Introduction
Assessment of electrocardiogram (ECG) is commonplace in dog toxicology studies. However, the standard ‘snap-shot’ technique has significant limitations that impact data quality and hazard identification. To overcome these limitations we evaluated a non-invasive telemetry system for ECG acquisition in freely moving singly and group housed dogs treated with moxifloxacin a fluoroquinolone antibiotic known to cause QT prolongation (Chen et al 2005).

Objectives
- Evaluate the ability of a non-invasive telemetry monitoring system (EMKA I/OX and EMKA ECG Auto) for detecting and quantifying changes in ECG parameters in response to moxifloxacin administration in conscious freely moving dogs.
- Identify the time period required for dogs to acclimatise to the jackets and collars required for non-invasive telemetry monitoring.
- Assess the quality of the ECG data collected by comparing the signals acquired and the response detected to data collected from an internalised telemetry device.
- Determine if animals can be group housed when using a non-invasive telemetry system.

Methods
Male (n=3) and female (n=3) beagle dogs, were acclimatised (over 3 days) to the jackets and collars required for the EMKA Non-Invasive Telemetry System. Male (n=3) and female (n=3) beagle dogs, were acclimatised (over 3 days) to the jackets and collars required for non-invasive telemetry monitoring. Male (n=3) and female (n=3) beagle dogs, were acclimatised (over 3 days) to the jackets and collars required for non-invasive telemetry monitoring.

Figure 1 Position of ECG Electrodes and the jacket and collar required for the EMKA Non-Invasive Telemetry System

Results
- Singly housed (all animals) and group housed (5 out of 6 animals) were successfully acclimated within the 3 day period.
- A reduction in food consumption (20 – 35 %) was observed following administration of moxifloxacin at 30 mg/kg. No treatment related changes were noted in clinical signs or body weight.
- Dosing with moxifloxacin at 30 mg/kg produced a reduction (10 - 11 msec) in PR interval at 30 mins to 10 hrs post dosing (Fig.3).
- Moxifloxacin at 30 mg/kg resulted in a sustained prolongation of QT and QTc interval (18 - 22 msec) from 0.5 hrs to 20 and 22 hrs post dosing, respectively.
- The pre-dose heart rates obtained from animals using non-invasive telemetry recording can be achieved in 3 days.
- The QT prolongation observed in response to moxifloxacin in this study is similar in magnitude and duration to the effect observed when using internalized telemetry in a previous Safety Pharmacology study and the effects reported in the literature (Chen et al 2005. Mittelstadt & Hart, 2005).
- The QT prolongation observed in response to moxifloxacin in this study is similar in magnitude and duration to the effect observed when using internalized telemetry in a previous Safety Pharmacology study and the effects reported in the literature (Chen et al 2005. Mittelstadt & Hart, 2005). Effects of moxifloxacin on QT interval in conscious freely moving dogs, when both singly and group housed.
- Acclimatisation of dogs to the jackets and collars required for non-invasive ECG recording can be achieved in 3 days.

Discussion
- The QT prolongation observed in response to moxifloxacin in this study is similar in magnitude and duration to the effect observed when using internalized telemetry in a previous Safety Pharmacology study and the effects reported in the literature (Chen et al 2005. Mittelstadt & Hart, 2005).
- The pre-dose heart rates obtained from animals using non-invasive telemetry were lower (65 to 75 bpm) compared to the average heart rates obtained from the current method used to monitor ECG in toxicology studies (110 bpm) (Tab.1).
- A non-invasive telemetry monitoring system can be successfully used to detect and quantify changes in ECG parameters in response to treatment in conscious freely moving dogs, when both singly and group housed.
- Acclimatisation of dogs to the jackets and collars required for non-invasive ECG recording can be achieved in 3 days.

Table 1 Comparison of the Predose Heart Rate Values Observed with Non-Invasive (n=6) and Internalised (n=4) Telemetry Systems (DSI).

<table>
<thead>
<tr>
<th></th>
<th>Non-Invasive</th>
<th>Internalised</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heart Rate</td>
<td>Approx. 110 bpm</td>
<td>Approx. 75 bpm</td>
</tr>
<tr>
<td>Predose Heart Rate from Singly Housed Animals</td>
<td>Approx. 75 bpm</td>
<td>Approx. 65 bpm</td>
</tr>
<tr>
<td>Predose Heart Rate from Group Housed Animals</td>
<td>Approx. 110 bpm</td>
<td>Approx. 75 bpm</td>
</tr>
</tbody>
</table>

References