

Porous material for the detection of *Candida albicans*, its method of preparation and diagnostic method that use it

Market sector: diagnostics, biomaterials

Type of opportunity: licensing and/ or co-development

Scope of the problem

Candida albicans is an important human yeast pathogen that accounts for the majority of superficial and systemic infections caused by the *Candida* genus. The morbidity of invasive candidiasis has been increasing in recent years due to the widespread use of broad-spectrum antibiotics, hormone drugs, and immunosuppressants, while invasive treatment such as endotracheal intubation and mechanically ventilation is also an important risk factor.

Conventional *C. albicans* detection methods based on phenotype include blood culture, microscopic examination, and biochemical identification, however, they are time-consuming, labor-intensive with low sensitivity. The long period of waiting time required to diagnose *C. albicans* infection often leads to a delay in the start of treatment with antifungal drugs. Additionally, several molecular biological methods have been applied to the detection of *C. albicans*, such as polymerase chain reaction (PCR), mass spectrometry, and immunoassay. Nevertheless, these techniques are relatively complex and require expertise and expensive instruments. Thus, a simpler, more cost-effective method is needed.

Patient need addressed: Infection of *Candida albicans*

Our innovation:

- Design of a new porous controlled delivery material for the detection of *Candida albicans*
- The material may be mesoporous silica nanoparticles or nanoporous anodized alumina in the form of film or plate
- Modification of the external surface of the material with a molecular ensemble allows the design of gated delivery systems
- Method of preparation of the material
- Development of a fast and sensitive *in vitro* diagnostic method using the new molecular gated system

Competitive advantages: sensitive, fast and more cost-effective system, it can be used *in situ* during the patient medical consultation. No expensive instruments or expertised personnel are required. Early detection of the pathogen, diagnostic time decreases from 3-4 days to 10-15 min.

Market size/ opportunity: One-third of episodes of candidaemia occur in the intensive care units (ICU), *Candida albicans* was by far the predominant species, causing up to two-thirds of all cases of invasive candidiasis, with mortality rates of up to 60% in critically ill patients (Méan et al., 2008). Occurrence of infection in ICU was associated with significantly higher treatment cost (the median attributable cost of an infection is USD 1436) (Chacko B et al., 2017).

The *in vitro* diagnostic market is expected to be worth \$55.4bn worldwide by 2020 (Marketline, MLA10002-073, 05/2017).

Intellectual property

Spanish patent application P201731069 (September 5, 2017)

International patent application PCT/ES2018/070571 (August 23, 2018)