infants who are breastfed exclusively.<sup>2</sup>

In addition to dietary vitamin D, it may be synthesized in response to ultra violet (UV) exposure. Exposure to sunlight is extremely variable in the amount of vitamin D generated. The most influential factor is skin pigmentation, and people with lighter skin pigmentation need less UV light to make the same amount of vitamin D as someone with darker pigmentation. Other factors that influence vitamin D synthesis include body mass, distance from the equator, season of the year, cloud cover, air pollution, amount of exposed skin, type of clothing, and use of sunscreen. The American Academy of Pediatrics recommends infants less than 6 months of age should not have direct exposure to sunlight. Due to the risk associated with sun exposure and the uncertainty of how much exposure is needed to generate vitamin D synthesis, oral supplementation of vitamin D is recommended.<sup>2</sup>

References:

1. MedlinePlus Website. U.S. National Library of Medicine and National Institute of Health Website. Available at: [www.nlm.nih.gov/medlineplus](http://www.nlm.nih.gov/medlineplus). Last updated: April 15, 2008. Accessed: October 28, 2008.
2. Wagner CL, Greer FR, the Selection on Breastfeeding and Committee on Nutrition. Prevention of rickets and vitamin D deficiency in infants, children, and adolescents. *Pediatrics* 2008;122(5):1142-52.
3. Natural Medicines Comprehensive Database [database online]. Stockton, CA: Therapeutic Research Faculty; 2008. Updated: November 3, 2008.

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## Safety of Inhaled Anticholinergic Agents in Patients with COPD by Rachel King

Inhaled anticholinergic agents, including ipratropium (Atrovent®) and tiotropium (Spiriva®), are used for the maintenance treatment of bronchospasm associated with chronic obstructive pulmonary disease (COPD).<sup>1,2</sup> The Food and Drug Administration (FDA) recently issued a public safety alert regarding the use of tiotropium and other inhaled anticholinergics causing an increased risk of mortality and cardiovascular events.

Three recent publications have addressed cardiovascular outcomes in patients receiving inhaled anticholinergics.

A meta-analysis published by Singh and associates in *JAMA* in 2008 analyzed 17 randomized controlled trials enrolling 14,783 patients with COPD. The primary outcome addressed in this meta-analysis was the incidence of nonfatal MI, nonfatal stroke, or cardiovascular death. The secondary outcome was all-cause mortality. Overall, inhaled anticholinergics significantly increased the risk of cardiovascular death, MI, or stroke. These results were not found in the short-term trials when analyzed separately from the long-term trials. When analyzing tiotropium and ipratropium separately, ipratropium showed a significant increase in the risk for cardiovascular events and tiotropium did not. Regarding the secondary outcome, inhaled anticholinergics did not significantly increase the risk for all-cause mortality.<sup>3</sup>

A case-control study published in *The Annals of Internal Medicine* by Lee and associates was conducted over four years using the National Veterans Affairs databases. Within the timeframe of the study, 32,130 patients died. Patients were divided into groups based on cause of death found in the VA mortality database and National Death Index Plus data. Deaths from the following causes were examined: respiratory, cardiovascular, respiratory or cardiovascular, or all-cause mortality. For the 11,897 patients whose cause of death was available, 3,159 patients died from cardiovascular causes (26.6%). Patients treated with ipratropium had significantly increased odds of death compared to patients treated with inhaled corticosteroids and long acting  $\beta$ -agonists. This result correlates with an 11% increase in the odds for death and a 34% increase of the odds of cardiovascular death with exposure to ipratropium.<sup>4</sup>

Understanding Potential Long-Term Impacts on Function with Tiotropium (UPLIFT) was a 4 year, randomized, double-blind clinical trial published in the *New England Journal of Medicine* in 2008. There were 5,993 patients that were randomly assigned to either 18 mcg daily of inhaled tiotropium or placebo. The study included 2,987 patients treated with tiotropium and 3,006 patients treated with placebo. Cardiovascular-related results from the UPLIFT trial showed 67 patients (2.2%) in the tiotropium group developed a myocardial infarction versus 85 (2.8%) in the placebo group. Stroke developed in 82 patients in the tiotropium group and 80 in the placebo group. Although these results were not statistically significant, they do not suggest an increased risk for cardiovascular events, but actually a reduction in cardiac adverse events associated with tiotropium.<sup>5</sup>

