MAD COWS, FORMALDEHYDE APOLOGY, EMBALMING AND ALL THAT JAZZ. A CJD UPDATE FOR EMBALMERS.

By James H. Bedino, Chemist/Director of Research
The Champion Company

In our current article, we investigate the misunderstood, convoluted, confused and, in some cases, flat out wrong morass of advice and recommendations regarding the embalming of CJD cases. Most of this information being passed around is by so-called "experts" in embalming or whatever, with the result being unresearched, unfounded, incorrect and out-of-context absurdist conclusions regarding precautions to take when embalming these types of cases and high risk embalming situations, in general. So just what recommendations are there that are based on brutal scientific facts and related medical research? What should an embalmer do in these situations? These questions and more will be investigated and answered in this article. As always, a warning — brutal honesty, the facts and my personal opinions follow. You will not find me standing waistdeep in the formaldehyde apology swamp pretending everything is "just alright" in the funeral industry. With that said, I invite you to read on.

Formaldehyde Is Beautiful
In It's Own Way
It's A Toxic Cancer-Causing Gas
But, Hey What Can I Say?

Cause Formaldehyde Is Beautiful
In It's Own Way
It's Bad With Bleach And Makes You Gasp
But Hey, That's Just OK!

For Formaldehyde Is Beautiful
And That's All I Have To Say!

— sung to the tune of " Everything Is Beautiful"

Well, actually, there's plenty more to say. Quite simply, there is no way that formaldehyde, the embalming trades' "one-trick-pony" can be the answer to everything in embalming. The failsafe bailout apology is — even when formaldehyde doesn't work — nothing else does either — so there! The only problem is that it's just not true. There are far superior techniques and chemicals that literally, leave formaldehyde in the dust, for many applications in embalming and the special situation of high risk and CJD embalming particularly.

I previously have published a lengthy and extensive Champion Encyclopedia article about CJD and related syndromes that is now several years old. After carefully reassessing this previous report, I am pleased to still recommend that you read it. It embodies the essentials and basics of the disease states, accurately reports the history of CJD and related prion diseases up to it's publication date and fairly assesses various disinfection protocols. In addition, after extensive overview, I still, absolutely, positively, embrace and recommend my suggested protocols for minimizing risk in CJD embalming scenarios. This is surprising to no

one more so than myself, but after methodical review of all the relevant modem research and investigations, I can find nothing that would dissuade or contraindicate my basic assumptions or recommendations.

Since my previous articles' publication, many advances have been made in the study and elucidation of prion-associated disease states. The infectious-protein model is virtually accepted by all researchers with only a seemingly remote chance that the causative agent will prove to be anything viruslike in nature. Documented and diagnosed sporadic CJD cases in the U.S. have tripled from 1996-2006, while iatrogenic and inherited prion diseases have flattened out in incidence. Prions are now found in even more tissues and exudates than previously thought, including milk products that are even homogenized/pasteurized. Much research is now centered around BSE and genetic-engineered "knockout gene" cows have been created. Recent experiments in mice models are focusing on engineered "gene turn off' for prion manufacture in the brain, making a disease proof animal. Filtration solutions are being worked on for blood and blood- related products in transfusions, etc. Mad Cow outbreaks appear controllable but not preventable by modern protocols, regulations and procedures. I could depart at this point and deliver a multi-page indepth update regarding research advancements of the field since the publication of my earlier article. Quite frankly, no one in the funeral industry would really care. For embalmers then, it is simply that all this adds up to the fact that CJD and related prion disease cases in embalming are not going away and will only increase, and we have to decide what to do about them.

So, what are the various "so-called" solutions and procedures for CJD embalming and what's wrong with about all of them? Basically, all the recommendations can be divided into roughly three camps: 1. It's hopeless, there is nothing you can do, 2. Nothing really works, but go ahead and use formaldehyde and follow up with bleach anyway, and finally, 3. My published recommendations, which differ drastically from these and have been vigorously attacked by various "experts" in embalming. Let's examine each of these and the scientific logic, if any, that they are based on.

Camp # 1 — There's no solution, nothing works, there's no hope, all you can do is bag'em and burn'em. Don't even think of touching them with a ten-foot pole, let alone the absurdity of attempting embalming. The logic of this group is to transfer the potential infectivity to the cremators, where it belongs. Some of this camp even think that maybe cremation is not good enough — who knows if all the infectivity is gone? — what about the fumes? and what about the ashes? Do we bury them in a toxic waste dump? Do we send them into deep space? — The questions never end. Fortunately, I hope, this is a fringe cult, but then again, you never know for sure. There is actually serious discussion by some "embalming experts" regarding this absurdist and absolutist stance. The conclusions reached by this camp is basically way out in left field and not based on sound scientific reasoning or any medical research. If the situation was this extreme, then the statistical probabilities of exposure and infection transference would reflect that. They don't. Sorry, the situation is serious, but it is not hopeless. I think you get the point here. Consequently, if your reductionist thinking takes you to this point, there is nothing more to be said than, "welcome to the abyss" and discussion and reason ends here.

