

# RetroMAD1®

## Proven efficacy against Feline Leukemia (FeLV)

**Summary:** Feline Leukemia (FeLV) is a medically important disease of cats. The cat's health progressively deteriorates and is almost always fatal within 6 – 12 months after the initial clinical signs. The major organ affected is the bone marrow leading to multiple blood disorders like anemia, leukemia, neutropenia and thrombocytopenia. Today, there is hope for cats suffering from FeLV. RetroMAD1 is the first antiviral protein issued from recombinant technology that was reported in the Archives of Veterinary Science and Medicine, 2019; 2(4) and showed significant improvement in the survival rate of FeLV-positive cats with clinical signs. These cats treated with an oral dose of RetroMAD1 daily for 30 days had more than double the chance of surviving with a good quality of life vs. cats not treated with RetroMAD1. In another study, unpublished, survival rate of cats treated with an oral dose of RetroMAD1 daily for 90 days, improved to 90%.

### Feline Leukemia (FeLV)

FeLV is a retrovirus, belonging to the same family as the Human Immunodeficiency Virus (HIV), the causal agent of AIDS. FeLV is a common infectious disease in cats. In cats that are ill or at high risk, infection rates can be as high as 30%. Cats that show clinical signs will deteriorate progressively<sup>1</sup>. The disease is almost always fatal within 6 – 12 months after clinical signs, primarily due to blood disorders, appear. FeLV is highly contagious, particularly in kittens, and is readily spread among cats in casual close contact, which include sharing food and water as well as mutual grooming and cat fights<sup>2</sup>. The virus can be transmitted from infected mother cat to her kittens, either before they are born or while they are nursing<sup>1</sup>. Like HIV-positive humans, FeLV-positive cats are carrier of the virus for life. The virus may disappear from the blood but remains integrated in the DNA of the immune cells. This is called the regressive stage and the cat remains healthy and active. In the literature, when a cat develops clinical signs of FeLV infection, treatment is mainly symptomatic and palliative, meaning that there is no antidotal treatment like antibiotics to treat bacterial infections. There are vaccines available but they are not 100% protective and do not form part of the core vaccination program<sup>2</sup>. This could be because FeLV occurs in nature not as a single genetic species but as a complex family of closely related viruses<sup>3</sup>.

### RetroMAD1®: The first antiviral to successfully treat clinical cases of FeLV-positive cats

#### What Is RetroMAD1?

RetroMAD1 is an antiviral molecule that is designed from 3 naturally occurring antiviral peptides using recombinant technology and synthesized by a genetically modified microorganism which has a GRAS status, purified and refolded to make it highly bioactive<sup>4</sup>. Bioactivity consists of inhibiting entry of the virus into the susceptible cells, disrupting the viral replication process in the cell and formation of the lipid membrane of the virus. The resultant molecule has many advantages over its original antiviral peptides, the most important application being its ability to withstand gastric digestion<sup>5</sup> and hence can be given orally. Oral medication presents ease of use and, consequently, higher pet owner compliance than the current interferon medication *via* intravenous route that requires hospitalization of the patient<sup>6</sup>.

**Saving lives by applying recent advancement in genomics and proteomics on infectious diseases that have no cure today**

### What were the outcomes of the trial reported in Archives of Veterinary Science and Medicine, 2019; 2(4)?

In the published paper, a total of 76 FeLV-positive cats with clinical signs were recruited for the trial by the University Federal Rio de Janeiro, Brazil. The reason the trial was conducted in Brazil was because of the high prevalence rate of FeLV (47.2%), thereby making recruitment easy. All cats were given symptomatic and palliative treatment as per standard protocol. Based on owners' consent, 55 cats were randomly selected to be treated with RetroMAD1 (RMD1) at 0.4mg/kg/day, 2 doses at 12-hour interval and for 30 days and the remaining 21 cats were not. Other than survival rate recorded up to 173 days, scoring of clinical signs – gingivitis, F.U.R.D. and anemia – as well as the standard blood parameters recommended for FeLV infected cats were monitored monthly. The results obtained from this trial demonstrated the efficacy of RMD1 in controlling the disease. Cats that were treated with RMD1 had a superior quality of life vs. those not treated with RMD1.

|  | Cats treated with RMD1 | Cats not treated with RMD1 |
|--|------------------------|----------------------------|
| % of cats survived 173 days post-treatment | 73%                    | 33%                        |

Observation for cats not treated with RMD1 ceased at 173 days for ethical reasons. The survival rate of untreated cats would have decreased further while all treated cats that survived, thrived with a better quality of life up to the end of the second observation period of 433 days, based on the Kaplan-Meier curve.

| Clinical signs score showed improvement | Cats treated with RMD1 |                       |
|---|------------------------|-----------------------|
|   | Day 1 of treatment     | Day 90 post-treatment |
| • Gingivitis ( $p < 0.001$ )            | 0.8                    | 0.2                   |
| • F.U.R.D. ( $p < 0.05$ )               | 0.5                    | 0.2                   |
| • Anemia ( $p < 0.05$ )                 | 0.3                    | 0.1                   |

In this study, the blood parameters were within the normal bands between day 1 and day 90 for the cats treated with RMD1. However, hematocrit was shown to improve by 2% ( $p < 0.05$ ) at day 90.

### RetroMAD1®: Key take-away messages

1. RetroMAD1 is indicated as the treatment of first choice for FeLV.
2. The current published paper reported good efficacy of RetroMAD1 in improving the survival rate and extending the quality of life of cats suffering from FeLV.
3. Based on the published paper and in another study<sup>5</sup>, the dose recommendation is preferably adjusted to 0.6 mg/kg, 3 doses daily for 90 days. The survival rate improves to 90%.
4. In a separate safety study, the No Effect Level (NoEL) of RetroMAD1 is at least 500 times the recommended dose of 0.6 mg per kg of body weight in cats<sup>5</sup>.

### References

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3. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3187695/>
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5. RetroMAD1 FeLV study: internal data
6. <https://www.ema.europa.eu/en/medicines/veterinary/EPAR/virbagen-omega>

RetroMAD1 2019.001.FeLV

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