It is unclear at this point in time whether or not inhaled anticholinergics carry a higher risk of cardiovascular events in COPD patients. Current studies show conflicting data on cardiovascular endpoints. It is clear, however, that healthcare providers do need to be cautious in prescribing and dispensing these medications. Until better evidence is available, guidelines such as the American Thoracic Society's Standards for the Diagnosis and Management of Patients with COPD should still be followed. Without additional data, it is too soon to recommend changing the standards of treatment for COPD patients and discontinue the use of inhaled anticholinergics. Anticholinergic medications increase exercise tolerability, improve health status, improve spirometry, and lead to fewer exacerbations. The recent publications that address cardiovascular events do not provide enough information to show the risk of cardiovascular events outweighs the benefits inhaled anticholinergic medications provide for patients. Anticholinergics may increase the risk of adverse cardiovascular events, however, until more is known, current treatment guidelines should continue to be followed for COPD.

### References:

1. Atrovent [package insert]. Ridgefield, CT: Boehringer Ingelheim Pharmaceuticals; 2008.
2. Spiriva [package insert]. Ridgefield, CT: Boehringer Ingelheim Pharmaceuticals; 2008.
3. Singh S, Loke Y, and Furberg C. Inhaled anticholinergics and risk of major adverse cardiovascular events in patients with chronic obstructive pulmonary disease. *JAMA*. 2008; 300: 1439-1451.
4. Lee T, Pickard S, Au D, et al. Risk for death associated with medications for recently diagnosed chronic obstructive pulmonary disease. *Ann Intern Med*. 2008; 149: 380-390.
5. Tashkin D, Celli B, Senn S, et al. A 4-year trial of tiotropium in chronic obstructive pulmonary disease. *N Engl J Med*. 2008; 359: 1543-1554.



## Intralipid for Treatment of Bupivacaine Toxicity by Ashley Tigges

Bupivacaine is a local and regional anesthetic that is used because of its rapid onset (1-10 minutes) and long duration (3-9 hours) of action.<sup>1</sup> Initial presentation of bupivacaine toxicity includes mental status changes, visual disturbances, agitation, tachycardia, and hypertension. As toxicity progresses, arrhythmias and central nervous system excitation manifest. Bupivacaine-associated cardiotoxicity is first observed as hypotension and bradycardia, but rapidly progresses to malignant ventricular arrhythmias and cardiovascular collapse.<sup>2</sup> Historically, cardiovascular collapse in cases of bupivacaine toxicity has been treated with cardiopulmonary resuscitation and sympathomimetics.<sup>2,3</sup> When these measures failed the only option was cardiopulmonary bypass.<sup>4</sup>

Lipid emulsions (i.e., Intralipid®) are now being considered for treatment of refractory cardiac arrest involving local anesthetic toxicity. Bupivacaine is a lipophilic agent with various actions, one of which is inhibition of mitochondrial transport of fatty acids. Fatty acids are the major energy supply for the heart in aerobic metabolism. Interruption of the delivery of these fatty acids is thought to contribute to the cardiotoxicity of bupivacaine. One theory suggests lipid emulsions can increase intracellular fatty acid content enough to overcome the inhibition of transport caused by bupivacaine. Another hypothesis for lipid use in bupivacaine toxicity is the “lipid sink” mechanism which states the lipid infusion causes bupivacaine to separate from the affected tissues and move into the plasma lipid phase, allowing for a more rapid removal of bupivacaine from cardiac tissue. The following four case reports regarding the successful use of lipid emulsions for treatment of bupivacaine toxicity have been published.<sup>2</sup>

