In 2013, we have seen a substantial consolidation of ISGlobal research capabilities and outputs, which constitute the core of its mission. The total annual output has stabilized in recent years at around 160 papers, with malaria and viral and bacterial infections as the leading topics. Overall, one out of every three new projects submitted was approved and financed. At present, we have 177 active projects, amounting to a total budget of 17 million euro.

Competitive funding has increased overall and we have been successful in obtaining competitive research funds from a broader range of new public and private sources (accounting for 40% and 60%, respectively). According to a recent report, for every euro provided by the Generalitat de Catalunya—CRESIB’s main contributing Trustee—more than eight euros were obtained from external research funding sources, making CRESIB the most effective health research centre in Catalonia.

In 2013, CRESIB’s first strategic cycle (2010-2013) was successfully completed and positively evaluated by its external Scientific Advisory Committee. Our translational activities have been strengthened with the creation of Innovex Therapeutics, a spin-off company oriented towards the creation of an exosome-based vaccine platform. At the same time, ISGlobal’s position as a leading research centre in Global Health has been reinforced by its designation as a WHO Collaborating Centre for Malaria Control, Elimination and Eradication.
**Main Active Research Projects**

**"A phase III study to evaluate, in infants and children, the efficacy of the RTS.S/AS01E candidate vaccine against malaria disease caused by *P. falciparum* infection, across malaria transmission settings in Africa"**

- PI: Pedro L. Alonso
- Funding Institution: PATH/MVI
- Funding: 9.6 M$
- Calendar: 2009-2013

**MiPPAD - “Evaluation of alternative antimalarial drugs to sulphadoxine-pyremethamine for intermittent preventive treatment in pregnancy (IPTp) in the context of insecticide treated nets”**

- PI & coordinator: Clara Menéndez
- Funding Institutions: EDCTP, Malaria in Pregnancy Consortium (MiPc) and Fondo de Investigaciones Sanitarias (FIS)
- Funding: 6.6 M€
- Calendar: 2008-2013

**SYSMALVAC - “Identifying correlates of protection to accelerate vaccine trials: systems evaluation of two models of experimentally-induced immunity to malaria”**

- PI & Coordinator: Carlota Dobaño
- Funding Institution: FP7 European Union
- Funding: 2.8 M€
- Calendar: 2013-2015

**GAMA - “Development of novel gastrointestinal biomarkers for use in HIV incidence determination in a sub-Saharan African setting”**

- PI and Coordinator: Denise Naniche
- Funding Institution: Bill & Melinda Gates Foundation
- Funding: 1 M$
- Calendar: 2012–2016

**Understanding RTS,S malaria vaccine-induced protection through integrated analysis of antibody, T Cell and T Cell immune responses”**

- PI & Coordinator: Carlota Dobaño
- Funding Institution: NIH
- Funding: 3 M$
- Calendar: 2012–2017

**CaDMIA – “Validation of the Mini-mally Invasive Autopsy (MIA) tool for cause of death investigation in developing countries”**

- PI and Coordinators: Quique Bassat, Clara Menéndez and Jaume Ordi
- Funding Institution: Bill & Melinda Gates Foundation
- Funding: 1.4 M$
- Calendar: 2013-2015

**TRANSEPI - "The Comparative Epidemiology of *P. falciparum* and *P. vivax* transmission in Brazil, Thailand and Papua New Guinea”**

- PI & coordinator: Ivo Mueller
- Funding Institution: Bill & Melinda Gates Foundation
- Funding: 3.5 M$
- Calendar: 2012–2015

**COMBACTE - “Combating Bacterial Resistance in Europe”**

- PI: Jordi Vila
- Funding Institution: Innovative Medicines Initiative (IMI), European Union
- Funding: 2.5 M€
- Calendar: 2013–2020

**Innovation**

Heparin-lipidic nanoparticle conjugates.

- Inventors: Fernàndez-Busquets, X., Marques, J., Moles, I.
- Institutions: IBEC, CRESIB
- Ref. number: EP13152187.4
- Priority countries: Europe
- Filing date: January 22, 2013

**Articles & Reviews**

157

% in First Quartile: 67%

% in First Decile: 33%

Normalized impact 2007-11*: 2.09

* Scimago Institutions Ranking 2013
Despite being an entirely preventable and treatable disease, malaria is still a serious health burden in large areas of the world—particularly sub-Saharan Africa—and in two of the most vulnerable population groups: children and pregnant women. Thanks to new tools and an increase in the available resources, we have witnessed spectacular progress over the last decade. However, the evidence shows that as soon as efforts relax the situation once again deteriorates. This is why the only long-term, sustainable solution is the complete elimination of the parasite in a given territory. In ISGlobal, the Malaria Elimination Initiative is the lynchpin for efforts focused on the elimination of this parasitic disease.

