

Shechita – Scientific Update 2015

In an animal subjected to proper *Shechita*, brain function is impeded extremely rapidly by the collapse in cerebral blood flow rendering the animal *stunned*. Combined with this, is the fact that, due to detailed *Halachic* requirements of the blade and motion of the incision, direct stimulation of nociceptors in the neck is below a level adequate to evoke a sentient response.

Shechita is reliable and effective as a technique for an integral stun and slaughter. Its efficacy has been independently attested to by international expert Professor Temple Grandin. In her behavioural study¹, a deliberately very light degree of restraint was deliberately employed for animals undergoing *Shechita*, and yet there was no flinching and no reflex defence response suggestive of any sensation of pain.

Despite this there have been numerous attempts to discredit *Shechita*, using a combination of poor science and agenda-driven misinterpretation.

Tissue damage and pain

Gregory² warns that ‘the cuts which are used involve substantial tissue damage in areas well supplied with pain receptors. The rapid decrease in blood pressure which follows the blood loss is readily detected by the conscious animal and elicits fear and panic. Poor welfare also results when conscious animals inhale blood because of bleeding into the trachea.’

The key point here is manifestly untrue. If an animal’s blood pressure falls very rapidly it loses consciousness, and is not in a position to ‘detect’ its fall in blood pressure, neither does this elicit fear and panic’. There is simply no evidence of this at all. Clearly it would be very poor welfare if a conscious animal were to inhale blood because of bleeding into the trachea. However, with *Shechita*, the animal a) is not conscious and b) our animals are restrained such that the blood gushes away from the neck outwards, it does not flow into the trachea.

Tissue manipulation and pain

The same authors assert that ‘manipulating tissues that are rich in sensory nerve endings, as are the structures in the neck and as occurs during this manual examination of the neck wound, will stimulate neurosensory pathways to the brain. This is likely to lead to the sensation of pain if the animal is conscious.’

This would be true under other circumstances, but in the course of *Shechita*, the animal loses consciousness so rapidly that it is not conscious at this point and so it is *unreasonable* to conclude that examination of the neck structures will cause pain.

Data on slaughter of calves and persisting cerebral blood flow due to ‘ballooning’

Anil and colleagues³⁴, described the process through which carotid ballooning (occlusion of the severed ends of the carotid arteries by a combination of elastic recoil, platelet aggregation and smooth muscle constriction) “could result in a maintenance of mean arterial blood pressure and that the mean vertebral blood flow can be held at about 30% of its initial level for approximately three minutes. Therefore, the anatomical difference in brain perfusion between cattle, deer and other species can play an important role in the contribution to continued brain function, should carotid ballooning occur.”

This mechanism is plausible – but has nothing to do with *Shechita*! In the latter, the animals are held in a restraining pen in such a way that the head is prevented from flopping forward and occluding the carotids. With the arterial ends apart, platelet aggregation and elastic recoil alone do not prevent the free flow of blood. The spurious suggestion that vertebral artery flow will maintain the brain’s circulation after *Shechita* has been dealt with elsewhere⁵. In fact, after the *Shechita* incision, there is a precipitous fall in cerebral perfusion pressure that causes neuronal dysfunction, stunning and rapid brain death.

Exsanguination

Anil and colleagues have made much recently of a demonstration that there is no appreciable differences in the bleed out between animals pre-stunned before slaughter and those killed by neck incision⁶. The key point here is that Anil and colleagues try to suggest that the *only point* of religious slaughter is the rate and degree of blood loss. Once again it seeks to devalue the religious approach and anyway has nothing to do with animal welfare.

Data vs misinterpretation in poultry slaughter

In a study by Barnett et al⁷², performed in Australia, measurements were made on poultry undergoing *Shechita*; the birds were watched closely and their responses before, during and after slaughter were noted. The time from removal from the crate to performance of the cut averaged 5 seconds; onset of muscular contractions and loss of postural one occurred after

about 12 seconds and, interestingly, only 4% of birds showed a physical response and that was only a mild movement.