Camp#2 — This is a big camp that encompasses about everybody else and a plethora of ideas and opinions, except, of course, mine. It's confusing, but basically goes something like this: Nothing really works but don't give up, so therefore, all the more reason to use good old formaldehyde, because it's as good as anything else and throw in some bleach, too, despite the fact that formaldehyde is incompatible with bleach, don't

worry about that, because the chances are remote that anything is going to happen anyway, but be "real" careful just in case, and don't worry, well, worry a little bit, but don't worry a whole lot, because probably everything is going to be alright, but then again. As you can see, there is some serious mixed messages being broadcast here — but when you tune out all the static, the broadcast comes through pretty clear — just do it with formaldehyde and then follow up with a bleach bombing.

The underlying theme is simply a formaldehyde apology wrapped up in a plea to embalm, more or less, as we always have and do what we always have done for a century, because I defy you to prove any way better. Many embalming" experts" profess this stance or a bizarre modification of it. I totally disagree. This line of reasoning is based on maintaining the status quo of formaldabalming, justifying formaldehydes' existence and apologizing for its limitations, failings and shortcomings, all in the name of the "profession". In fact, I violently disagree with the conclusions and reasoning of this camp as misguided and wrong. One report even states that "by definition" you can't even embalm. The confusion derives from taking commentary from a half-century old embalming textbook that misdefines sanitation vs. disinfection, with the result being a logical absurdity, which easily morphs into an apology for formaldehyde usage. The whole disinfection/sanitation/embalming debate revolves around this pervasive misunderstanding and is further muddled by the embalming trades use of 50-year old data and 100-year old thinking to justify everything being archaic as it is. Long live formalin! Consequently, I am not even going to waste any time debunking some of the bizarre recommendations or quirky modifications to good old-fashioned embalming that have surfaced: such as dousing the body with cavity fluid, pouring embalming fluid down the throat, do a pretend-waterless embalming, don't aspirate, wear a bunch of latex rubber gloves, don't attempt drainage and fear the trocar, to name just a few. Which brings us to my recommendations regarding this situation.

Camp#3, my recommendations — well, they essentially turn archaic formaldathinking on its head and professes, with documentation, a superior and effective, but unfamiliar solution to a very serious problem that puts formaldehyde and all its apologists in their place. My recommendations advocate the reduction/elimination of formaldehyde, the implementation of glutaraldehyde/phenolics, the use of SDS (Sodium lauryl sulfate) as detergent/cleaning agent with final sanitation/disinfection achieved by glutaraldehyde/NaOH (Sodium hydroxide), and the use of armored/nitrile gloves, standard apparel, disposable HEPA masks, and disposable instruments (including injection tubes, trocars, needles, etc.). This is not, at all, a daunting task and is easily achieved by use of a Champion Extreme Precaution Kit that is readily available. If required or you feel it necessary, drainage/aspirate fluids can easily be collected and treated with NaOH and then disposed of as hazardous waste. Utilizing the protective/disposable equipment and implementing the suggested chemicals, the embalming can then safely proceed. The embalming industry, tied as it is to formaldehyde and the old ways, in general, cannot not stomach this — hence the vociferous attacks and wails of condemnation by the legions of self-proclaimed embalming experts, regarding my protocols for CJD embalming scenarios. And so it is.

This is not to say that every set of recommendations that you can find out there is way offbase. An excellent example of this is a March 2000 article by Dr. Paul Brown, an eminent researcher in the prion field, that clearly and concisely delineates procedures and chemicals for use in embalming that is soundly based on medical fact and scientific research, that you just can't argue with. Sadly, even this excellent protocol was attacked by many in the funeral industry for various and generally spurious reasons. I am not surprised.

So where is the thinking of the formaldehyde apologists all wrong? In their desire to keep and justify formaldehyde as a last resort, their arguments result in a classic logic trap — "reductio ad absurdum". By failing to grade in a common sense way the relative disinfection/sanitation capabilities of several available embalming chemicals and excluding any middle ground or graded continuum of chemical disinfection efficacy, they arrive at an illogical result. By grading on the absolutist 100% scale, everything available to an embalmer fails, therefore — it doesn't matter, so use formaldehyde. No one would apply this faulty logic in other real life scenarios, but it appears perfectly alright to do it in the embalming room. Following then, are some examples of this reductionist/absurdist logic carried to its illogical conclusion.