Main Lines of Research

- Enabling technologies for malaria research
- Parasite biology
- Phytopathology
- Malaria immunology
- Diagnostics
- Evaluation of preventive and therapeutic tools
- Epidemiology and clinical presentation of Plasmodium falciparum and Plasmodium vivax
- Vector biology and control
- Novel approaches and strategies for malaria elimination

Main Results 2013

- We assessed the performance of six multiplex commercial kits in the quantification of cytokine and chemokine responses in culture supernatants from P. falciparum stimulations. Luminex-based kits with magnetic beads were found to have the best performance (Moncunill et al., PLoS One, 2013a).
- Heparin was found to bind with high specificity to P. falciparum-infected red blood cells versus non-infected red blood cells. This finding opens the way for the design of heparin-based nanotherapies for the targeted delivery of antimalarial drugs (Valle-Delgado et al, Nanoscale, 2013).
- We reported the first evidence of the presence of sugar nucleotides in the blood stages of P. falciparum and described the active metabolic routes involved in their biosynthesis. In addition, the de novo route of GDP-Fuc, a metabolite probably involved in the biosynthesis of novel fucosylated glycans not yet described in the malaria parasite, was characterised (Sanz et al, J Biol Chem, 2013).
- It was demonstrated that malaria parasites can become resistant to toxic compounds such as drugs as a result of epigenetic switches in the expression of genes necessary for the formation of solute channels (Sitra-Martinez et al, Cell Microbiol, 2013).
- Antibody responses to P. falciparum in pregnant women were shown to be affected by variables that influence the risk of exposure to the parasite, such as parity, season and neighbourhood. HIV infection modifies these associations between exposure and antibody responses, probably through its impact on the maintenance of IgG responses (Mayor et al, JID, 2013).
- Different antimalarial compounds were assessed in two studies. Artemether/lumefantrine (AL) was found to be an acceptable, interim option for young children in co-endemic areas where P. vivax is resistant to chloroquine. AL produces a rapid clinical response against both P. falciparum and P. vivax malaria. However, it is associated with a high rate of P. vivax recurrent clinical episodes, and should therefore ideally be complemented with a course of primaquine (Senn et al, CID, 2013). Furthermore, analyses of different dhfr-dhps resistance to P. vivax do not show cross-resistance to the formulation in a wide range of transmission settings. Treatment failure was associated with a lower dose of primaquine, particularly in young children, suggesting that there is potential for further dose optimisation (WorldWide Antimalarial Resistance Network-DP Study Group, PLoS Med, 2013).

Malaria Elimination Initiative

- Advances in the development of an in vitro culture system for P. vivax were reported (Fernandez-Becerra et al, Mem Inst Oswaldo Cruz, 2013; Martin-Juilar et al, Malar J, 2013).
- A novel computational approach was used to redefine the subtelomeric vir superfamily of P. vivax. This methodology, resource and new classification of vir genes will contribute to a new structural framing of this multigene family and other multigene families in malaria parasites (Lopez et al, BMC Genomics, 2013).
- In a study undertaken to describe clinically relevant cytoadhesive phenotypes of P. vivax, rosetting was shown to be a frequent cytoadhesive phenotype in P. vivax infections associated with an increased risk of anaemia. No specific cytoadhesion phenotypes associated with pregnancy were observed, although a P. vivax haplotype was more frequent among pregnant women than non-pregnant hosts, suggesting that other, as yet unknown, parasite phenotypes may increase the propagation of certain P. vivax clones observed in pregnant hosts (Martin-Menéndez et al, PLoS Negl Trop Dis, 2013).
- In areas where P. vivax and P. falciparum are co-endemic, immunity to P. vivax seems to be acquired more rapidly. The high number of P. vivax clones that infect children in early childhood was shown to be likely to contribute substantially to the rapid acquisition of immunity against clinical P. vivax malaria (Koepfl et al, PLoS Negl Trop Dis, 2013). In addition, in a cohort of Papua New Guinea children aged 1 to 3 years, the presence of antibodies to Merozoite Surface Protein 3a (PvMSP3a) Block II and Merozoite Surface Protein 9 (PvMSP9) N-terminus was shown to be associated with protection against clinical P. vivax malaria. This suggests that (PvMSP3a) Block II and...
Reduced these processes.

