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Left: An example of 'burnt' tuna flesh – as discovered in the author's 106kg southern bluefin tuna 10 hours after it was boated in cool conditions off South Australia.
Above: This is how tuna flesh should look when the fish has been brain spiked, bled, cored and then quickly chilled in an ice slurry.

'Burnt' tuna – and how to prevent it

Catching a huge tuna, perhaps a southern bluefin weighing over 100kg, is a very special moment, probably one you've dreamt about for a long time. Exhausted, but elated as you look at your prize fish lying on the deck, your thoughts begin to savour the many meals you'll share with family and friends, recounting the epic battle many times over.

However, that euphoria later wanes when you begin filleting your tuna and notice that instead of the glistening, translucent redness you were expecting, parts of the muscle appear much paler than normal. While some of the muscle

is still a deep red, your knife also reveals flesh that looks green. The tuna fought long and hard, so you cannot imagine it was disabled with a disease, but some of the muscle looks terrible. More than half of your superb tuna is looking inedible.

The fact is that your tuna did not have a disease, at least not an infectious one. It was affected by what is scientifically described as exertional rhabdomyolysis, more colloquially known as 'burnt tuna'. The Japanese name for it is *yake-niku*, which when translated means 'spontaneously done meat'.

Fortunately, most recreational anglers have never seen such a dramatic example of this condition as shown in these photos, although it is well known among commercial fishermen targeting bigger tuna. Studies have estimated that up to 25% of yellowfin tuna caught commercially by handliners off Hawaii, and around 20% of southern bluefin tuna commercially caught off New Zealand were affected to some extent by this condition.

The condition develops during the capture of the fish and continues after it dies. The stress of capture, reduced oxygen to the muscle and changes in other metabolic processes leads to an accelerated deterioration and degeneration of the tuna's muscle fibres. While it looks unappealing, it can still be eaten, although affected muscle generally has a sour taste and is considered of very poor quality.

The photos shown here are of a 106kg southern bluefin tuna that was caught recreationally in April off Port MacDonnell, South Australia. Around half its muscle was severely affected. Microscopic analysis revealed the affected muscle had developed exertional rhabdomyolysis, or in other words it was 'burnt'.

While there is no doubt that the condition

is linked to the stress of capture, there is still some debate over what exact processes occur within the fish that lead to such rapid deterioration in the muscle. Some tuna may also be more prone to developing the condition, with one study suggesting that female fish were more commonly affected than male fish, as were fish with low energy reserves, such as after undergoing a long-distance migration. Interestingly, a similar condition has been reported overseas in yellowtail, *Seriola quinqueradiata*, which is related to Australia's yellowtail kingfish.

There are no guarantees that the condition will not affect a tuna you catch. However, there are a number of things you can do to minimise the chances of it occurring:

- Use tackle that enables you to catch your tuna quickly.
- Immediately kill the fish when you get it aboard, either by spiking its brain or stunning it and then bleeding. Always bleed the fish after spiking or stunning.
- Insert a wire, fibreglass rod or length of heavy monofilament leader down the spinal cord of the fish. This can easily be inserted into the spine after exposing it with a small section cut from the fish's forehead, or with a coring device. This helps prevent muscle twitching that may otherwise continue even after the fish is brain dead.
- Cool the fish as quickly as possible by removing the gills and gut and getting the whole fish into an ice slurry, which is much more effective than ice alone.

Watch out for more details on these techniques and other ways to look after your fish in upcoming *BlueWater* articles.

– **Dr Paul Hardy-Smith**
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The author's 106kg southern bluefin tuna, shown here soon after capture off South Australia's Port MacDonnell in April.