The discussion section of the paper is fascinating. The absence of physical reaction to the incision is seen as analogous to a similar absence of reaction to *Shechita* in cattle reported by Temple Grandin¹. It was accepted that ‘the eye test has been criticised as a test for unconsciousness because it is more indicative of brainstem reflexive function, which may be present even though an animal is unconscious’⁸. This is despite the latter test having been misapplied to attack *Shechita* in large animals in earlier studies

It was further acknowledged that the fact that *Shechita* is performed on one bird at a time is a good thing and the fact that each bird is definitely dead removes any later pain or fear at the time of shackling. The authors state (grudgingly) that: ‘on balance, taking into account the entire process, including the removal of the birds from their crates, their behavioural responses to neck cutting, the time to bleed out and the avoidance of the need to shackle live birds, that the *Shechita* procedure is acceptable.’

Stunning and effects on poultry

Despite a long career in opposition to *Shechita*, Gregory in his 2005 review, notes that unrestrained poultry subjected to electrical stunning across the head only develop severe wing flapping, for which reason head-to-vent electrocution has been advocated⁹. The flapping causes accelerated depletion of muscle ATP and glycogen, pH decline, lactate accumulation and poverty of water holding capacity. Of course, with the calm, purposive handling of birds prior to *Shechita* the severe wing flapping (and the fractures that can accompany this) simply does not arise. On the topic of gas stunning, Gregory acknowledges that ‘in the human, CO₂ induces a sense of breathlessness with dyspnoea.’

Buhr considers the effect of stunning and anaesthetic agents upon poultry for slaughter in terms of the levels of anaesthesia recognised by professional anaesthetists and originally categorised by Guedel in 1937¹⁰. He does mention the ‘possibility of the occurrence of electrical immobilization, retaining the ability to sense and perceive pain but unable to respond to stimuli, can occur if the electrical current path does not reach the brain of the subject.’

Massey University Programme of EEG based research

The most recent work on un-stunned slaughter (but not actually *Shechita* or Halal slaughter) carried-out at Massey University and reported in the NZ Veterinary Journal in 2009 is an example of research that is deeply unsound, yet is being hugely over-interpreted.^{11,12,13}

They have set out to establish a biological marker (spectrally analysed EEG) through which the pain effects of a neck incision can, it is claimed, be distinguished from the effects of a precipitous fall in cerebral blood flow. After this comes the paper that shows that a *shechita*-like cut produces a change akin to that of the supposed pain response and then comes a paper to show that stunning can put it all right. Thus the objective of the overall exercise is achieved, with the apparent endorsement of science.

A list of just some major concerns about the conduct of their experiments is shown below:

- the knife described is too short and bears no comparison to equipment used for *Shechita*
- the actual slaughter and restraint methods are poorly described and questionable
- the “special equipment” is not shown
- there is a lack of detail about the incision, its positioning and delivery, which in *Shechita* is precisely and carefully defined
- the head holder also does not seem to be doing the job properly, probably allowing too much movement
- the training and qualifications of the slaughter man is not given
- like so many of these papers, it does not give enough detail about the non pre-stunned slaughter (or un-stunned slaughter as they call it) experiment to determine what really is happening, which violates the basic scientific principle that the work must be repeatable by others!
- if this project is really about “un-stunned slaughter” unrelated to religious slaughter why is religious slaughter mentioned so frequently in the paper?
- the whole issue of the “sham cut” feels more like a negative control, i.e., what happens with minimal pressure. But the impact of a lot of pressure with no cutting is never addressed. The difference between the use of a broomstick (used to stimulate the

anterior neck as a sham condition) and the *Shechita* incision using its fine instrument without pressure makes a nonsense of a most important part of the whole project

- The whole issue of sharpening of knives is a major part of a *Shochet's* training. The *chalaf* of the *Shochet* is a precision instrument designed specifically to deliver a sensation-free incision and it is constantly examined and maintained.
- The heart rate reading very high in the first paper and much lower in the other two papers, suggesting that these animals were more stressed, it is hard to understand why that should be the case if the animals were not conscious?
- Even the authors admit that anaesthetic agent might have specific and important effects.
- the papers are extremely sloppy about how the words unconsciousness, insensibility, and undoubted insensibility are used, allowing much distortion of the discussion. The papers never actually establish an unconsciousness point, where it is accepted that the animal would not feel pain. According to the EU and common vocabulary, when the animal drops, it is unconscious and doesn't feel pain.