Age- and exposure-dependent immune responses to Plasmodium infections may be the key to understanding the role that age and exposure play in the acquisition and maintenance of naturally acquired immunity to malaria. We evaluated immune responses (cytokines, chemokines and IgG levels against blood stage proteins) using flow cytometry and Luminesin in plasma from Mozambican adults and children and European adults living in Spain who had visited Africa (travellers) or lived there for at least one year (migrants). Our findings indicate that age does not play an important role in the immune response to a first malaria episode. Migrants had a different cytokine/chemokine and antibody profile compared to immune adults, but also to naïve adults. Upon cessation of malaria exposure, IgG responses to malaria-specific antigens were maintained to a large extent, although the conservation and magnitude of the recall response depended on the nature of the antigen. However, control of pro-inflammatory responses and tolerance to P. falciparum appeared to be reduced (Moncunill et al, PLoS One, 2013 b,c,d).

The influence of temperature on the effectiveness and toxicity of chemical insecticides was established, providing information pertinent to the impact of vector control tools. In particular, data on the impact of temperature variations throughout the day led the authors to suggest that testing recommendations for new tools should include a broader range of temperatures so as to allow their deployment in different environments. (Ghiant et al, PLoS Pathog, 2013). Daily fluctuations in habitat temperature were also studied in relation to vector fitness. It was shown that a cool mean temperature significantly increased larval development and survival, whereas warm temperatures reduced these processes. These findings are essential to understanding the distribution limits of vectors and their response to climate change (Pauenjans, Global Change Biology, 2013).

Malaria epidemiology on Lihir Island, Papua New Guinea, was investigated. A substantial reduction in the prevalence and incidence of P. falciparum and P. vivax was found in villages adjacent to a mining area where an integrated malaria control intervention had been implemented. In other areas of the island, parasitaemia levels remained high. The observed reduction confirmed the positive impact of malaria interventions on transmission patterns (Mitjà et al, Malaria Journal, 2013).

The economic burden of malaria in children under five years of age was estimated in three sub-Saharan African countries. Both direct and indirect costs were calculated. The findings may assist policy makers in the design and introduction of future malaria control interventions, help to guide the introduction of new prophylactic measures and improve the current strategies for malaria control (Securi et al, Malaria Journal, 2013).

Strategic thinking on the key challenges and prospects for malaria control and elimination highlighted the risks posed by insecticide and drug resistance, weak health systems and declining funding, while stressing the importance of further R&D to improve malaria control and progress towards elimination. The authors also emphasized the need to address both P. falciparum and P. vivax in any elimination campaign (Alonso and Tanner, Nat Med, 2013).

Because of the potential for transmission and chronic health complications, Chagas disease clearly affects the health of Latin American immigrants living in Spain, where the disease is not endemic, and the Spanish health system. Since 2002, we have been involved in research on this imported disease in Spain. In 2008, we launched an intervention strategy in Bolivia, the endemic country most affected by this neglected disease.

Main Lines of Research
- Epidemiology of Chagas disease in non-endemic areas
- Biomarkers for therapeutic efficacy in treated patients and early diagnosis of cardiac damage in patients with Chagas disease
- Clinical trials for new drugs to treat Chagas disease parasitologically
- Studies on the pharmacokinetics of benznidazole

Chagas Disease

Main Results 2013

- Migratory flows have facilitated the spread of Chagas disease into areas where it was previously unknown. Economic, social and cultural factors play a significant role in the presence and perpetuation of the disease. We undertook a systematic review to provide a comprehensive overview of the qualitative research on Chagas disease in both endemic and non-endemic countries. Most interventions do not address clinical, environmental, social and cultural aspects together. Therefore, an explicitly multidimensional approach, incorporating the experiences of people affected by Chagas disease, is a potential tool for the development of successful long-term programmes (Ventura-García et al, PLoS Negl Trop Dis, 2013).