It's a proven fact that human vaccinations against disease are not 100% effective, and in fact, can cause serious reactions in young children — therefore, vaccinations are not to be trusted and it doesn't matter if you get one. Antibiotics are not 100% effective against certain deadly strains of bacteria in humans — therefore, antibiotics are not to be used or relied on for treatment, as there is no guarantee they will work. Cancer treatments are only marginally or moderately effective against some types of cancers — therefore cancer treatments are not to be relied on or used as their efficacy, overall, is just fair or poor. Seatbelts are not even close to 100% effective in preventing deaths in car crashes — therefore, they should not be used or relied on, as there is no guarantee they will work. The same, of course, goes for Airbags — why bother, there's no proof they will work each and everytime. When you grade on the absolutist either/or scale it gets real simple and also real absurd. 5-point restraint harnesses in cars are not 100% effective in preventing serious injury during crashes and a rope nailed to the floorboards is also not 100% effective — therefore it doesn't matter whether you use the harness or the rope, because there is no guarantee either will work. My personal decision, and I think yours too, is to use the restraint harness, not the rope.

When you grade relative disinfection/sanitation effectiveness, reported in the research literature, formaldehyde almost always ranks below the readily available embalming alternatives glutaraldehyde and phenolics. Nothing in the embalming room is 100% effective, that's just the facts, but several are better than plain old formalin and the literature reflects that. Formaldehyde also has the nagging problem of a bizarre hardening/encapsulation effect on prion samples that results in a more difficult subsequent disinfection attempt, such as autoclaving. This effect has not been noted with any other chemical, to my knowledge. When you factor in the exposure parameters, health hazards, toxicity and cancer-causing effects of formaldehyde compared to either glutaraldehyde and phenols, there is little justification for pretending that formaldehyde is just as good as anything else — it is not. If you advocate formaldehyde embalming and then the use of bleach, which at certain concentrations, is proven effective, you are forced to pretend that bleach and formaldehyde are perfectly alright being mixed together in the embalming room — they are not. Saying that you will use bleach and that somehow justifies whatever you do first, formaldehyde or otherwise, is nothing but a red-herring. You also have to pretend that there is something wrong with glutaraldehyde and phenols in embalming, and you better attack anybody that tries to say different.

Which brings us to a summary of my recommendations and its justifications. Don't use formaldehyde, not when glutaraldehyde and phenolics rank higher on almost all lists of prion-tested disinfection agents and they embalm just as good. Besides, it's a safer and lower exposure embalming and neither glutaraldehyde or phenols have demonstrated a reverse action on prions that inhibits other disinfection procedures, like formaldehyde definitely has. Glutaraldehyde and phenolics don't cause cancer, but formaldehyde does. Sorry, but there are a zillion reasons not to use formaldehyde in normal embalming and there's even more

reasons in this particular scenario. Can't live without formaldehyde? — then, at least, drastically reduce the amount you use and substitute with glutaraldehyde/phenolics. I believe your odds will be improved, your exposures down and the body will be better embalmed anyway. You have a lot to gain and nothing to lose by implementing this embalming strategy. Don't use bleach in a formaldehyde soaked embalming room, in fact, don't ever use bleach, not when an alternative like NaOH (Sodium hydroxide) is as good or better in disinfection action than bleach in almost all prion scenarios. Bleach and formaldehyde, when mixed, generates a veritable explosion of many noxious and toxic gases and there is no way to safely neutralize bleach in embalming rooms after you use it.

And, as if I needed another reason to tell you not to use formaldehyde, there is even potentially a problem with Sodium hydroxide and formaldehyde. There have been reports of possible hydrogen gas evolution, a potential explosion hazard in closed systems, when certain concentrations of NaOH and formaldehyde are reacted together, as formaldehyde has no alpha-hydrogens available. The normally anticipated Cannizaro reaction does proceed but, some hydrogen gas has been detected as well. In a well-ventilated open-space scenario, such as embalming, this probably is not a serious concern, due to dilutions and quantities of reactants present, and I would choose NaOH always over chlorine bleach in any circumstances in an embalming room. This just further serves to exemplify the untoward hyperreactivity of formaldehyde with just about everything in the embalming room with usually toxic and noxious results. Bleach is definitely bad news with formaldehyde and NaOH possibly has a reactivity problem also. Apparently, it seems, you just can't win with formaldehyde. Why am I not too surprised? Oh well, one more thing.