Rosenblatt, et al. described a 58-year old, 82-kg male who became incoherent and had a tonic-clonic seizure after receiving 20 mL of 0.5% bupivacaine and 20 mL of 1.5% mepivacaine. Cardiac rhythm was found to be asystole and advanced cardiac life support was initiated. After 20 minutes the patient’s rhythm was still asystole so it was decided to administer 100 mL of 20% Intralipid® through a peripheral IV catheter, followed by continued advanced cardiac life support. Normal sinus rhythm returned and a lipid infusion was run at 0.5 mL/kg/min for the next 2 hours. The patient was awake and responsive 2.5 hours later following extubation and experienced no complications from the lipid infusion.<sup>5</sup>

Spence reported a case in which an 18-year old, 86-kg pregnant female presented for labor induction and received 6 mL of 0.25% isobaric bupivacaine and 10 mL of 0.5% bupivacaine via an epidural catheter. She experienced an increase in blood pressure and heart rate in addition to agitation, restlessness, and twitching of her face and limbs. Aspiration of the epidural catheter revealed venous blood, suggesting possible intravenous bupivacaine administration. Eventually she lost consciousness. She was given two 50 mL boluses of 20% Intralipid®. The rest of the bag (400 mL) was run in freely as an infusion. The patient regained full consciousness 30 seconds later and had no reported complications from lipid administration.<sup>6</sup>

Smith, et al. published a case report about an 83-year old, 75-kg male who experienced loss of consciousness, a tonic clonic seizure and asystole following a total of 26 mL of 0.5% bupivacaine. Chest compressions were started and a 250 mL bolus of 20% lipid emulsion (brand not specified) was given IV over 2 minutes. Sympathomimetics were then given and a lipid infusion was started at 0.2 mL/kg/minute. Normal sinus rhythm returned and the patient was awake and responsive after extubation 90 minutes later. No complications were reported from the lipid infusion.<sup>7</sup>

Warren, et al. described a 60-year old, 83-kg male who became unresponsive following a procedure in which he had received 30 mL of 1.5% mepivacaine, 3 mL of 8.4% sodium bicarbonate, followed by 10 mL of 0.5% bupivacaine. Cardiopulmonary resuscitation was started and sympathomimetics, sodium bicarbonate, and magnesium sulfate were given as well as several defibrillations. With no response to 10 minutes of treatment, 250 mL of 20% Liposyn III® was given via central infusion over 30 minutes. Further defibrillations were administered and cardiovascular activity returned.<sup>8</sup>

All four case reports resulted in successful return of cardiovascular activity. Currently there are no defined dosing recommendations for lipids in bupivacaine toxicity. No complications resulting from lipid infusion were detected in the case reports. The main safety concern for lipid use in the acute setting such as in these cases, is allergic reaction, with an incidence of <1%.<sup>4,9</sup> Intralipid® and Liposyn® both contain soy bean oil.<sup>1</sup> This needs to be taken into consideration when evaluating patient allergies.

Based on case reports, lipid emulsions have been effective for bupivacaine toxicity when conventional measures were ineffective. There is not enough data to support use of these products as first line therapy, but they should be considered as adjunct to standard resuscitation measures in the treatment of refractory bupivacaine toxicity.

### References:

- 1 Clinical Pharmacology Web Site. Available at: <http://www.clinicalpharmacology-ip.com/Forms/Monograph/>. Accessed 11/3/08.
- 2 Weinberg G. Lipid Rescue Resuscitation from Local Anaesthetic Cardiac Toxicity. *Toxicol Rev* 2006;25:139-145.
- 3 Micromedex Helathcare Series Web site. Available at: <http://www.thomsonhc.com/clinicalxpert/librarian>. Accessed 11/03/08.
- 4 Brull SJ, Lipid Emulsion for the Treatment of Local Anesthetic Toxicity: Patient Safety Implications. *Anesth Analg*. 2008; 106:1337-9.
- 5 Rosenblatt MA, Abel M, Fischer GW, et al. Successful Use of 20% Lipid Emulsion to Resuscitate a Patient after a Presumed Bupivacaine-related Cardiac Arrest. *Anesthesiology* 2006; 105:217-8.
- 6 Spence A. Lipid Reversal of Central Nervous System Symptoms of Bupivacaine Toxicity. *Anesthesiology*. 2007;107:516-7.
- 7 Smith HM, Jacob AK, Segura LG, et al. Simulation Education in Anesthesia Training: A Case Report of Successful Resuscitation of Bupivacaine-Induced Cardiac Arrest Linked to Recent Simulation Training. *Anesth Analg*. 2008;106:1581-4.
- 8 Warren JA, Thoma RB, Georgescu A, Shah SJ. Intravenous Lipid Infusion in the Successful Resuscitation of Local Anesthetic-Induced Cardiovascular Collapse After Supraclavicular Brachial Plexus Block. *Anesth Analg*. 2008;106:1578-1580.
- 9 Lexi-Comp Online Web site. Available at: <http://online.lexi.com>. Accessed 11/10/2008.