- Following our work on biomarkers, we evaluated an ELISA test based on a mucin glycoprotein antigen from Trypanosoma cruzi. This technique, which allows the serological detection of lytic antibodies against the parasite, proved to be highly sensitive and specific. This assay can therefore be used to detect active T. cruzi infection and to monitor trypanosomicidal treatment (Iaquirold et al, Mem Inst Oswaldo Cruz, 2013).

- Immunosuppression, which has become an increasingly common clinical condition in recent years, modifies the natural history of T. cruzi infection in most patients with Chagas disease. Parasitaemia is the most important defining feature of reactivation. We analysed the relationship between Chagas disease and immunosuppressive conditions and provided recommendations for the management of these patients based on our experience and on the data in the literature (Pinazo et al, PloS Negl Trop Dis, 2013).

Cure biomarkers are crucial in assessing the efficacy of antiparasitic drugs in clinical trials. The lack of a reliable method to do so for assessing whether Chagas disease has been
Maternal, Infant and Reproductive Health

Global health indicators show that maternal health is still the area in which the greatest inequities persist. Every year, around 287,000 women die as a result of complications related to pregnancy, childbirth or the postpartum period, and more than eight million children under five years of age die. Almost all of these deaths are from preventable causes and many could be avoided with the adequate use of evidence-based technology, preventive and therapeutic tools, and cost-effective measures. In the last decade, we have contributed to achievements in women’s and children’s health through field research undertaken to create tools that will lead to better and more effective application of knowledge generated in low and middle income countries.

Main Lines of Research

- Malaria in pregnancy
- Operational research on the acceptability and feasibility of the implementation of a human papillomavirus (HPV) vaccination programme for preadolescent girls in Africa.
- Pharmacovigilance studies of antiretroviral and antimalarial drugs in pregnant women
- Aetiology and risk factors for anaemia in children
- Causes of death in low-income countries
Main Results 2013

- In a study undertaken to describe clinically relevant cytotoxicity phenotypes of \( P. \) \textit{falciparum} parasites expressing specific VAR2CSA variants that have the potential to reach a high parasitaemia in the placenta and eventually increase the risk of poor pregnancy outcomes. The motifs in VAR2CSA associated with high placental parasitaemia in the study may be of relevance to our understanding of the molecular mechanisms that mediate parasite sequestration to host tissues and to the development of new preventive tools against placental malaria (Rovira-Valibona et al, PLoS One, 2013).

- The concentrations of dichlorodiphenyltrichloroethane (DDT) compounds in the cord blood of 214 children born between 2003 and 2006 in Manhiça (Mozambique) were determined. The strongest factor affecting DDT concentration was parity. A well-defined decreasing concentration trend was observed for the cord blood concentrations in the period of study. Children from multiparous women showed much lower concentrations than primiparous women (Manaca et al, Environ Sci Pollut Res Int, 2013).

- Antibody responses to \( P. \) \textit{falciparum} in pregnant women were shown to be affected by variables that influence the risk of exposure to the parasite, such as parity, season and neighbourhood. HIV infection modifies these associations between exposure and antibody responses, probably through its impact on the maintenance of IgG responses (Mayor et al, JID, 2013).

- Women with HIV RNA in breast milk showed a different pattern of microbiological composition, suggesting specific immunopathological phenomena in HIV-infected women. Both breast milk and faecal microbiota composition varied with lactation period. These findings provide insight into interactions between commensal bacteria and HIV infection in human milk and the role of these bacteria in mucosal protection against infections in breastfed infants (Gonzalez et al, Clin Microbiol Infect, 2013).

- Severe malnutrition among hospitalised children in Mozambique was found to be common but frequently undetected despite the association with a high risk of death. Measures to improve the recognition of severe malnutrition by clinicians responsible for the first evaluation of patients at the out-patient level are urgently needed in order to improve the likelihood of survival (Nhampossa et al, Public Health Nutr, 2013).

- In a prospective autopsy study that included all consecutive pregnancy-related deaths in a tertiary referral hospital in Maputo, Mozambique, between October 2002 and December 2006, extensive sampling of all major viscera was performed. Massive visceral sequestration of \( P. \) \textit{falciparum}-infected erythrocytes with significant involvement of the central nervous system was found to be an infrequent but definite direct cause of maternal death in endemic areas of Africa (Castillo et al, J Clin Microbiol, 2013).

