Cancer in the sea – integrating approaches to environmental carcinogenesis

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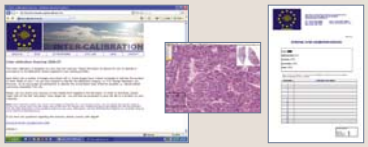
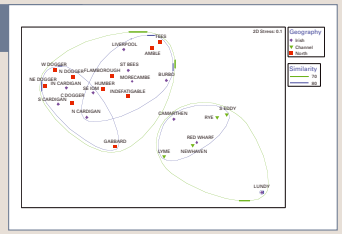
Biological Effects Quality Assurance in Monitoring (BEQUALM)

- Meeting international standards
- Validation of disease data for flatfish
- Annual quality assessments
- Intercalibration exercises
- Data handling for ICES databank



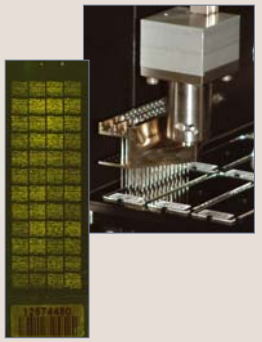
Marine epidemiology

- Multiple diseases recorded
- Disease profiles reflect location
- Stable disease patterns between years



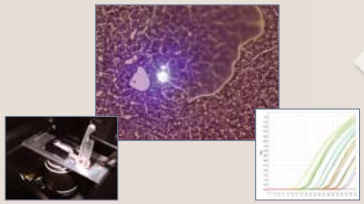
Genomic approaches [b]

- Flatfish 13,270-clone cDNA microarray
- Tumour and non-tumour tissue profiles compared
- Disease specific fingerprints
- Investigating mutations in cancer genes (e.g. Rb) [d]



Laser capture microdissection

- Isolate histological lesions (e.g FCA's)
- High quality RNA extraction
- Integrated into genomics platforms (qPCR and microarray)

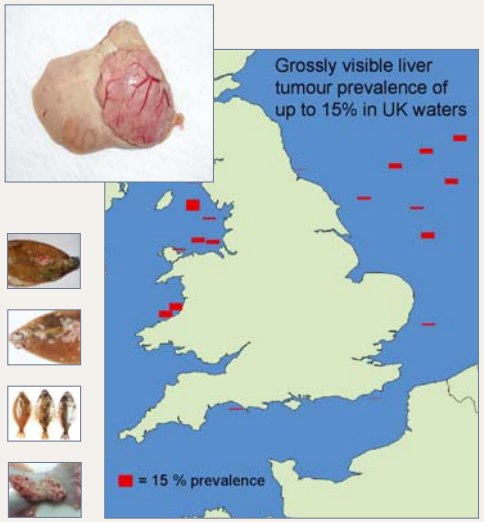


Fish disease monitoring is part of the UK Clean Seas Environmental Monitoring Programme (CSEMP).

Disease measurements integrated with biomarkers (EROD, bile metabolites, DNA adducts) and chemistry.

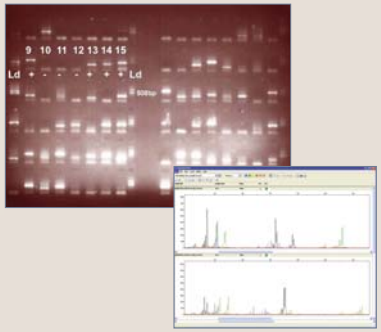
Approximately 5000 fish examined annually for external disease and liver tumours. Histological liver tumour prevalence up to 25% at some sites (15% by gross observation).

Over 20 years of monitoring data available for spatial and temporal trend analysis.



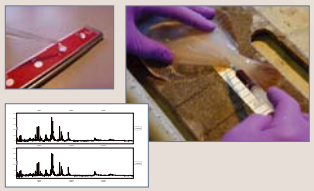
Population genetics [c]

- Microsatellite markers developed
- Examining population structure and connectivity
- Integrated sampling and disease monitoring



Proteomics of tissue and plasma [a]

- Tumour and non-tumour tissue profiles compared
- Discriminatory tissue protein and metabolite profiles
- Plasma from fish with and without liver tumours
- Plasma proteins indicative of cancer status



- Extensive quality assured dataset of diseased and non-diseased samples
- Environmental model for studying hepatocarcinogenesis
- Potential for cancer biomarker discovery and application in aquatic environments
- Need for collaborative approaches (studying genes to populations)

Collaborative partners: [a] Cancer Research UK Institute for Cancer Studies, The University of Birmingham, UK; [b] School of Biosciences, University of Birmingham, UK; [c] Molecular Ecology and Fisheries Genetics Group University of Wales, Bangor, UK; [d] Department of Biology & Environmental Science, University of Sussex, UK.

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