## Is Fish Oil Safe and Effective for Arrhythmias? by Katerina Petrov

Despite advancements in medicine, supraventricular and ventricular arrhythmias continue to be prevalent health care problems. In 2001, approximately 2.3 million US adults were reported to live with atrial fibrillation (AF).<sup>1</sup> Sudden cardiac arrest due to ventricular tachycardia in 2003 accounted for about 350,000 deaths in the US.<sup>2</sup>

Antiarrhythmic agents are used to prevent and treat arrhythmias but they require close therapeutic monitoring due to many adverse effects. Therefore, some research has focused on finding safe and alternative options for prevention and treatment of arrhythmias. One such option is fish oil. Fish oil can be obtained through dietary sources or from purified oil capsules. It contains the active ingredient omega-3 fatty acid, which is an essential polyunsaturated fatty acid. Long chain omega-3 fatty acids include eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA). EPA and DHA are believed to have some cardioprotective effects.

Atrial fibrillation (AF) is the most common type of arrhythmia. In recent years, omega-3 fatty acids have been investigated for preventing and treating AF. Calo et al. reported that omega-3 polyunsaturated fatty acids (n-3 PUFA) reduced the incidence of post-operative AF after coronary artery bypass grafting (CABG).<sup>3</sup> In this study, 160 patients undergoing CABG were randomized to receive 2g/day n-3 PUFA or placebo from 5 days preoperatively until discharge. Postoperative AF was reduced from 33% to 15% in the fish oil group (54% RRR, NNT=5.5,  $p=0.03$ ). On the other hand, epidemiologic studies provided inconsistent evidence on the incidence of AF. Mozaffarian et al. reported that tuna or other broiled/baked fish (but not fried fish or fish sandwiches) was associated with 30% lower incidence of AF.<sup>4</sup> In contrast, fish consumption was assessed in 47,949 patients in the Danish Diet, Cancer, and Health Study and consumption of n-3 PUFA was not associated with a reduced risk of AF/atrial flutter.<sup>5</sup> AF occurred in 556 people after a mean follow up of 5.7 years.

Omega-3 PUFA supplementation has been investigated in patients with implantable cardioverter-defibrillators (ICDs) and a history of sustained ventricular tachycardia (VT) to evaluate the potential benefits of preventing future VT episodes. Leaf et al. demonstrated a benefit to fish oil with a longer time to recurrent VT/VF or death from any cause in patients with ICDs randomly assigned to receive four 1g gelatin capsules of fish oil providing 2.5mg EPA plus DHA, compared to those who received four 1g gelatin capsules of olive oil (RRR 28%,  $p=0.057$ ).<sup>6</sup> The differences were more significant in patients who continued therapy for at least 11 months (RRR 48%,  $p=0.06$ ). In contrast, Raitt et al. reported that for 200 patients with ICDs and a recent VT, a fish oil dose of 1.8 g/day providing 576mg EPA and 540mg DHA, did not reduce the incidence of VT/VF.<sup>7</sup> In this study, recurrent VT/VF was actually more common in the fish oil group (79% in the fish oil group vs. 65% in the control). In the Study on Omega-3 Fatty Acids and Ventricular Arrhythmias [SOFA], 549 patients with ICDs were randomized to 2g of fish oil providing 464mg EPA and 335mg DHA or 2g sunflower oil for a period of 365 days.<sup>8</sup> The primary outcome of spontaneous VT or all-cause mortality was not significantly different in the fish oil group (HR 0.86, 95% CI, 0.66-1.26). However, in patients with prior MI, there was a trend toward a benefit from fish oil ( $p=0.09$ ). Finally, Metcalf et al. researched the induction of VT in patients at high risk for sudden cardiac death (SCD). The fish oil group consisted of 12 patients who were treated with 3g/day fish oil providing 540mg EPA and 360mg DHA versus a control group of 14 patients who did not receive treatment. Overall, there was a change to less inducible VT in the fish oil group ( $p=0.003$ ) but no change in the control group ( $p=0.65$ ). The investigators concluded that fish oil may have an antiarrhythmic effect under controlled conditions but its role in spontaneous VT is unclear.