- Our findings suggest that severe maternal anemia in the first trimester may be a result of seasonality or secular events (Nhampossa, Am J Trop Med Hy, 2013).

- Among enterotoxigenic \( E. \) coli, the most frequent toxin was STb, and the most frequent colonisation factors (CFs) were CS21, CS6, and CS3 (Rivera et al, J Clin Microbiol, 2013).

- We investigated whether hospitalisation for lower respiratory tract infections (LRTI) associated with rhinovirus during infancy was associated with an increased risk of wheezing. The findings suggest...
that there is a short-term increased risk of wheezing after an initial episode of LRTI with rhinovirus (O’Callaghan-Gordo et al, PLoS one, 2013).

- We analysed the viral load (VL) of human metapneumovirus and human bocavirus in infants aged under 12 months admitted for bronchiolitis. VL correlated with length of hospital stay in both viruses: human metapneumovirus VL correlated with the duration of oxygen therapy and human bocavirus VL correlated inversely with days of respiratory effort before admission (Ricart et al, Pediatr Infect Dis, 2013).

- The Haemophilus influenzae type b (Hib) conjugate vaccine has dramatically reduced invasive Hib disease worldwide. However, data on the vaccine’s efficacy in protecting against pneumonia in children with HIV are limited. The impact of the introduction of Hib conjugate vaccine in 2009 in a rural, high-HIV-prevalence area in Mozambique was evaluated. A considerable reduction in invasive disease and pneumonia following the introduction of the Hib conjugate vaccine in a high-HIV area was observed. Continued surveillance is needed to monitor the long-term effects of Hib conjugate vaccine, particularly among children with HIV (Siguasque et al, J Pediat, 2013).

- In 2012, one oral dose of azithromycin was shown to be as effective as intramuscular penicillin in the treatment of yaws, and the WHO launched a new initiative to eradicate the disease by 2020 (Mirjä et al, Lancet, 2013).

Antibiotic Resistance Initiative

- Multidrug resistance is a problem in the management of tuberculosis (TB), and new regimens that include currently available drugs are urgently needed. Of the various combinations of antimicrobials tested, the levofloxacin/amikacin/ethambutol combination was the most potent against M. tuberculosis multiplying inside macrophages (Rey Jurado et al, Int J Antimicrob Agents, 2013).

- We found high levels of resistance to ampicillin and cotrimoxazole in diarrhoeagenic E. coli in children under five years of age in Lima, Peru. We also found that there is a tendency to overuse antibiotics for diagnosed pharyngitis, bronchospasm and the common cold (Ecker et al, Pediatr, 2013; Rev Peru Med Exp Salud Public, 2013).

- Among 362 Salmonella enterica isolates of non-Typhimurium serotypes isolated in Terres de l’Ebre (Catalonia, Spain), 16.5% showed multidrug resistance (MDR). Overall, 35 isolates (9.2% of all isolates and 54% of MDR isolates) belonging to 15 different serotypes carried class 1 integrons. On investigating the antimicrobial resistance of Shigella sp. causing traveller’s diarrhoea, an increase in nalidixic acid and tetracycline resistance was observed (Pérez-Moreno et al, Int J Med Microbiol, 2013; Pons et al, Travel Med Infect Dis, 2013).

- It has been suggested that efflux pumps are the main mechanism of resistance to rifamycin in E. coli isolates and that efflux pumps play a role in the basal levels and development of azithromycin resistance in S. boydii. The combination of antibiotics and efflux pump inhibitors appears to be a good solution for reducing the frequency of mutation in E. coli and Shigella sp. clinical isolates (Gomes et al, Trans R Soc Trop Med Hyg, 2013; Microb Drug Resist, 2013; Int J Antimicrob Agents, 2103).
Main Lines of Research
- HIV and maternal and child health
- Pathogenesis of acute and early HIV infection
- Community epidemiology studies to inform future HIV-prevention interventions
- Immune reconstitution inflammatory syndrome (IRIS)
- Vaccination response in HIV-infected patients
- HIV testing modalities

Main Results 2013
- The incidence and mortality of immune reconstitution inflammatory syndrome associated with Kaposi sarcoma (KS-IRIS) was found to be higher in sub-Saharan Africa than in the United Kingdom. This was largely explained by the more advanced Kaposi sarcoma disease and lower availability of chemotherapy in Africa. Our findings support the need to continue the progressive scale-up and earlier initiation of antiretroviral drugs, better clinician and patient education to encourage earlier presentation, referral and diagnosis of KS, and high-level advocacy on improving access to optimal chemotherapy in order to decrease the unacceptably high mortality of KS and KS-IRIS in Africa (Letang et al, AIDS, 2013).

