**////Title: The Power of Traditional Chinese Medicine in Cardiac Care**

**////Stand-first**:

Traditional Chinese Medicine has been used in the treatment of disease for centuries, although its potency is often overlooked by researchers. Dr Yu-Ling Ma and colleagues in the Oxford Chinese Medicine Research Centre at the University of Oxford have focused on a multi-component herbal medicine called Xin Su Ning in the treatment of cardiac arrhythmia to elucidate the mechanism of action and pharmacological properties of its components.

**////Body text:**

The practice of Traditional Chinese Medicine (or TCM) has evolved over thousands of years and is guided by comprehensive theories which aim to achieve a restoration of balance in the body. To date, TCM has facilitated the successful treatment of numerous recognised human medical conditions.

Whilst the efficacy of TCM is evidenced by many years of remedial practice, its value in the modern medical world remains disputed by the mainstream due to a poor understanding of its mechanistic actions and efficiency in treating disease in comparison to its clinically endorsed counterparts.

In a recent review, Dr Yu-Ling Ma and colleagues at Oxford University’s Chinese Medicine Research Centre explain the origins and development of Xin Su Ning (XSN), with a particular focus on arrhythmias caused by a build-up of phlegm and heat in certain areas of the body, as defined by TCM theory. They further describe their own findings regarding the study of individual components of the formula. Using conventional drug discovery research methods, they were able to establish the mechanisms of action and the pharmacological properties of XSN components and compare the efficacy of XSN to other antiarrhythmic medicines. More recently, a novel multichannel system encompassing a computational prediction model to aid in the quantitative analysis of TCM has been developed and tested by the team to confirm their results.

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Whilst the standard prescribed treatments for cardiac diseases are undoubtedly invaluable, there are concerns regarding potential toxicity and the emergence of adverse side effects with long-term usage. Moreover, advances in medical expertise indicate that many diseases are caused by multiple genetic defects, which therefore require multi-constituent medicines, meaning that drug research and development has become more time-consuming and costly. This necessitates the identification of alternative therapies. Capitalising on the multicomponent nature of TCM makes XSN an ideal prospective candidate, as advocated by Dr Ma in her formidable pursuit to promote TCM as a viable and widely accepted medicinal option.

Cardiac arrhythmias may stem from a variety of causes, including coronary and hypertensive heart disease and viral myocarditis. There are serious health concerns related to arrhythmias, many of which are worsened with drug treatment, particularly in those who are vulnerable. Therefore, the discovery and development of well-tolerated, safe treatments with minimal side effects is imperative. To this end, the use of TCM to treat arrhythmias is potentially highly advantageous.

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In their review, Dr Ma and colleagues explain that XSN is composed of eleven separate herbal elements which together exert powerful antiarrhythmic effects in the control of abnormal heart rhythms. The formula is based upon a distillate which has been used to successfully treat patients for over three decades and was approved in China for clinical grade production and use in 2005 for the treatment of specific arrhythmias.

Prior to certification, initial studies by research scientists across several institutions demonstrated that XSN significantly suppressed arrhythmia induced by numerous chemical agents, delayed the onset of abnormal heart rhythms, and shortened the time of cardiac disturbances. At all doses used, XSN was found to inhibit arrhythmia-related disorders. Additionally, total cholesterol levels were reduced, blood viscosity and clotting factors were regulated, and red blood cell levels were normalised.

To investigate the toxicity of XSN, animal studies involving hugely inflated doses were conducted, which showed no pathological changes or adverse reactions in the organs and bodily systems of any of the participants.

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Using cellular electrophysiological techniques to assess the effect of XSN on isolated heart cells, Dr Ma and colleagues established that XSN can regulate cardiac function via the modulation of potassium and sodium channels, and acts in a similar way to prescribed antiarrhythmic drugs. Furthermore, XSN displayed significant protective and restorative effects in injured heart muscle cells. Studies regarding the antiarrhythmic properties of XSN revealed that single chemical element contributed uniquely to the multicomponent mixture, highlighting its complex nature.

Pre-registration clinical studies performed at several Chinese organisations showed that XSN was able to significantly reduce the occurrence of the extra heartbeat experienced in premature ventricular contraction, also known as PVC, and offer increased symptomatic relief when compared to another TCM formula. Safety tests corroborated the results of animal studies and showed that XSN is indeed safe for treating arrhythmia in humans.

The review conducted by Dr Ma and colleagues proceeded to highlight several studies in which XSN was proven to be superior in effectively treating arrhythmia and improving the overall condition in patients with cardiac dysfunction. Indeed, a recently completed high-quality randomised controlled trial led by Professor Xin-Chun Yang in China was published with the support of the mechanistic research data obtained by Dr Ma’s research group at the University of Oxford. The clinical study found that XSN improved the frequency and symptoms of PVC, and that results were comparable to those seen using a prescribed antiarrhythmic compound.

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Due to its complex multicomponent nature, quantifying the integrity of TCM formulations has been challenging. However, the development of physiological modelling and computational algorithms have enabled Dr Ma and colleagues to predict the pharmacological actions of the components of XSN. Using a novel approach which measured the relative proportion of constituents within the formula, the team were able to decipher the precise integrative pharmacological mechanisms of XSN. Further, using a bespoke prediction calculator, they showed that the dominant target of components of XSN was the cardiac cellular pathway.

The extensive knowledge and practical experience associated with TCM may contribute to the evolution of effective, high-quality human medicines that induce minimal adverse reactions and promote personalised patient care. Using conventional cellular physiological research methods to confirm the characteristics and pharmacological properties of XSN has opened the door to further studies.

There is certainly scope for larger-scale research trials into the clinical efficacy and toxicological profile of XSN in comparison to other more conventional antiarrhythmic drugs. These may include an evaluation of quality standards, the effect of XSN on cardiac arrhythmias of varying origin, and an assessment of a broader spectrum of XSN components. Indeed, this may pave the way for novel pharmacological insights and potential accreditation of other TCM formulas for clinical use in a wide range of diseases, and with the esteemed Dr Ma at the helm of these ground-breaking developments, this is unquestionably an area of medicine with a promising future.

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This SciPod is a summary of the paper ‘Xin Su Ning – A Review of Basic and Clinical Pharmacology Integrated With Traditional Chinese Medicine Antiarrhythmic Theory’, from the journal Frontiers in Pharmacology. DOI: https://doi: 10.3389/fphar.2021.657484.

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