However, it is even more important to put on record that this series of studies is methodologically unsound, for a number of key reasons:

1. EEG recording electrodes have a very limited field of recording and the set up used by the MG was well away from the brain structures of pain signalling processing (PSP).
2. EEGs have poor spatial specificity and could never provide definitive evidence of pain signal processing even if they had recorded over the relevant temporal lobe structures.
3. EEG signals were obtained in the anaesthetised state which (by definition) induces a functional disconnect between pain signalling pathways and the higher cortical structures of awareness. Thus, cortical EEG cannot be used to reflect PSP.
4. The three derived Quantitative EEG (Q-EEG) values used by the MG are over simplistic, subject to confounding errors and are not used in modern Q-EEG literature.

5. The data sampling windows used by the MG were too short to provide meaningful Q-EEG frequency resolutions for any of the important frequencies they were trying to prove changes in and were presented without statistically derived confidence intervals.
6. Using these small windows facilitated the MG to use a flawed technique of ‘rolling comparisons’ to artificially generate a statistical difference from a single animal to prove that a blade incision of the neck induces a noxious response. This approach should be considered misleading.
7. The frequency shifts charted by the MG to qualitatively provide evidence of PSP were so small that they are clinically meaningless.
8. Q-EEG techniques always require a comparison with the original ‘raw EEG’ they are derived from. The lack of provision of these traces in all but one of the MG papers is highly suspicious.

Further criticism of individual aspects of each of the MG papers is currently being prepared for publication by Freilich et al.

Conclusion

Much work has been done to construct a scientific case against religious slaughter, but when viewed with an appropriately critical stance, the science is simply not reliable. There are numerous unfounded assumptions, methodology is very imprecise, the biological markers recently selected are extremely non-specific and the overlap between positive and negative responses between groups is considerable. Finally, the interpretation of the data and conclusions drawn are most unreasonable. Overall this is a very poor basis on which to formulate policy, when compared to the reliability, durability and intrinsic humaneness of *Shechita*.

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- ¹Grandin T. Euthanasia and slaughter of livestock. *J Am Vet Med Assoc* 1994; **204**: 1354-1360
- ²Gregory NG. Recent concerns about stunning and slaughter. *Meat Sci* 2005; 70: 481-491.
- ³Anil MH.,Mckinstry JL, Gregory NG, Wotton SB & Symonds H. Welfare of calves. 1. Investigations into some aspects of calf slaughter. *Meat Science* 1995; 41:101-112
- ⁴Anil MH.,Mckinstry JL, Gregory NG, Wotton SB & Symonds H. Welfare of calves. 2. Increase in vertebral artery blood flow following exsanguinations by neck sticking and evaluation of chest sticking as an alternative slaughter method. *Meat Science* 1995; 41:113-123
- ⁵Rosen SD. Physiological insights into Shechita. *Veterinary Record* 2004; 154, 759-765
- ⁶Anil MH, Yesildere T, Aksu H, Matur E, McKinstry JL, Weaver HR, Erdogan O, Hughes S, Mason C. Comparison of Hala slaughter with captive bolt stunning and neck cutting in cattle: exsanguination and quality parameters. *Animal Welfare* 2006; 15: 325-330.
- ⁷Barnett JL, Cronin GM, Scott PC. Behavioural responses of poultry during kosher slaughter and their implications for the birds' welfare. *Vet Rec.* 2007; 160: 45-49
- ⁸Gregory NG. The physiology of electrical stunning and slaughter. In: *Humane slaughter of Animals for Food*. Potters Bar UFAW 1987; 3-14.
- ⁹Savenije B, Schreurs FJG, Winkelman-Goedhart HA, Gerritzen MA, Korf J and Lambooji E. Effects of feed deprivation and electrical, gas and captive needle stunning on early post mortem muscle metabolism and subsequent meat quality. *Poultry Sci* 2002; 81: 561-571.
- ¹⁰Guedel AE. Stages of anaesthesia. Inhalation anaesthesia. London Macmillan 1937: 10-13.
- ¹¹Gibson, T et al. Components of electroencephalographic responses to slaughter in halothane-anaesthetised calves: effects of cutting neck tissues compared with major blood vessels. *New Zealand Veterinary Journal* , 2009; 57(2), 84-89
- ¹²Gibson, T et al. Electroencephalographic responses of halothane-anaesthetised calves to slaughter by ventral-neck incision without prior stunning. *New Zealand Veterinary Journal* , 2009; 57(2): 77-83.
- ¹³Gibson, T et al. Amelioration of electroencephalographic responses to slaughter by non-penetrative captive-bolt stunning after ventral-neck incision in halothane-anaesthetised calves. *New Zealand Veterinary Journal*. 2009; 57(2): 96-101.