In summary, evidence for the potential benefit of omega-3 fatty acids from fish or supplements in arrhythmias is conflicting and inconclusive. However, omega-3 fatty acids have been shown to reduce the incidence of coronary heart disease as well as to lower triglyceride levels. Therefore, people should not generally be discouraged from taking fish oil supplements. The American Heart Association currently recommends that patients with coronary heart disease (CHD) consume 1g/day EPA plus DHA and people without CHD consume at least 2 servings of fish per week.<sup>10</sup> For patients with hypertriglyceridemia, 2 to 5 g/day of EPA plus DHA are recommended. Omega-3 fatty acids are available over the counter in a variety of EPA and DHA concentrations. Lovaza is currently the only fish oil prescription product.<sup>11</sup> At this time, fish oil should not be taken specifically for preventing arrhythmia but it can be safely given for CHD prevention and triglyceride lowering.

### References

1. Go SA, Hylek EM, Phillips KA, et al. Prevalence of diagnosed atrial fibrillation in adults. *JAMA*. 2001; 285:2370-2375.
2. Centers for Medicare and Medicaid Services. *Health Care Financing Review: Medicare and Medicaid Statistical Supplement*. Baltimore, Md: Centers for Medicare and Medicaid Services; 2003. Available at: <http://www.cms.hhs.gov/apps/review/Suppl/>. Accessed October 26, 2008
3. Calo L, Bianconi L, Colivicchi F, et al. N-3 fatty acids for the prevention of atrial fibrillation after coronary artery bypass surgery. *J Am Coll Cardiol* 2005; 45:1723-1728.
4. Mozaffarian D, Psaty B, Rimm EB, et al. Fish intake and risk of incident atrial fibrillation. *Circulation* 2004; 110:368-373.
5. Frost L, Vestergaard P. n-3 fatty acids consumed from fish and risk of atrial fibrillation or flutter: The Danish Diet, Cancer, and Health Study. *Am J Clin Nutr* 2005; 81:50-54.
6. Leaf A, Albert CM, Josephson M, et al. Prevention of fatal arrhythmias in high-risk subjects by fish oil n-3 fatty acid intake. *Circulation* 2005; 112:2762-2768.
7. Brouwer IA, Zock PL, Camm AJ, et al. Effect of fish oil on ventricular tachyarrhythmia and death in patients with implantable cardioverter defibrillators: The study on omega-3 fatty acids and ventricular arrhythmia (SOFA) randomized trial. *JAMA* 2006; 295:2613-2619.
8. Raitt MH, Connor WE, Morris C, et al. Fish oil supplementation and risk of ventricular tachycardia and ventricular fibrillation in patients with implantable defibrillators: a randomized controlled trial. *JAMA* 2005; 293:2884-2891.
9. Metcalf PG, Sanders P, James MJ, et al. Effect of dietary n-3 polyunsaturated fatty acids on the inducibility of ventricular tachycardia in patients with ischemic cardiomyopathy. *Am J Cardiol* 2008; 101:758-761.
10. Kris-Etherton PM, Harris WS, Appel LJ, and for the Nutrition Committee. Fish Consumption, Fish Oil, Omega-3 Fatty Acids, and Cardiovascular Disease. *Arterioscler. Thromb. Vasc. Biol.* 2003;23:e20-e30.
11. Lovaza<sup>®</sup> [package insert]. Research Triangle Park, NC: GlaxoSmithKline; July 2008.