NaOH does not counterreact in a bad way with glutaraldehyde or any of the other chemicals in the embalming room and can be easily neutralized after use by the addition of household vinegar and safely flushed down the drain. There is simply no way to safely neutralize a caustic and corrosive bleach solution in the embalming room. You have to consider it a hazardous liquid waste — and that presents a real disposal problem. Use glutaraldehyde as your standup cold-chemical sterilant, as that's about as good as it gets for everyday embalming purposes. For detergent action and general cleaning use SDS (Sodium lauryl sulfate/ Sodium dodecyl sulfate) in as hot water as you can get — you have to use a detergent anyway and this one has demonstrated effective dissolution action on gross prion lab samples and is the protein digestant basis for SDS/PAGE elucidation of prionic tissue samples. So what do you have to lose by using it? Finally, exercise Extreme Precaution by using HEPA masks, armored /nitrile gloves,and dispose of all your protective gear and use disposable instruments, including the use of a disposable trocar. All this is readily available in kit form and very easy to use. Even if you just do only some of these procedures and use just some of the alternative chemicals, you increase the safety factor for yourself in embalming these cases.

The screams of outrage and condemnation were loud and swift. One fluid mixing company, which shall remain nameless, was appalled that I would even suggest that glutaraldehyde/phenols were somehow better than good old formalin, and that I was just so-so-so-very-very wrong about this. They said they talk to the CDC (Centers for Disease Control) all the time and that they liked all their ideas. Well and good. The CDC, both on and off the record, clearly states that embalming, in its modern embodiment, serves no legitimate public safety function. Other medical experts, in allied fields, but not directly associated with the CDC, have even gone farther and professed that embalming in some instances, needlessly increases infection risk to embalmers and is merely a methodology for preservation of anatomical specimens or temporary preservation of corpses for social/psychological ceremonial purposes such as public grieving and wakes. Well, that sums

that up. At any rate, this fluid company had to pull the bleach recommendations out-of-context and invoke the 100% absolutist/absurdist rule to hopefully score their meager formaldehyde apology points. Oh, well, guess they were just following the old rubric — friends close, enemies closer. At any rate, bringing bleach out on the stage, before the final curtain falls, does not justify or excuse bad-acting, formaldehyde, or anything else for that matter. Deus ex machina.

This is no condemnation, however, of the CDC that engages in cutting-edge epidemiological research and is almost always dead on to rights and calls it the way they see it. In fact, it's just the opposite, they are absolutely right. In situations of CJD and related syndromes, the corpse, embalmed or not, is the infectious hazard, not the solution. Consequently, how it was chemically derivatized or arrived in its embalmed state is an artifact and of no concern to them. What to chemically do about it, after the fact is the question, and logically this entails effective protocols involving chlorines (bleach) or Sodium hydroxides, along with protective and impervious gear, disposal, etc. No problem here, when you look at it from that point of view. For some in the embalming trade to spin formaldehyde apology into this mix, however, is a problem, at least that's my opinion.

The Mutual Admiration Societies have even had their say, condemning NaOH as a dangerous caustic but conveniently forgetting that bleach is as bad or worse. One of the protocols called into question was even Dr. Paul Browns well-researched recommendations. Of course, ignore the fact that NaOH can be easily and safely neutralized anyway, but not so with bleach. An awful lot of this type of commentary appears, at least to me, to be the tail wagging the dog scenario. Well, ya gotta do what ya gotta do.

So, am I an absolutist about formaldehyde, only just in the reverse? No, formaldehyde in moderate amounts has its uses in embalming, especially for edema/dehydration style embalming situations and if you want or need stiffness/skin tightening/hardness results on an embalmed body. The brutal facts are, however, that you can lose 90% of the formaldehyde in embalming and never notice the difference, except for the reduced exposure, reduced cancer risk and the elimination of noxious odor. Sorry — the fat lady has already sang for formaldehyde and it ain't pretty. And, I think, that's a good thing.

In conclusion, my opinion was and still is that CJD embalming can be done and with acceptable levels of safety for the embalmer. I suggest following my previous and current embalming protocol recommendations, that I define as Extreme Precautions, as a way to minimize risk during the embalming and maximize effectiveness of the sanitation/disinfection chemicals used in embalming. And yes, I had then and have now, extensive documentation to back up my beliefs and opinions concerning this situation. Of course, it's all my personal opinion and analysis of the research literature, but I have a bad feeling that I am right. Finally, as always, embalm smart, embalm safe.

After all this, still not convinced? Just can't see the logic of walking away from formaldehyde, bleach and all that jazz, like we always have used — for, well — forever? In that case, I wish you the best of luck, I really do. The next time you jump into that vintage 1932 FormaldaCoupe with a jug of bleach on the rumbleseat and hit the bricks on The Old National Road, you be sure and cinch that rope up — good and tight.