Radioactive measurement of feces, blood, liver, brain or fat tissue
A Comparison of Dissolvation with Combustion

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Abstract
Combustion of tissue is the most used technique to determine the amount of radioactivity. This combustion technique is very labour intensive and therefore a search for alternatives was made. Feces and blood were directly dissolved with Soluene® 350. Liver, brain and fat were dissolved with Soluene® 350 and the Adaptive Focused Acoustics wave technique of Covaris. The solubility technique gave a recovery of 95-110% of the values found with combustion.

Introduction
To measure the amount of radioactivity in feces, blood, liver, brain or fat samples, it is necessary to process these samples before submitting them to liquid scintillation counting. As an alternative to sample combustion, these samples may be dissolved.

Feces samples were obtained from rats dosed with a 14C labeled compound and liver, brain and fat samples were obtained from a dog dosed with the same 14C labeled compound. Blank rat blood was spiked with a 14C labeled compound.

Covaris instrument
The Covaris Adaptive Focused Acoustics (AFA) process works by sending acoustic energy wave packets from a dish-shaped transducer (figure 1) that converges and focuses to a small-localized area, creating intense mixing. At this focal point, the energy density may be controllably focused into the sample of interest (figure 2). The Covaris acoustic transducer operates at 500khz with a wavelength of ~1mm, unlike conventional sonics which has a wavelength of ~100mm. This enables the acoustics energy to be exactly directed in a non-contact and isothermal mode.

Sample preparation
Combustion
Of each sample 200 mg was weight in duplicate in combustion cones. Radioactivity in the weighed aliquots was determined after combustion and trapping of liberated 14CO2 in an alkaline medium, and addition of a suitable liquid scintillation cocktail to the entrapment medium with liquid scintillation counting.

Dissolvation (feces and blood)
• Add 2 ml Soluene® 350 to each glass scintillation vial including backgrounds
• Place samples in an oven (45-55°C) for 72hrs
• Let the samples stand overnight prior to liquid scintillation counting

Covaris (liver, brain and fat)
• Add 2 ml Soluene® 350 to each glass scintillation vial including backgrounds
• Place samples in the Covaris with a cycle of 10 seconds on 10 seconds of for 5 minutes
• After cooling samples to room temperature add 15 ml Hionic-Fluor™ to each vial
• Let the samples stand overnight prior to liquid scintillation counting

Criteria
The recovery was calculated by dividing the measured radioactivity after dissolving with the measured radioactivity after combustion. The dissolvation procedure was accepted if the recovery was 100%±10% of the values found with combustion.

Results
The amount of radioactivity was determined with combustion and dissolvation / Covaris for all tissues. In figure 3 the measured amounts are given.

<table>
<thead>
<tr>
<th>Tissue</th>
<th>Recovery (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faeces</td>
<td>101</td>
</tr>
<tr>
<td>Liver</td>
<td>100</td>
</tr>
<tr>
<td>Brain</td>
<td>96</td>
</tr>
<tr>
<td>Fat</td>
<td>110</td>
</tr>
<tr>
<td>Blood</td>
<td>95</td>
</tr>
</tbody>
</table>

Table 1: Recovery

Conclusion
• Direct dissolving blood and feces followed by LSC gave comparable values (95% and 101% resp.) when compared to combustion results
• Dissolving liver, brain and fat tissue with Adaptive Focused Acoustics and measured with LSC gave comparable values (100%, 98% and 110% resp.) when compared to combustion results
• Time saving and simple in use
• Combustion can be replaced by dissolving with only Soluene® 350 (feces and blood) or together with Covaris (other tissues)

References
1. website http://www.covarisinc.com/how_it_works.htm