## Honey for Burn Wound Treatment by Heath Grone

Raw, unprocessed, undiluted honey is recommended as a treatment option for burn wound therapy in partial and superficial thickness burns. Honey, a viscous, supersaturated sugar solution derived from nectar gathered and modified by the honeybee, is a traditional topical treatment for wounds.<sup>1</sup> Since ancient times, honey has been a remedy used in wound care.<sup>2</sup> Recently, honey has been rediscovered by medical professionals as a potential medical therapy and has been used to manage burns wounds, surgical wounds, pressure wounds, ulcerated wounds, and oral mucosa wounds.<sup>3</sup>

The wound healing properties of honey are multi-factorial. Honey provides a physical barrier on the wound. There is a hydrogen peroxide effect, along with flavanoids and phenolic acids, which provide the anti-septic property of honey. The slightly acidic pH of honey helps to prevent bacterial growth in the burn wound.



Honey keeps the wound moist to allow epidermal regeneration, and contains several nutrients, to aid the healing process. Honey has been shown to boost the immune response locally through increasing inflammatory cytokines from lymphocyte and phagocyte activity<sup>1</sup>. Research has shown that the proliferation of peripheral blood B-lymphocytes, T-lymphocytes, and phagocytes in cell culture are stimulated by honey at concentrations as low as 0.1%.<sup>4</sup> At a concentration of 1%, honey stimulates monocytes in cell culture to release cytokines, tumor necrosis factor (TNF)-alpha, interleukin (IL)-1 and IL-6, which activate the immune response to infection.<sup>4</sup>

There are several sources of honey including manuka or jellybush honey from *leptospermum scoparium* which is found in New Zealand and Australia. Jambhul honey from the *Syzygium cumini* plant is found in India. Manuka honey does not have the hydrogen peroxide effect but still contains the other antibacterial properties, including phytochemicals that come from the nectar of the *leptospermum scoparium*. This antibacterial activity is measured as the Unique Manuka Factor (UMF).<sup>5</sup>

Several studies have been conducted to evaluate the effectiveness of honey for burn therapy. A systematic review of studies that used honey as the treatment of wounds was conducted and results have proven that honey is an effective treatment for the healing of burn wounds. In this systematic review there were 19 trials reviewed 9 of them using honey for treatment specifically in burn wound patients. The burns in these studies ranged from superficial to full thickness burns. These studies have compared honey to potato peel dressings, amniotic membrane dressings, silver sulfadiazine, polyurethane film, Vaseline-impregnated gauze, soframycin dressing, and sterile linen dressings. Early excision and grafting is also a treatment option and the role for honey as a supplementary treatment was assessed. The evidence for honey compared with other treatments in the treatment of burns shows improvement in healing. However all of these clinical trials were conducted and written by the same author.

Currently, two options of honey-containing products have received FDA approval for wound treatment: honey-impregnated calcium alginate dressings (MEDIHONEY) and gamma-irradiated manuka honey (MEDIHONEY).<sup>1</sup> The gamma irradiation kills clostridial spores, while maintaining the antibacterial properties.<sup>3,4</sup> The honey is applied to gauze and this is then applied to wounds, including burns.

### References:

1. Eddy, J., Gideonsen, M., Mack, G. Practical Considerations of Using Topical Honey for Neuropathic Diabetic Foot Ulcers: A Review. *Wisconsin Medical Journal*. 2008. Vol 107. :187-190.
2. Jull, A., Rodgers, A., Walker, N. Honey as a topical treatment for wounds. *Cochrane Database of Systematic Reviews*, 2008. Issue 4.
3. Gunes, U. Eser, I. Effectiveness of a Honey Dressing for Healing Pressure Ulcers. *Journal of Wound Ostomy Continence Nursing*. 2007. Vol. 34: 184-190.
4. Molan, P. *Honey as a topical antibacterial agent for treatment of infected wounds*. <http://www.worldwidewounds.com/2001/november/Molan/honey-as-topical-agent.html>. 2001.
5. Ingle, R., Levin, J., Polinder, K. Wound healing with honey—a randomized controlled trial. *South African Medical Journal*. 2007; 97(5): 314-416.



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