

ASX Release

6<sup>th</sup> March 2015

**The American Association for Cancer Research (AACR) Accepts  
Late-Breaking Abstract for Presentation at the 2015 Annual Meeting in  
Philadelphia for PPL-1 (Monepantel or MPL)**

***Abstract Title: "Monepantel a new first in class potent inhibitor of P70S6K potentiates the anti-tumor effects of gemcitabine and doxorubicin: In vitro and in vivo studies."***

**PharmAust Limited** ("PharmAust") (ASX: PAA & PAAO) is pleased to report that it has received notification that its Late-Breaking Abstract has been accepted for presentation in a Poster Session at the American Association for Cancer Research (AACR) Annual Meeting 2015 and will be published in Part 2 of the 2015 *Proceedings of the AACR*. The abstract is attached in Annexure A.

The abstract highlights the anti-tumor activity of monepantel (PPL-1) in ovarian cancer through the attenuation of mTOR/P70S6K pathway and that emerging data indicates that mTOR inhibitors are most effective when combined with other target agents.

The Abstract further emphasizes that MPL (PPL-1) in combination with gemcitabine or doxorubicin synergistically reduced survival rates of a panel of malignant cells from different origins while having no additive effect upon non-malignant (normal) cell survival rates. It further describes in vivo, antitumor activity being observed in all treatment groups as compared to the mock-treated animals after 4 weeks of treatment. However combination therapy with MPL and chemotherapeutics significantly attenuated tumor growth, compared to monotherapy without showing any toxicity.

Professor David Morris, added, "This was particularly encouraging news as it highlights the current excitement associated with the mTOR-inhibiting class of drugs. Our team at the St George Hospital continues to provide strong supportive evidence to the studies of monepantel (PPL-1) in man".

PPL-1 is an approved veterinary drug launched in recent years by one of the leading global animal health corporations for the treatment of parasitic diseases in sheep.

The cancer chemotherapy market (estimated at \$42 billion/annum)\* is currently the fastest growing sector within the pharma industry, mainly driven by the identification of new potential therapeutic targets. This growth is further fuelled by the magnitude of the disease worldwide, currently estimated at more than 25 million people suffering from cancer globally, and an estimated 5 million people dying each year from the disease.

\*Reference: Research and Markets.com accessed 14<sup>th</sup> February 2014:

[http://www.researchandmarkets.com/reports/335548/chemotherapy\\_market\\_insights\\_20062016\\_a](http://www.researchandmarkets.com/reports/335548/chemotherapy_market_insights_20062016_a)

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## ANNEXURE A

### **Monepantel a new first in class potent inhibitor of P70S6K potentiates the anti-tumor effects of gemcitabine and doxorubicin: In vitro and in vivo studies.**

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**Aims:** Monepantel (MPL) is a new nematode-specific anthelmintic agent. We have recently communicated the preliminary results showing the anti-tumor activity of this agent in ovarian cancer through attenuation of mTOR/P70S6K pathway. As emerging data indicate that mTOR inhibitors are most effective when combined with other target agents, we evaluated whether MPL could favorably be combined with the clinically approved chemotherapeutic agents to improve therapeutic efficacy.

**Methods:** The effects of MPL and/or chemotherapeutic agents gemcitabine (Gem)/ doxorubicin (Dox) on the growth of a panel of cancer cell lines were determined using SRB assay. In vitro drug synergy was determined using combination index (CI) methods derived from Chou-Talalay equations using CalcuSyn software. For in vivo studies, we evaluated the effect of MPL, alone and in combination with Gem/ Dox on the growth of established human ovarian (OVCAR-3) tumors implanted subcutaneously in BALB/C nude mice. Toxicity was evaluated measuring animal weight. In vivo combination effects was determined using Fractional Tumor Volume (FTV) method.

**Results:** In vitro, MPL in combination with Gem or Dox synergistically reduced survival rates of a panel of malignant cells from different origins while having no additive effect upon non-malignant cell (HOSE) survival rates. In vivo, antitumor activity was observed in all treatment groups compared to the mock-treated animals after 4 weeks of treatment. However combination therapy with MPL and chemotherapeutics significantly attenuated tumor growth, compared to monotherapy without showing any toxicity. Combining MPL (50 mg/kg) increased the tumor inhibitory effect of low dose Gem (2 mg/kg), high dose Gem (5 mg/kg), low dose Dox (2 mg/kg) and high dose Dox (5 mg/kg) by 32.29, 35.1, 15.2 and 24.38% respectively. Moreover, MPL (25 mg/kg) enhanced the tumor inhibitory rate of Gem (5 mg/kg) by 36.26%. These resulted in complete tumor growth inhibition in Gem 5 mg/kg + MPL 25 or 50 mg/kg and Dox 2 or 5 mg/kg+ MPL 50 mg/kg treatment groups. Assessment of therapeutic synergy with FTV method revealed strong synergy in Gem 5 mg/kg + MPL 25 or 50 mg/kg, Gem 2 mg/kg + MPL 50 mg/kg and Dox 2 or 5 mg/kg+ MPL 50 mg/kg treatment groups with odds ratio of 2.48, 2.59, 1.48, 1.63 and 2.97 (>1 indicates synergy) respectively.

**Conclusion:** These findings provide a rational to further investigate MPL in combination with standard chemotherapeutics as novel combination regimens which could hopefully provide strong anticancer synergy.