- HIV seropositivity is considered a risk factor for complications in hepatitis A virus infection. Factors associated with the immune response to hepatitis A vaccination in HIV-infected patients were described. The findings underscore the importance of identifying strategies that optimise the timing and effectiveness of hepatitis A vaccination in HIV-infected patients and the need for further studies on individual factors, such as sex and hepatitis C co-infection, that may affect the response to vaccination (Mena et al, Vaccine, 2013).
Main Lines of Research

- Migrants’ health and travel medicine
- Leishmaniasis
- Evaluation of vaccination campaigns
- Pathology of premalignant lesions and neoplasias related to human papillomavirus infection

Main Results 2013

- A systematic review of the qualitative literature on TB in migrant populations indicated that immigrants’ knowledge of and attitudes towards TB are largely a result of their previous experiences. The review concluded that in addition to escalating current interventions and increasing monitoring of the incidence and prevalence of TB in immigrant populations, it is crucial to understand immigrants’ perceptions of TB and the specific obstacles they face in accessing the health system, seeking a diagnosis and adhering to a treatment programme (Abarca et al, PLoS One, 2013).

- Improved clinical management and diagnosis of infectious diseases that primarily affect travellers have been proposed for strongyloidiasis (Requena-Méndez et al, PLoS Negl Trop Dis, 2013), refractory giardiasis (Muñoz et al, Travel Med Infect Dis, 2013), schistosomiasis (Muñoz et al, PLoS Negl Trop Dis, 2013) and the neurological complications of dengue virus infection (Carod-Artal et al, Lancet Neurol, 2013).

- We described the case of Japanese encephalitis in Spain (Doti et al, Eurosurveillance, 2013).

- Epidemiological studies on canine leishmaniasis in the Balearic Islands (Alcover et al, Acta Tropica, 2013) and Lleida (Ballart et al, Prev Vet Med, 2013) found an apparent emergence of canine leishmaniasis in Menorca and the presence of an autochthonous focus of canine leishmaniasis in the Pallars Sobirà region of Lleida.
An evaluation of an influenza vaccination campaign among health care workers at a university hospital in Barcelona found that increasing the information provided to health care workers and heightening their risk perception do not necessarily lead to greater acceptance of influenza vaccination (Llupià et al, Am J Infect Control, 2013). In addition, an evaluation of the effect of three vaccination promotion strategies on the intention of medical students to get vaccinated and an analysis of associated factors showed that having done clinical rotations and having received previous influenza vaccinations were independently associated with the intention to get vaccinated. Online promotional campaigns seemed to improve the intention to get vaccinated (Mena et al, BMC Med Educ, 2013).

The pathways of vulvar intraepithelial neoplasia and squamous cell carcinoma were reviewed (del Pino et al, Histopathology, 2013).

It was shown that a negative result or low Viral Load (VL) in the preconisation hr-HPV test is associated with the absence of cervical intraepithelial neoplasia in the loop electrosurgical excision procedure. In addition, patients with a negative preconisation hr-HPV test or a low VL have a low risk of postconisation recurrence (Rodriguez-Manfredi et al, Gynecologic Oncology, 2013).

In a pilot study, intraoperative postconisation (IOP) human papillomavirus (HPV) testing was assessed for early detection of treatment failure in patients with cervical intraepithelial neoplasia. IOP-HPV testing was shown to be feasible and to accurately predict treatment failure in patients with CIN2–3. This new approach may allow the early identification of patients with treatment failure, thereby facilitating the scheduling of less intense follow-up for negative patients who are at very low risk of persistent disease (Torné et al, Gynecologic Oncology, 2013a).

We evaluated transvaginal ultrasound-guided myometrial injection of radiotracer (TUMIR) as a new method for sentinel lymph node (SLN) detection in endometrial cancer. TUMIR was shown to be a safe, feasible method for SLN detection in patients with endometrial cancer. It has a good detection rate and provides representative information on the lymphatic drainage of endometrial cancer (Torné et al, Gynecologic Oncology, 2013b).